FEBRUARY, 1970

Weed Control Issue

10

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The Cover

"We Kill Noxious Weeds," the sign says, and the jeep is parked on bare ground proof. Custom applicator Robert G. Wright, left, is spraying additional evidence, a check strip showing what the weeds would have been like without treatment. Ed Sorgatz had just checked his records to see what kind of application was used. It was Pramitol, 4 gal., plus Simazine 10#/acre. Sorgatz, field representative for Geigy Agricultural Chemicals Corp., worked with Wright, owner of Precision Spraying, to establish a 23-plot herbicide demonstration on the grounds of Continental Grain Co. at Savage, Minn. Wright and Sorgatz tell their stories beginning on 16 and 17.



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EDITORIAL

Conspiracy of Ignorance

This country faces perhaps the most dangerous threat in history to its existence and future. That threat is a conspiracy of ignorance.

Yes, we've coexisted with ignorance since the beginning of man. Yes, you're smiling and saying: "A little learning is a dangerous thing."

Stop smiling. The truth of that adage is affecting our lives to a shocking and unparalleled degree.

Review the disturbing events of the past decade —drug use, hippy-ism, student rioting, social unrest, political assassinations, wars, and, currently, pollution. Analyze the role of ignorance.

What has made ignorance such a dangerous thing today is a not-so-new ingredient that we've failed to recognize, much less come to deal with. It's the systemic ingredient of instant and mass communication.

Literally, ignorance can be spread in an electronic flash across the world, cloaked in the authority of our mass communication devices.

Ignorance breeds emotion, Sen. Ellender of Louisiana has said. And emotion gets thing done or undone—when all else has failed.

Weed scientists can no longer remain "detached" when untruths and exaggerations—even from colleagues—about pesticides are publicized, said

roll after ro

slab after sla

day after da

Homer LeBaron, outgoing president of the Northeastern Weed Science Society.

Indeed, the "Great Silent Majority" cannot afford to remain silent on any matter that is being distorted, either accidentally or for a purpose.

Emotion unlocked the barn door and our fine thoroughbred, DDT, is gone. Stop screaming about the lost. The door is still open. Be concerned about saving the whole herd.

We shall see a great many pesticide laws go on the books this coming year. Do you plan to "go on about your business" and leave the legislating to others?

Who is the gentleman in your State House who will initiate and mold pesticide legislation?

We suggest you find out who he is now—not after pesticide legislation is processing. In addition to writing him, or calling him on the phone, we'd even suggest your inviting him to spend a day at your business to see first-hand what chemicals you use, why you use them, and how you handle them.

Public relations and public education must be assigned as top priorities for 1970. You can no longer expect government by reason based on fact. Ignorance has become too rampant and agile.

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Here's an Outline to Orient Your New Employees...

WHERE DO YOU begin to explain to a new, untrained employee what he needs to know about herbicides?

Confronting him with most references — voluminous, technical and uninteresting — most likely would impress him only that the material is so dry it should replace the grammar book as the carrier for that mischievous schoolboy book-edge inscription: "In case of flood, stand on this."

What's needed is a quicky orientation that the average employee feels he can master in a few days, or at the most in a few weeks. Given the basic outline, the employee can then build on his knowledge as quickly as he is able or as the job requires.

Such an orientation has been developed by Allen F. Wiese, professor of agronomy, at Texas A&M University. It is used at A&M's annual weed control conference for orientation and review.

Prof. Wiese begins at the very beginning with definitions of the words basic to chemical weed control work. Following is his "Herbicides for Beginners."

WEED: An obnoxious growth, a plant growing where it is not desired.

HERBICIDE: A chemical used for killing or inhibiting the growth of plants.

Herbicide Names

1. Trademark or trade name is the name under which products are advertised and sold. If several manufacturers sell the product, there will be many trade names.

2. Chemical name refers to the name of active ingredients. This will not vary on different companies' labels unless the active ingredient is formulated in a different way. Example: (5-bromo-3-sec-butyl-6-methyluracil).

3. Common name — Short name or abbreviation for the active ingredi-



ent which is accepted by the Weed Science Society of America. *Example:* (bromacil).

Herbicide Labels

Herbicide labels contain the followinformation: (1) Trade name; (2) Chemical name of active ingredient; (3) Concentration of active ingredient (pounds per gallon or percent based on dry weight); (4) Instructions for use. (It is illegal and usually unsafe to use a herbicide for any situation not described on the label.) (5) Safety and use precautions; and (6) Manufacturer and address.

Types of Herbicides

It is impossible to make a rigid classification of herbicides. Each chemical compound that has herbicidal properties has particular characteristics, and as a result, many herbicides would fit into more than one place in any classification. A comprehensive classification would of necessity be based on herbicide chemistry. The following simple herbicide classification is made primarily for people planning to start work in industrial weed control.

1. Foliage Herbicides — Herbicides applied to top growth of plants.

a. Contact herbicides—These herbicides kill plant parts that are covered with spray. The visual effects usually appear within a few hours. There is little if any soil residual.

Examples: Herbicidal oils, dinitrophenols, petrachlorophenol, paraquat, and ammonium sulfamate.

b. Translocated herbicides—Herbicides that are absorbed into plants and move to and kill growing points, such as buds and root tips.

(1) Broadleaf weed killers—The phenoxy herbicides and one substituted benzoic acid are the most common herbicides in this group. These readily translocated herbicides are absorbed through both foliage and roots. At usual rates of application for foliage treatments, soil residual is from 1 to 4 weeks. They kill plants by upsetting the balance between synthesis and utilization of food. Examples: 2,4-D, 2,4,5-T, MCPA,

silvex, 2,4-DB, dicamba (Banvel).

(2) Grass killers—The only herbicide in this group is an aliphatic acid. It is absorbed by foliage and roots and may persist in the soil for 1 to 3 months. It is used as a foliage treatment to control a large variety of annual and perennial grass plants. Usually more than one application is required to control perennials.

Example: dalapon (Dowpon).

2. Soil Sterilants — Herbicides that are applied to and act primarily through the soil.

a. Little soil residual — Soil persistence is usually from 1 to 3 weeks. These chemicals are sometimes referred to as soil fumigants and are very toxic to all forms of plant and animal life including weed seed and fungus spores. They are generally used to fumigate seedbeds for nursery stock and areas such as golfgreens and football fields where weed and disease-free turf needs to be established rapidly.

Examples: methyl bromide, carbon disulfide, and chloropicrin.

b. Long soil residual—These materials usually persist in soil from 1 to 3 years.

(1) Broadleaf weed killers -Herbicides in this group are a benzoic acid, picolinic acid, phenylacetic acid and a benzyloxypropanol. These chemicals kill plants by upsetting internal metabolism similar to the phenoxy herbicides. These herbicides are usually water soluble and leach up to six feet into the soil where they are absorbed by roots. Foliage uptake may occur, but kill of perennial plants is usually by root absorption. High dosages in the soil will prevent growth of both annual grasses and broadleaf weeds. Perennial grasses are not usually killed. These herbicides are used to kill deep rooted perennial broadleaf weeds such as field bindweed.

Examples: 2,3,6-TBA (Benzac 1281, Trysben 200, and Benzabor); picloram (Tordon formulations, and Borolin); fenac (Fenac); and 2,3,6trichlorobenzyloxypropanol (Tritac).

(2) Grass killers—An aliphatic acid, trichloroacetic acid is the only herbicide available in this group. It is very similar to dalapon in chemical structure but differs in two functional characteristics. It has a longer period of soil persistence (three to six months), and is not readily absorbed by foliage. It leaches readily and is absorbed by roots.

Example: TCA (Sodium TCA).

(3) Broadleaf and grass killers —Chemical compounds that are used for general long term soil sterilization are the substituted ureas, substituted triazines, uracils, sodium borates and sodium chlorate.

These herbicides have a range of physical and chemical characteristics, and as a consequence, some of these materials work better under different soil and climatic conditions. In general, they are not absorbed by foliage but are readily absorbed by roots. They do not leach as far into the soil as those herbicides used for perennial broadleaf weed control. As a result, they are not very effective against those weeds.

Most of these herbicides inhibit photosynthesis and death is the result of slow starvation. Germinating annual weeds die as soon as food material in the seed is exhausted. Sodium chlorate upsets respiration and carbohydrate metabolism. Boron is an essential element for plant growth at a few pounds per acre but is highly toxic at higher rates of application. These herbicides are used at low rates to eliminate annual weeds on non-crop sites for 1 or 2 years. If perennial weeds are present, higher rates of application are necessary.

Examples: bromacil (Hyvar X); prometryne (Pramitol); monuron (Telvar); sodium chlorate; diuron (Karmex); sodium borates; and mixtures of these materials.

Herbicide Formulations

Most organic chemicals that are used for herbicides are not soluble in water. Consequently, in order to be useful, they must be prepared for convenient dispensing over the weed or crop. Herbicides must be prepared so that uniform applications of as little as $\frac{1}{2}$ pound per acre can be made. Herbicides have been formulated as solutions, emulsions, wettable powder, granules or pellets and dusts.

A solution is a physical homogeneous mixture of two or more substances. Most water solutions can be seen through easily. Sugar or salt in water and amine salts or 2,4-D form true solutions.

An *emulsion* is formed when one liquid is dispersed with another liquid but the two materials maintain their separate identity. Milk and ester formlations of 2,4-D are common emulsions. These emulsions appear milky and are called the oilin-water type. Small droplets of oil are surrounded by water. These emulsions have the same viscosity as water. In water-in-oil emulsions, small drops of water are surrounded by oil, and viscosity varies.

Wettable powders form suspensions consisting of solid particles dispersed in either oil or water. The proper surfactants must be added in order for wettable powders to stay in suspension.

Where it is not essential that even distribution be obtained, herbicides can be formulated by sticking them to clay *granules* or by actually combining them into *pellets*. Recently, a new type of granule was prepared by sticking soil sterilants to small rock fragments.

In the past, herbicides have been prepared as dusts, much the same as insecticides and fungicides. However, dusts are extremely susceptible to drift and are no longer used.

Herbicide Concentration

Herbicide concentration varies. For example, 2,4-D may be purchased from one to six pounds per gallons. Consequently, it is very important to determine the active ingredient in any herbicide formulation. Two,4-D acid is usually formulated as an amine or an ester to make acceptable spray mixtures. In view of the fact that the acid is the toxic ingredient, 2,4-D, 2,4,5-T and similar herbicides should be carefully check for acid equivalent. If the formulation contains four pounds per gallon, one pound of acid will be contained in each quart. One pint is applied to an acre for a ½ pound per acre application. Liquid formulations are usually made upon basis of liquid volume. Dry formulations are usually measured in dry weight and contain a certain percentage of active ingredient. For instance, Dacthal 50W contains 50% active ingredient. In order to apply six pounds of active ingredient per acre it is necessary to apply 12 pounds of Dacthal 50W.

Herbicide Selectivity

A selective herbicide refers to a chemical that is more toxic to one plant than to another. This difference may be due to many factors and most important are:

Morphological or structural differences—The directed spray takes advantage of a height difference among the weeds and crops. The crop can be missed, because it is taller than the small weeds. Other plants are resistant to herbicides, because they have a waxy coating that will not allow herbicides to penetrate. Weeds on the other hand may be susceptible if they do not have this protection. Grass tends to have upright leaves, and does not intercept as much spray as flat-leafed plants.

Absorption of herbicides—In order to affect a plant, herbicides must enter. Some plant surfaces absorb herbicides easily and other plant surfaces repel herbicides.

Translocation differences — In order for herbicides to be effective, they must not only penetrate into the plant but also move to areas in the plant where they are effective. When herbicides are applied to leaf surfaces, the toxic material is usually transported upward or downward through the phloem. Soil herbicides are usually transported in the water stream in the xylem.

Physiological differences—As herbicides become more specific, physiological differences are accounting for a large part of selective toxicity. Herbicides upset various physiological processes involved in photosynthesis and respiration.

Herbicides in Soil

In order to be effective, herbicides applied to the soil must be at high enough concentration where the weed seeds are germinating to cause death. Frequently, selectivity of soil herbicides is based on the fact that herbicides are in the upper ¼-inch of soil where weed seeds germinate and crop seed are much deeper. If the herbicide is toxic to both weeds and crop, heavy rains may cause crop injury.

Soil type and organic matter will affect herbicide performance. The toxicity of an herbicide is related to the concentration in soil water. Silty clay loam holds about twice as much available water as fine sandy loam. Consequently, the amount of herbicide must be doubled on silty clay loam in order that the available soil water has a comparable concentration of herbicide. As the soil dries, it becomes more difficult for plants to absorb water..

The persistence of herbicides in the soil will be affected by the microbial decomposition, chemical decomposition, adsorption to soil colloids, leaching, volatility and photodecomposition.

Microbial decomposition—Various soil fungi can utilize herbicides, as carbonaceous organic matter for respiration. Anything that affects micro-organism growth usually changes the rate of herbicide decomposition. Herbicides persist much longer under dry and cold conditions than when it is warm and moist.

Chemical decomposition — There are not many chemical herbicides that are susceptible to oxidation, reduction, hydrolysis or hydration. Seasone is hydrolyzed into an active form of 2,4-D when placed in soil.

Adsorption to soil colloids—Herbicides are much like fertilizer and are rendered inactive when they are adsorbed on clay minerals or soil organic matter. Some herbicides are readily adsorbed and others are not. Treflan is highly adsorbed and must be thoroughly mixed in order to be effective. Tordon is very soluble and readily leaches into the soil profile. *Leaching*—The persistence of her-

eaching—ine persistence of her



"It's faultless . . . now change that!"

bicides may be determined by leaching. Herbicides used for perennial weed control must leach into the soil where the weed roots are to be killed.

Volatility — All chemicals have a vapor pressure or have a tendency to evaporate. Evaporation of water is an example of volatility. Herbicides can be lost in the form of volatile gases. In some instances, herbicide volatility can be regulated by formulation. Ester formulations of 2,4-D volatilize easily compared with amine formulations.

Photodecomposition—Many herbicides are decomposed when subjected to ultra violet light from the sun, Monuron, diuron and norea are very susceptible to this type of breakdown.

Drift and Volatility

Most injury to susceptible plants is caused by drift and not volatility.

Spray Drift is the lateral or upward movement of airborne spray particles that occur from the time that the droplets leave the spray jet until hitting the soil or plant surface. The amount of drift depends on (1) the size of droplets (2) amount of wind and (3) the height above the ground that the spray is released. The size of the droplets depend on the spray pressure, the size of the spray orifice and the surface tension of the spray fluid.

In order to minimize drift, sprays should be applied at low pressure (15 to 25 psi) and a high gallonage.

In the last few years several methods of reducing drift have been attempted. The most advertised method has been with invert emulsions. Milk is an "oil-in-water" emulsion with a viscosity like water. Two,4-D esters make this type of emulsion and spray like water. If the emulsion is reversed or inverted to a "water-in-oil," it will be much more viscous and with proper methods can be sprayed in large droplets. Other methods of reducing drift are with shields, placing more nozzles on the boom, and markedly reducing pressure.

Spray Volatility is the tendency of a sprayed material to vaporize or give off fumes after it has hit the soil or plant surface. Volatility, because of the small amount of material involved, can only be a hazard where extremely sensitive crops are nearby. Cotton, for example, is sensitive to as little as 1/1000 lb/A of 2,4-D. Volatility can be controlled only be reducing the chemical's tendency to vaporize.





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By Turney J. Hernandez E. I. du Pont de Nemours & Company

TO INDUSTRY, weeds are more than an eyesore. They are the itch that affects the daily maintenance, efficiency, and safety of operations. Every industry has its own vegetation control needs and problems which are unique to its type of operation. Fortunately, with the variety of safe chemicals and treatments marketed, vegetation control commensurate with this need can be programmed for the customer.

In a nutshell, industrial weed control today is a "prescription science." Programs are prescribed that solve the vegetation problems of many industries classed as industrial markets. This analysis requires an understanding of the customers' problems, a knowledge of the herbicides commonly used and labeled for industrial uses, being conversant on vegetation species and agronomic conditions associated with their growth and the ability to assist the customer to see that the applications are made properly and at the right time.

Type of Control Desired

Methods of vegetation control applicable to various problems in industrial weed and brush control markets in southwestern United States include:

1. Clean ground—The use of soil active herbicides such as "Hyvar" X bromacil weed killer or "Karmex" diuron weed killer at such rates that all plants are controlled for at least one season with continued control possible at about one-half of the rates. Initially it is the most expensive of the weed control treatments, \$100 to \$400 per acre, but each succeeding year costs are markedly reduced. These costs vary due to different areas of the country, rainfall, vegetation species, and soil type.

2. Abatement weed control—Usually a residual type herbicide such as "Hyvar" X bromacil weed killer or "Karmex" at one-third to onehalf of the rates needed for clean ground plus a strong contact or systemic herbicide such as Dalapon or sodium chlorate and a surfactant are combined and applied to control weeds during the peak of the growing season, at a cost of \$75 to \$100 per year in southwestern areas.

3. Selective Weeding in the South —Selective control of tall growing annuals and perennials and their replacement by Bermudagrass shows promise in tests with two to three applications of low rates of "Karmex" (1 to 2½ lbs) or "Hyvar" X (¾ to 1 lb.) plus MSMA or DSMA and a surfactant. Annual cost in areas where the growing season is year-round are about \$75 to \$100 per year.

4. Chemical Trimming — This is an application, on a postemergence basis, of a contact herbicide to knockdown vegetation in areas containing roots of valuable trees where soil active herbicides cannot be used. Costs per application vary from \$25 to \$50 per treated acre because of differences in species length of growing season, rainfall and other factors.

5. Woody Plant Control — Brush can be controlled with summer foliage applications of "Ammate" X weed and brush killer or phenoxy herbicides. Other methods of treatment are dormant cane with phenoxy herbicides and stump and frill treatments with either the phenoxys or "Ammate" X. Soil applications of "Hyvar" X or "Dybar" fenuron weed and brush killer pellets are also effective on many brush species.

The cost of a treatment is determined by the cost of the chemicals, the application availability of water, the accessibility and size of the area to be treated as well as the type of vegetation control desired.

The appropriate chemical to use depends on: (1) degree of control desired or needed, (2) type of vege-

Here's an Estimate Of Weed Control Costs In Long-Season Areas

Railroad beds treated with modern herbicides can be weed and brush free. Yards are cleaner, promoting safety and improved efficiency by maintenance personnel.

tation, (3) equipment at hand, (4) availability of manpower, (5) chemicals required to get the job done.

Technical Support Expected

The industrial customer should expect technical support from his chemical suppliers and custom applicators in the selection of the proper chemical, advice as to correct timing of the application, and assistance in assuring proper application of the treatment.

First, a comprehensive survey of the problem is needed to decide what chemicals to use and what rates to apply. In the course of this survey, climatic conditions should be recorded; soil studied as to type and organic matter content; species, density, and height of vegetation studied; surrounding areas charted; equipment inspected to determine what modifications may be necessary; analysis of the size and proximity of area to be treated; sources of supplies needed for the application; and results the company expects to receive.

Major Market and Problems

It is well established that the degree of control needed by diverse markets varies due to the need and/or economics. Some of the major markets and their problems include:

1. RAILROADS - Treatment of road beds probably represents the greatest return on investment to railroads from the standpoint of protecting their maintenance dollar. For \$50 to \$75 per mile, a railroad can protect a \$2,000 to \$4,000 permile maintenance investment with an effective road bed vegetation control program. This usually involves the use of a residual, a translocated and possibly a contact herbicide applied once or twice during the growing season. Weeds in the ballast section may cause poor drainage of the ballast which is pertinent to the condition and safety of the road bed. Wavy track, faster deterioration of ties, and poor ballast are results of poor track drainage.

Railroads need bare ground under bridges and trestles, on industrial sidings, around signals and switches, and in some storage yards. Dry chemicals as well as sprays are used. Herbicide costs up to \$200 per acre may be requested for bare ground treatments. The major concern is to protect these facilities from fire.

In yards, a chemical treatment that results in clean ground is often desired. Some railroads are satisfied with an abatement program of achieving bare ground over a twoor three-year period. The elimination of fire hazards, reducing employee complaints, and ballast drainage are the major concern here.

Many states now have laws setting standards on vegetation heights at crossings. A selective weeding program to control tall species and promote the development of lowgrowing grasses involving costs up to a maximum of \$100/acre/year, and is usually accomplished with cost in the range of \$50/acre. Mowing costs are greatly reduced.

Right-of-way brush control facilitates inspection during movement of trains at curves, prevents brush from encroaching onto the railroad tracks, and protects communication lines. Costs vary from \$30 to \$60 depending on the geographical location.

Bindweed, Canada thistle, musk thistle, Johnsongrass, bur ragweed, leafy spurge, and Russian knapweed, are classed as noxious by several states. Laws requiring their control have been recorded. All require the use of specific chemicals timed to obtain the optimum control.

Many counties, cities, and municipalities also have laws regulating the height of vegetation to be allowed on the railroad rights-of-way within city limits or in urban areas. Herbicides for trimming and rotary



Utility companies are realizing great savings in manpower and dollars by using herbicides to chemically trim trees and brush along rights-of-way. Here, herbicides are sprayed on foliage adjacent to power lines.

mowing machines are used. Chemicals used must not volatilize and should be applied when atmospheric drift is not a factor. Also, they should be low in toxicity to man and animals. Costs for areas in the Southwest range from \$15 to \$25 per acre.

2. HIGHWAY WEED CONTROL —Increased costs, more road mileage, and decreased availability of manpower to cut weeds demand that chemical methods be used to control vegetation on roadsides. Herbicides are a necessity and their use is now accepted practice in many areas of the country.

The successful and economical highway vegetation control program utilizes both the mechanical and the chemical methods on a well-planned and coordinated basis. The overall objective is to beautify highways with smooth, green turf, free of tall, unsightly weeds.

Conversely, bare ground is desirable in storage yards, at bridge ends, around signs and markers, mailboxes, and under guard rails, and fences. But care must be exercised in the use of soil-active herbicides to prevent erosion problems on steep slopes and damage to roots of desirable trees. Adequate control can be obtained by using reduced rates of soil-active herbicides plus a systemic or contact herbicide and a surfactant, at costs of \$50 to \$75 per treated acre in southwestern states. On road shoulders and medians, an abatement program is usually adequate. In the southern areas this prevents Bermudagrass encroachment and controls annuals and perennials whose root system might cause rapid erosion of the asphalt.

On the rights-of-way, use of selective chemicals and brush control materials may be used to reduce the frequency of mowing and improve highway beautification. Some of these materials may present volatility hazards; therefore, regulations regarding their use must be observed and necessary precautions taken to circumvent damage to valuable off right-of-way property.

Other special treatments employed by various highway departments are: chemical control of poison ivy and poison oak in parks, chemical trimming around trees and shrubbery beds, and interstate fence line control. These treatments can be made chemically at a fraction of the cost of hand cutting.

3. THE PETROLEUM INDUSTRY —Weeds pose serious problems to the petroleum industry. They directly affect the maintenance, efficiency and safety of operations. The enormous cost of petroleum facilities necessitates that weed eradication or prevention be obtained to eliminate fire hazards around storage tanks, processing equipment, valve manifolds, compressors, along rod lines, in pipe yards, in storage areas, at meter settings, and around pipeline markers. Labor rates at the present high levels make hand control uneconomical. So, the use of herbicides is standard procedure.

Many open rights-of-way are still being mowed with rotary cutters. In other areas the use of selective weed control chemicals has been employed with economic success. Experience is proving that this treatment controls woody plants, also. As the undesirable species are controlled and grasses become established, the right-of-way becomes more accessible. Properly maintained, grass cover controls erosion and improves the efficiency of pipeline crews.

The use of a contact herbicide for side trimming of branches encroaching over the rights-of-way is a new practice that seems to offer cost reductions of almost 50% over hand trimming, depending on height of the trees, density and length of limb encroachment. Ammonium sulfamate is widely used because it is nonvolatile, translocates only to a limited degree and is highly safe to man and animals.

4. UTILITY WEED AND BRUSH CONTROL—Trees and brush create operational problems by disrupting or interfering with communication lines. Hand cutting is expensive for utilities. In some areas, rotary cutting is practiced on transmission lines, particularly in areas with flat, wide open rights-of-way which are free of stumps and stones. Most util-











Н F D .

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Bare ground around storage tanks from application of soil active herbicides eliminates fire hazard and boosts maintenance efficiency at petroleum refineries.

ity brush control programs, however, involve the use of mechanical and chemical methods of control, with the chemical applications being made to stands of brush growing in areas where the terrain is not level. The cost of a chemical brush control program to utilities is determined by species, density, accessibility, and height of brush. There are many treatments that are currently being used. Some include:

a. Summer foliage sprays of phenoxy herbicides and "Ammate" X weed and brush killer.

b. Basal Treatment—The application of "Hyvar" X-P bromacil brush killer or "Dybar" fenuron weed and brush killer or Tordon in pellet form at the base of the plant, phenoxy herbicides in oil applied to the stem and base of the plant.

c. Aerial Applications — Usually restricted to areas inaccessible to ground spray equipment.

d. Dormant Cane—Phenoxy herbicide applied to canes of dormant plants in the wintertime in areas where valuable crops make spring or summertime application nonfeasible.

A long-range program might be: a. Initial applications — Summer foliage spray using "Ammate" X in crop areas and the phenoxy herbicide or trichloropicilinic acid in non-crop areas. b. The third or fourth year, treat remaining species with one of the formulations of "Hyvar" or a 4% phenoxy in oil basal treatment.

c. Sixth or seventh year, clean up with pelleted herbicides.

d. Re-treat as necessary on spot basis with pelleted herbicides.

Utilities also have a need for complete control of vegetation in pole yards, substations, storage yards, parking areas, scalping at the base of poles and around pedestals. One application per year usually will suffice.

Side trimming offers considerable promise in reducing maintenance costs. This treatment may only be practical in rural areas and certainly will not eliminate tree trimming. However, where applicable, it could mean substantial savings (up to 50%) to utilities over the hand method.

5. PLANT SITE VEGETATION CONTROL—A better looking plant not only improves community relations but also boosts employee morale. Employees take pride in the plant's appearance and more importantly, may perform their jobs more efficiently. Tall weeds dry in the fall to form serious fire hazards. During summer months they clog ditches, hampering drainage and form mosquito breeding areas. Two methods of vegetation control normally employed on plant sites are



Clean shoulders on modern superhighways are kept weedfree with short-residual herbicides that enable landowners to plan housing or industrial developments without limitation.

bare ground and chemical trimming for control of vegetation growing under fences, around flower beds, along shrubbery borders, along buildings and areas where roots of valuable trees extend. Lawn areas are usually improved and mowed. 6. CITIES, MUNICIPALITIES AND PARKS-The high cost of labor as well as the need for beautiful facilities is sufficient incentive to make management personnel consider the use of herbicides. The use of soil-active herbicides is restricted to storage yards, around the base of telephone poles and signs, in pavement and asphalt cracks, beneath some overpasses and around fire hydrants when such areas are not near root systems of valuable trees.

Selective weeding programs along roadsides and drainage ditches, would maintain the desired degree of vegetation control, encourage the establishment of Bermudagrass to reduce erosion problems and improve the beauty at a cost of onehalf or less of hand programs.

Weed control technicians must assist top management to operate their plants at optimum efficiency with the greatest of safety. It is their responsibility to properly satisfy the customer's needs. Therefore, iong-range vegetation control programs that will do the best job, the safest, at the lowest possible cost must be developed.

Meeting Dates

Dates for this column need to reach the editor's desk by the 10th of the month preceding the date of publication.

- 41st International Turfgrass Conference and Show, Golf Course Superintendents of America, Albert Thomas Convention and Exhibit Center, Houston, Tex., Feb. 8-13.
- **Georgia Weed Control Society** annual meeting, Center for Continuing Education, University of Georgia, Athens, Ga., Feb. 10-11.
- National Arborist Association annual convention, Del Webb's Towne House, Phoenix, Ariz., Feb. 13-19.
- **Regional Lawn and Garden Retailers Day** sponsored by the University of Connecticut and New York State Cooperative Extension, Holiday Inn, Route 84, Fishkill, New York, Feb. 18.
- Pennsylvania-Delaware Chapter, International Shade Tree Conference 5th annual shade tree symposium, Marriott Motor Hotel, City Line and Monument avenues, Philadelphia, Feb. 20-21.

- 14th Annual Ohio Garden and Flower Show, Ohio State Expositions Center in Columbus, Feb. 28 through Mar. 8.
- Southern Chapter, International Shade Tree Conference, Hampshire Motor Inn, 7411 New Hampshire Ave., Langley Park, Md. Mar. 1-4.
- **University of Massachusetts** Annual Fine Turf Conference at Highpoint Motor Inn in Chicopee, Mass., Mar. 4-6.
- 36th Annual Turfgrass Conference, Iowa Golf Course Superintendents Association, Roosevelt Motor Hotel, Cedar Rapids, Mar. 9-11.
- North Carolina State University Turfgrass Conference, Faculty Club at NCSU, Mar. 10-11.
- Western Society of Weed Science annual meeting, Sacramento Inn, Sacramento, Calif., Mar. 17-19.
- **University of Maine** Mid-Winter Turf Conference, Steer Inn Motor Lodge, Rte. 1, Maine Turnpike Exit No. 7, South Portland, Me., Mar. 18-19.

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If so, notify our circulation department right away to be certain the magazine reaches you at your new location. The Post Office won't forward your copies. So when you write us, make it at least three weeks in advance of your moving date, and include your old address, as well as the new one. We'll see you don't miss a single issue.

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Applicator Bob Wright Tells How He Tries To Make a Profit

By ROBERT G. WRIGHT, Owner Precision Spraying Wayzata, Minn.

A QUARTER-CENTURY as an independent custom applicator has taught me many lessons; a few bitter, many sweet.

Having made my share of mistakes, I consider myself an authority on what *not* to do, and reasonably knowledgeable on some things to do.

Considering there are more than 600 chemical compounds that are used in excess of 60,000 pest control formulations, it's small wonder there are thousands of textbooks, fact sheets, technical bulletins and magazine articles covering the subject.

My thoughts for this article, however, stray from any technical or scientific endeavor. They pertain, rather, to the pleasant but sometimes difficult chore of making money as a custom applicator.

Profit Factors

The most important factors involved in squeezing out some profit, in my opinion, are: Diversity, advertising, pricing, and quality control. Let's look at diversity.

As dependent as we are upon weather conditions, with such brief periods in which to work each season, with further limitations by pest life cycles . . . it's vital that we chase more than dandelions.

Our season begins with early dormant spraying of ornamentals and shade trees. Once frost is out of the ground, non-selective vegetation control—or the so-called soil sterilization—activities begin. Because this work may be stopped by wind or rain, we do considerable fertilizing of turf, shrubs and trees. We prefer granular applications of slowrelease fertilizers. We also make liquid applications, that can be done in almost any kind of weather, utilizing our hydraulic spraying equipment.

At about the same time—but extending into early cover spraying of trees and shrubs—we do battle with crabgrass. This activity also can be conducted in bad weather because neither wind nor rain affect the efficiency of the chemicals used.

Broadleaf weed control comes on strong next. Before this is over, we're knee-deep in spraying for disease and insect control of deciduous trees and mite control on evergreens.

During late summer and fall, broadleaf weed control and nonselective vegetation control resumes. In late fall, we're fertilizing everything in sight.

For good measure, we dabble in the bat, bee and flea business!

Advertising

I'm not about to offer a short (Continued on page 20)

Robert Wright, left, owner of Precision Spraying, Wayzata, Minn., and Ed Sorgatz, field representative for Geigy Agricultural Chemicals Corp., consult the layout of a herbicide demonstration at the Savage, Minn., facilities of Continental Grain Company. Twentythree plots are under test, and will be reviewed at a public clinic and tour in June.



Geigy Uses 'Maxi-Plot' To Introduce Herbicides

By ED SORGATZ Field Representative Geigy Agricultural Chemicals Corp.

FANTASTIC potential exists in the industrial weed control business. Our question was: How could this potential be developed?

With seven triazine herbicides, our company felt it had one of the most versatile and effective lines of soil sterilants for industrial weed control. Yet sales of these products had been small in the Minneapolis-St. Paul area relative to the acreage that should be treated.

One primary reason was that we had been involved in a rather explosive corn herbicide market in the Midwest. Most of our effort had gone in this direction. As this market matured and solidified, we turned more attention to industrial weed control.

Introduction of our products to potential users in the Twin Cities area became a major objective for 1969. With hundreds of potential users,

individual calls were not feasible.

We decided the greatest number of people could be reached in the least amount of time by establishing a large-scale industrial weed control demonstration. We planned to follow through with an industrial weed control clinic and tour of the plots.

Custom chemical applicator Bob Wright, owner of Precision Spraying, Wayzata, Minn., was consulted for advice on locating the demonstration. He selected a site that exhibited characteristics that would test the maximum capability of ours and competitive companies' products.



The site was the Continental Grain Company in the Minneapolis suburb of Savage.

Testing Criteria

Working with Wright, these criteria were set up for establishing and spraying the plots:

1. Wright would spray all plots with the same equipment and in the same manner he used on any similar commercial job.

2. All plots would be at least 1/8 acre with the exception of a few smaller plots where our research department wanted to test some new pellet formulations.

3. Chemical cost/acre would be kept in the \$45-\$60-per-acre range.

4. Major competitive products (duPont, Amchem and Niagra) would be tested also.

5. Applications were to begin in the fall of 1968, and continue with pre-emergence and post-emergence treatment in the spring of 1969.

Continental Grain Company property provided an excellent test because of the weed control problems that would be encountered.

First, we had about 20 species of weeds to deal with. Secondly, the organic matter content of the soil and railroad track ballast was extremely high because of the continuous rain of grain chaff that is normal for this type of facility. Thirdly, we had to contend with the constant track spillage from railcars loading and unloading.

Fall applications were made on Nov. 11, 1968, on about two acres.

Unexpected Obstacle

Mother Nature deposited an unexpected and major obstacle upon the test during the winter and spring. Winter brought record snowfall. Continental is siutated near the banks of the Minnesota River. When the record snowfall melted, most of our plots were inundated with six feet of water. Only areas close to the elevator that had been diked remained dry.

Most of our fall work was destroyed, but we did make at least one interesting discovery. Our Pramitol 25E, though flooded, did not have to be retreated.

Pramitol 25E, a relatively soluble liquid herbicide, is formulated to control both deep-rooted and shal-

A check plot tells the real story of just how effective the various herbicide combinations were. The picture above covers all or portions of Areas 17 through 21. Refer to the sketch and key on the facing page to determine what herbicides were used. low-rooted weed species. Whereas other herbicides either on or very close to the surface of the soil washed away, Pramitol 25E apparently moved into the soil far enough to give weed control all summer.

At the time the fall plots were retreated, on May 27, 1969, the spring pre-emergence treatments were also made. These encompassed about two more acres. Post-emergence treatments on another acre were made on June 10, 1969.

Clinic and Tour

Sixty persons came to a clinic and tour in late June. Guests included representatives from the oil and gas industries, lumber industry, state and county highway departments, city park and health departments, state agronomy services, and others.

This broad cross-section of guests gave us a variety of answers to the question: What is your weed problem? The clinic confirmed our belief that tremendous potential exists in industrial weed control.

After a noon luncheon, guests were given sketch maps of the demonstration site, and a tour of Continental Grain property was conducted.

Just about all of the applications were giving good weed control at the time of the tour. Guests were invited to tour the plots again at any time in the future.

Most treatments looked good throughout the summer of 1969. But the true test of the residual capabilities of these herbicides will be disclosed in the coming spring and summer. By this time, all the chemicals will have been down at least a year.

Second Clinic Planned

A second clinic and evaluation tour is scheduled for June 22, 1970. The clinic will convene at 10:30 a.m. at the Burnsville Bowl, two miles east of the junction of Interstate 35W and Highway 33.

Hopefully, a reading on the plots at that time can be passed on to the readers of WEEDS TREES and TURF magazine.

We feel the plot, clinic and tour have been successful. Hopefully, when the residual capacities of all the products can be observed next June, we will accomplish the true objectives of our efforts—to show the potential customer an excellent group of industrial weed control products manufactured by Geigy and compared with competitive products.



Grain spillage from truck and rail traffic complicated the weed control problem.



KEY TO INDUSTRIAL WEED CONTROL PLOTS

Area No. 1 — Small scale granular herbicide research plot contains 20 different applications. Applied 11-20-68.

2. Amchem's Fenamine, 5 gal./acre, sprayed 11-20-68.

3. Sprayed 11-20-68 with Atrazine and Simazine. 10# plus 10#/acre; flooded in spring, did not hold; resprayed 5-27-69 with 5# Atrazine and 4 gal. crop oil/acre.

4. Sprayed 11-20-68 in three strips, western tracks with 20# Atrazine/acre, middle tracks with Amchem's 68-5, 10-gal./acre, eastern tracks with Simazine 20#/acre, flooded in spring, did not hold. Resprayed 5-27-69 with 5# Atrazine and 4 gal. crop oil/acre.

5. Sprayed 11-20-68 with Pramitol, 10 gal./ acre south area outside dike flooded. North unflooded. Nothing resprayed.

6. Sprayed 11-20-68 with Fenamine, 5 gal./acre.

7. Sprayed 5-27-69 with 6# Simazine 80W plus 6# Hyvar X plus 6 gal. crop oil/acre.

8. Sprayed 11-20-68 with Pramitol 25E, 8 gal./acre.

9. Sprayed 11-20-68, Pramitol 4 gal. plus Simazine 10#/acre.

10. Sprayed 11-20-68, Atrazine 10# plus Simazine 10#/acre. 11. Sprayed 11-20-68, with Fenamine 5 gal./acre not flooded. Resprayed 5-27-69 with Pramitol, 4 gal./acre.

12. Sprayed 11-20-68, Pramitol 4 gal. plus Simazine 10#/acre.

13. Sprayed 11-20-68. Atrazine 10# plus Simazine 10#/acre.

14. Sprayed 6-11-69 with Pramitol, 8 gal. plus Dacamine 4# plus 4 gal. crop oil/acre.

15. Sprayed 6-11-69, Niagra's Tandex, 10# Dacamine 4#/acre.

16. Sprayed 5-27-69. Simazine 20# plus Dacamine 4#/acre.

17. Sprayed 5-27-69, Atrazine 20# plus Dacamine 4#/acre.

18. Sprayed 5-27-69, Pramitol 8 gal. plus Dacamine 4#/acre.

19. Sprayed 5-27-69, Telvar, 25# plus Dacamine 4#/acre.

20. Sprayed 5-27-69, Hyvar X, 10# plus Dacamine 4#/acre.

21. Sprayed 5-27-69, Hyvar X 10# plus Dacamine 4#/acre.

22. Number skipped.

23. Sprayed 6-11-69, Pramitol 25E, 8 gal. plus Dacamine 4# plus one pint Surfol surfactant/acre.

Custom Applicator Bob Wright

(Continued from page 16)

course in advertising—rather, just a few merchandising hints that have proved beneficial.

1. Use sharp looking, clean equipment. Put a brief advertising message on your vehicles.

2. Even if business is so good you can't handle another job, keep advertising. You may be able to shrink your trade area. None of us makes a dime driving down the street.

3. Try various advertising media and then ask each customer why he selected your firm. You'll soon learn where best to spend that important advertising dollar.

Pricing

Pricing the job can be tough—and costly. A printed price schedule on every service offered is wise. List unit prices for broadleaf weed control, soil sterilization, crabgrass control, fertilizing, and so on. Our unit prices decrease as the size of the job increases.

On each job, we count, measure or pace the units in question. We check the price list and quote the total cost. This method is fair to all customers, and is the equivalent of hanging a price tag on our merchandise. This minimizes guess-work, argument and second-guessing the next time the customer calls.

We don't pass these price lists to our customers, but our local competitor is welcome to a copy. We want him to charge as much as we do!

Quality Control

With those 600 chemical compounds and 60,000 formulations plus the custom applicator's ability to create an infinite number of his own formulations, quality control has to be a complex—if not bewildering aspect of our business.

Obviously, we've got to know quite a bit about the materials we work with. Chemical houses, salesmen, technical bulletins, etc., are all very helpful. But the fact remains that the results you obtain with the local conditions you encounter with your equipment using your methods of application play a vital role in determining the quality of your work.

The Continental Caper

Two years ago, Ed Sorgatz of Geigy Agricultural Chemicals Corporation asked if we would be interested in putting out some test plots of his company's non-selective herbicides.

Upon learning that he was thinking of a truly large-plot test to be applied under field conditions, I jumped at the chance. As Ed's description of this project indicates, this demonstration was no 100-sq. ft. scientifically controlled show piece to prove that a product could kill vegetation.

The site selected was that of one of our customers who had a genuine problem. We didn't wait for ideal working or weather conditions. In fact, the first applications came late in the year, and it was snowing. Organic matter was piled here and there. There were a number of boxcars on the trackage to be treated.

This job was handled as though it were another day's work in the life of a custom applicator. We covered the several acres working rapidly with both booms and hand guns. We measured our chemicals carefully and watched our rates per acre. Simply routine. We tried various rates with many different chemicals. We followed up at different seasons with additional formulations.

The Crux of the Plot

To me, the most important benefit of the demonstration is this:

We've gone back many times to inspect our handiwork. Ed knows, I know, and the many interested people who came to the field day know the effectiveness of the materials we used.

At those times of year, using those chemicals, with those soil conditions, with *those* weeds and *those* methods of application, we obtained *specific* results. The results are varied—but they're there!

The very same plots established in an arid portion of the West Coast or anywhere else, for that matter would have produced different results.

As sound as the advice might be from your county agent, from the Department of Agriculture, university, or chemical salesman, that advice necessarily must be general in nature to cover maximum conditions.

Each case of pest control, however, is unique. As an oldtimer once told me: "Circumstances alter cases."

I don't mean custom applicators should become a bunch of "mad scientists" experimenting wildly. To quote another oldtimer, offended at my mixing 2,4-D with 2,4,5-T instead of buying his pre-mixed brush killer: "Remember, Bob, you're an applicator, not a fabricator."

Seriously, don't do anything with chemicals that could conceivably be harmful to any living thing you don't wish to destroy. Don't ever use any material not on the recommended list and for its intended purpose.

In the hundreds of times I've used such a common material as lowvolatile 2,4-D, I'm always fascinated by the results.

I inspect as many of our jobs as I possibly can. Occasionally, these inspections prompt me to drop a chemical or change its exact formulation, or make some other modification.

If we all would inspect as many of our jobs as humanly possible, we would accomplish many things. Sometimes, we would be able to go to a less expensive chemical. We would retain more old customers and make new ones. We certainly would improve our quality. Emphatically, we would make more money! Here are some close looks at Wright's spray equipment. His spray unit is made by the Minnesota-Wanner Company and is powered by a 9 h.p. Briggs Stratton engine. His pump is rated at 20 gpm at 1,000 psi. The lower pictures show what kind of spray pattern he gets from his broadcast tip. His jeep units are equipped to do either hand or boom work. The picture at right shows the value of a "frontview" mirror. From the driver's seat, Wright can watch the operation of the frontmounted boom, noting stoppages immediately. Without the mirror, Wright, said, it would be possible to travel quite a distance without knowing no herbicide was being applied.











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(Treflan^(R)—trifluralin, Elanco) (Dymid^(R)—diphenamid, Elanco) Elanco's dependable weed-control crew.



Preliminary rough grading of the Graeagle Meadows golf course greens and tees involved spreading fir bark four inches deep over a 14-inch layer of washed sand. The bark replaces peat.

California



The sand-bark process calls for rotovating the sand a bark to a two-to-one mixture for a depth of eight inche The construction method was developed by landscape arch tect Ellis Van Gorder.

Course Builds Sand/Bark Greens And Tees



Harvey West, Jr. (right), developer of Graeagle, a vacation and retirement home community in Plumas County, California, discusses the sand-bark turf construction method with Carl Dell Aquila, contour grader. **GRAEAGLE** Meadows, a recently completed 6,700-yard, 18-hole championship golf course in the heart of the Sierras in Graeagle, Calif., boasts a new method of tee and green construction.

Ellis Van Gorder, golf course architect, who designed the course, which averages 4,800 feet above sea level, calls the process "Sand and Bark" construction. The process is unique, he says, because fir bark "fines" are used in place of conventional peat.

According to Van Gorder, the process is faster and saves labor costs. The technique results in a more uniform surface, makes possible more even mixing of ingredients, and because of the product's excellent water retention value, results in more uniform seed germination. Because the bark is weed-free, the customary maintenance problem is almost completely eliminated.

Although Van Gorder has used the method before on such projects as Makaba Golf Course in Hawaii, and Peacock Gap Golf Course in San Rafael, Calif., he said the technique is not well-known.

"Primary shaping and contouring is done using existing soil," Van Gorder explained. "Normal care is given to promote proper drainage to avoid impounding water areas. Clean sharp sand is then laid on to a depth of 14" and rough-graded to the specifications of each putting surface. If an overabundance of silt is present, then washed sand would be desirable. A 4" layer of $\frac{3}{8}$ " fine fir bark is then spread over the entire putting surface. This is done with a conventional scraper and rough-graded again to the contour of the final green.

"The combination of bark and sand is then rotovated to a depth of 8" using extreme care to get a uniform mix. Each 4,500-square-foot green requires about 70 yards of bark. After rotovating, the surface is tractor-graded and rolled to final contour, then raked and dragged by hand to the final putting surface.

"Greens are then seeded $2\frac{1}{2}$ pounds per thousand square fee, with a high-grade, weed-free seed mixed with a 10-10-10 combination of fertilizer (10 lbs. per thousand square feet) and 20 pounds of milorganite.

"The area is rolled again then kept moist during the entire germination process, from 14 to 21 days, depending on climate and atmosphere."

Van Gorder emphasized one advantage of fir bark at this stage. Because of the material's inherent water retention, he noted, bark is easier to keep moist, requiring fewer hours of watering. Because of the texture and bulk of the bark, compacting does not occur until well into the germination period. Although Graeagle has an ample and economical supply of water, this feature is particularly important in areas where water is expensive or in short supply.

Carl DellAquila, contour landscape grader, who has engineered such projects as the Palo Alto Muni Golf Course, Peacock Gap Country Club and Palo Alto Hills Golf Club, and the contour grader at Graeagle Meadows, cited some side ben-



ing is accomplished with this equipment. The 18-hole mpionship golf course winds around a natural pine to est at an elevation of 4,800 feet.



Just prior to seeding, the greens and tees are hand-raked. Note the even texture and uniform pattern, a condition difficult to obtain with peat-type products.

efits on the sand-bark process. "One obvious benefit" he said, "is that we can tractor-grade the bark throughout the entire process. With peat, it's strictly 'by hand.' Peat bunches up under the blade and it's almost impossible to get a uniform texture unless you mix and fill completely by hand, through 'off site' mixing method. "This sandbark method obviously saves time but it also gives a better surface with less raking and dragging by hand."

While bark used at Graeagle was obtained locally at the Feather River Lumber Company, in Loyalton, Calif., the company plans to market the product nationwide, in both bag and bulk quantities. It will be handled through the special products division of the R. F. Nikkel Lumber Company, Sacramento, Calif. Nikkel also plans to market a line of bagged "decorative" fir bark products for sale through retail outlets and nurseries.



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SOD INDUSTRY SECTION



A new variety of Colonial Bentgrass reported to be as easily managed as bluegrasses is being introduced for golf course use by Northrup, King & Co.

Called HOLFIOR Bentgrass, the new variety has been undergoing tests by Northrup King since 1956 and is said to produce a turf of uniform color and texture over the entire fairway. It is recommended also for use on aprons and tees, but not on greens.

According to Howard Kaerwer, chief turf agronomist at Northrup King, HOLFIOR produces plants of leafy, dense and upright growth that do not segregate for color, texture, leaf width or growth characteristics. Golfers reportedly like the firm, upright support it gives the ball. HOLFIOR thrives with only the moderate amounts of fertilization and irrigation required by bluegrasses. Intensive disease control measures are needed infrequently; it is resistant to snow mold and only moderately susceptible to Dollarspot.

Said to be the fastest-establishing bentgrass available, HOLFIOR also mows clean without matting or tufting. It can be mowed at any height from $\frac{1}{4}$ " to $1\frac{3}{4}$ ".

HOLFIOR adapts well to varying conditions of soil and moisture, and is compatible with the new short-cut bluegrasses (Prato, Fylking, Pennstar). For more details, circle (713) on reply card.

Tell 'em How to Grow YOUR Sod

By Gene Ingalsbe

A purchaser of cultivated sod should get an "owner's manual."

Let's think about it.

Suppose you bought an automobile, tractor, or major appliance and weren't provided an owner's manual covering maintenance and operating instructions. The first time something went wrong and you didn't know why or didn't know what to do, who would you blame? The manufacturer, of course.

Isn't it possible that the reaction may be the same when the product is sod? How many times have you had to replace sod when you knew your product wasn't at fault?

Turf specialists know that it's as easy to burn up a lawn as it is to burn up an engine; that a lawn can become as "sluggish" through improper fertilization, watering and

AMERICAN SOD PRODUCERS ASSOCIATION invites your participation

If you are a Sod Grower you should be a member of ASPA.

Keep in touch with progress. Allied Industries are welcome. mowing, through weed infestation, or disease as can an engine without proper maintenance.

Most cultivated sod is near perfect upon delivery. It just makes sense that the longer the sod remains that way, the longer the customer is going to be satisfied with the product. So wouldn't it be good business to tell the purchaser of your product how to keep it in "showroom" shape?

You know better than anyone else how to take care of that sod you grew. Most recommendations on turf care are necessarily general. Since sod is usually marketed within a 100-mile radius of where it is grown, you can provide the most precise information on how to care for it.

Where would you begin? Well, as a homeowner, here's what I would like to know:

1. Soil Preparation. What steps should be taken to prepare the ground for receiving the sod? Should I attempt to eliminate weeds, cultivate, fertilize?

2. Breaking-In Instructions. Exactly how should I water the new sod? When should I first mow it? What height? When should I first fertilize?

3. Mowing Instructions. How can mowing practices affect the health of my lawn? When should I mow? What height? How often? What do I do if I scalp a spot?

4. Fertilization. Give me a yeararound program to follow.

5. Disease. Tell me what disease my sod is most susceptible to, when disease is most likely to occur, what the symptoms are, what curative measures I can take.

6. Weeds. What weeds are most likely to crop up? When? What weed killers are available to correct the problem? How do I apply the weed killers and at what rates?

7. Watering. How can watering practices affect the health of my lawn? When should I water? How much?

Instructions of this nature can be as detailed as the producer of the turf wishes. He could provide specific maintenance instructions for each variety he sells. The format might be simply an instructional leaflet, or a more complete, polished booklet that could double as a merchandising tool.

Dr. Henry Indyk, executive secretary of the American Sod Producers Association, predicts that the sod industry will continue to expand, but that demand may have to be cultivated. A grower will stay in the business only if he keeps up to date, he believes.

Success of some of the newer sod varieties may very well be determined by how well informed the buyer is concerning its maintenance. If not for this reason, then competition alone may produce a turf owner's manual.



"You've got weeds in your turf, Harry."

Try These Tips on Using Dicamba and Mecoprop

Broadleaf weeds in turf ought to be as archaic as the Model T Ford, exclaimed Dr. Edward W. Stroube at the recent Ohio Turfgrass Conference.

Good turf management practices should all but eliminate weeds, said the Ohio State agronomist, but should some appear, there's a herbicide to quickly take care of the culprit. Uniform and timely applications are necessary, however.

"Most weeds are more susceptible when there is good soil moisture and when the weeds are growing rapidly," he said. "They become more resistant when they become semidormant due to dry soil or as they approach maturity."

Herbicides recommended for broadleaf weed control are intended for turf areas only, Dr. Stroube reminded. Indiscriminate use can bring injury to flowers, trees, ornamentals and gardens. He advised that, if sprayed, the compounds should be applied at low pressure and during periods of little or no wind.

"Dicamba (Banvel) should not be used under desirable plantings, as root absorption by these plants may result in injury," he warned.

Herbicides should not be used on newly seeded turf unless weeds pose a greater danger, Dr. Stroube said. It has been reported, he added, that the relatively new herbicide, bromoxynil, is safe to use on seedling broadleaf weeds in newly established turf.

For states with climate similar to Ohio's, Dr. Stroube offers his recommendations in Table 1 for controlling some of the more common weeds that appear in turf.

Lee Record, agronomist for the United States Golf Association offered advice on using the systemic herbicides, Dicamba and Mecoprop (MCPP).

The two will effectively control knotweed, clover, common chickweed and mouse ear chickwood. Formulated with 2,4-D, they will control dandelion, plantain and pigweed.

Systemic herbicides make use of

physiological differences of plants for selectivity, Record explained. Dicamba and Mecoprop applied to leaves penetrate the cuticle and stomata, translocating to the food or water conducting tissue and then to other parts of the plant.

Pattern of translocation is influenced by the kind and stage and growth of the plant, Record said.

"Sometimes, the herbicide is absorbed and inactivated by cells in the leaf," he said, "and sometimes it may remain on the leaf surface and never enter the plant."

Soil relationships to the herbicide, temperature and moisture have been



"The Pioneer in Foliar Feeding"

Honored by American Horticultural Council "for demonstrating in a practical way that plants could be fertilized through their leaves; for being the first to develop and market an effective plant food for foliar feeding; and for opening the way to a new cultural practice in horticulture."



For More Details Circle (105) on Reply Card

recognized as important factors in the effectiveness of weed control programs, he said.

"Optimum conditions for weed control when using Dicamba and Mecoprop would be to have adequate soil moisture and temperatures between 70 and 75 degrees.

"We have seen on numerous occasion the importance of having adequate water as a carrier for Dicamba or Mecoprop. One-half to threequarters pound of actual material applied in 40 to 50 gallons of water per acre will give excellent results.

"The same rate of actual material in 20 gallons of water per acre will give very poor results.

"We have found that Dicamba and Mecoprop have a wide margin of safety when used intelligently. Repeated applications from year to year, on the other hand, have shown thinning of bentgrass and bluegrass. Complete kill has been noted on turf when herbicides were misused."

Weed	Annual or Perennial	to Use Chemical	Time of Application	Degree of Control
Black medic	annual	silvex or dicamba	early spring	good
Chickweed, common	annual	silvex, MCPP or dicamba	spring or fall	good
Chickweed, mouse ear	perennial	silvex, MCPP or dicamba	spring or fall	good
Chicory	perennial	2,4-D or silvex	spring	good
Dandelion	perennial	2,4-D or MCPP	spring or fall	good
Dock, curly	perennial	2,4-D or dicamba	spring or fall	good
Garlic or onion	perennial	2,4-D ester or dicamba	early spring late fall	fair
Ground Ivy	perennial	silvex or MCPP	spring, sum- mer or fall	fair to good
Heal-all	perennial	2,4-D	spring	good
Henbit	annual	silvex .	spring	good
Knotweed	annual	2,4-D or MCPP	spring	fair
Mallow, roundleaf	annual	silvex	spring	fair
Plantain, buckhorn	perennial	2,4-D or MCPP	spring or fall	good
Plantain, common	perennial	2,4-D or MCPP	spring or fall	good
Poison ivy	perennial	2,4,5-T or silvex	spring or summer	good
Red sorrel	perennial	dicamba	spring, sum- mer or fall	good
Speedwell, thyme- leaved	perennial	dicamba or endothall	spring or fall	fair
Speedwell, annual	annual	dicamba or endothall	spring or fall	fair to good
Spurge, spotted	annual	silvex or dicamba	spring	good
Thistle	perennial or biennial	2,4-D or dicamba	spring or fall	fair to good
White clover	perennial	silvex, MCPP	spring, sum- mer or fall	good
Wood sorrel	annual	silvex or dicamba	spring	fair to good
Yarrow	perennial	dicamba	spring or fall	fair to

World Pesticide Symposium Set at MSU for Feb. 25-27

Six hundred of the world's top researchers will convene for a pesticide symposium and the dedication of Michigan State University's Pesticide Research Center, Feb. 25-27, at East Lansing.

Speakers and topics have been confirmed for the "Symposium on Pesticides in Soil: Ecology, Degradation and Movement," according to Dr. Gordon E. Guyer, chairman of MSU's entomology department and director of the Pesticide Research Center.

The symposium will be keynoted by J. Van der Drift, soil biologist from the Netherlands and summarized by Dr. L. J. Audus of the University of London.

Presenting research papers during the meeting will be scientists from Germany, Canada, England and the United States.

A tour of MSU's new Pesticide Research Center will be conducted Thursday afternoon, Feb. 26, and the center will be officially dedicated that evening.

"The symposium is built around this interdisciplinary approach to research," said Dr. Guyer. "Scientists will report on the effects of pesticides on our environment and the latest efforts to reduce pesticide residues."

Central Chemical Forms Turf Products Division

Central Chemical Corporation, Hagerstown, Md., has formed a turf products division.

President Franklin M. Thomas, Jr., said the new division's purpose will be to serve the turfgrass industry with selected fertilizers, chemicals and specialties.

George Cassel has been named division manager. Headquarters will be at Central Chemical's Everett, Pa., offices. Cassel, a Penn State graduate, is a 19-year employee in the company's agricultural group.

James M. Edgar, who has been associated with the golf industry, has been hired as the division's first sales specialist.

MARCH : IRRIGATION ISSUE

Florida, Michigan Leading In Golf Course Construction

With the picture ever-changing, there were at year's end 439 golf facilities under construction throughout the country, reports Harry Eckhoff, facility development consultant for the National Golf Foundation.

Eckhoff authored the golf industry outlook for the coming year in the December issue.

Of the new facilities, Eckhoff reported, 381 are regulation courses and 58 are par threes and executive type.

States leading in new golf course construction are: Florida, 30; Michigan, 25; Illinois and Pennsylvania, each 21; California and Ohio, each 20; North Carolina, 19; Tennessee and Texas, each 18; Virginia, 16; New York, 15; Washington and Indiana, each 14; and Georgia, 12.

Prolonged tight money has brought some changes into financing of golf projects, said Eckhoff. "Many private clubs are selling long-term interest-bearing bonds to their members," he said. "Small syndicates are being created to finance profitmotive golf courses. Some projects are obtaining legal authority to sell stocks on the open market."



Bill Byers, right, president of the Iowa Golf Course Superintendents Association, presents a check for turfgrass research to Floyd Andre, dean of agriculture, Iowa State University. Looking on, from the left, are Ed Cott, ISU Extension horticulturist and turfgrass specialist; and Dr. J. P. Mahlstede, associate dean of agriculture. The Iowa GCSA has given ISU a research grant annually since 1941.

An example of the stock venture, Eckhoff reported, is the 18-hole Trent Jones designed Golden Triangle Golf Course planned for the 170-acre Johns Hopkins Estate between Baltimore, Md., and Washington, D.C.

Stock offering for this one is under way, according to Carl Rasnic, former PGA Middle Atlantic Section president and now president of Golden Triangle.

A stock offering of four million shares, Eckhoff said, has been announced by American Family Recreation Centers, Inc., of Annapolis. Proceeds will be used to build yearround resorts, including golf courses, motels, travel-trailer parks, swimming pools and other facilities. They'll be located between Kentucky and Florida adjacent to Interstate 75 and from Virginia to Florida adjacent to Interstate 95.

The first two resort sites, Eckhoff continued, are planned (each at a cost of about \$8 million) just south of Atlanta and in the Orlando, Fla., area.

Insect Report

WTT's compilation of insect problems occurring in turfgrasses, trees, and ornamentals throughout the country.

TURF INSECTS

CHINCH BUG

(Blissus leucopterus)

INDIANA: Noneconomic in 23 grass and soil samples in northwest, west-central, northeast, and east-central districts. Averaged 24 per square foot at one location each of Atkinson in Benton County.

GRASS WEBWORM

(Herpetogramma licarsisalis)

HAWAII: Heavy on turf in park at Mililani, Oahu; larvae and/or pupae 10-12 per square foot.

INSECTS OF ORNAMENTALS

ARMORED SCALES

FLORIDA: Nymphs and adults of Lepidosaphes maskelli on 90 percent of 939 Juniperus chinensis in nursery at Dover, Hillsborough County. All instars of Pseudaonidia clavigera on 100 camellia plants in nursery at Englewood, Charlotte County.

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BROWN SOFT SCALE (Coccus hesperidum) CALIFORNIA: Heavy on strawberry trees, Arbutus unedo, at Taft, Kern County.

TREE INSECTS

AN APHID

(Lachnus salignus) CALIFORNIA: Heavy on weeping willows locally at Nevada City, Nevada County.

(Essigella pini)

OKLAHOMA: Continues active on pines at Stillwater, Payne County. Up to 10 per terminal.

WESTERN PINE BEETLE

(Dendroctonus brevicomis)

CALIFORNIA: Ponderosa and Jeffrey pine trees in Lassen National Forest, struck by lightning, currently show 30+ trees infected in one-half acre area. Salvage of dead and infested trees planned.

A RHOPALID BUG

(Leptocoris rubrolineatus) NEVADA: Collected from Acer negundo (boxelder) at Mina, Mineral County. This is a new county record.

FOREST TENT CATERPILLAR

(Malacosoma disstria)

MINNESOTA: Egg masses in northern area checked in November and December 1969: Egg parasitism 3.93 percent, dead prelarvae 0.77 percent, and dead eggs 5.63 percent. "One goal for the 70s must be to communicate the importance, safety and potential of herbicides."

> —Outgoing President Dr. Homer LeBaron



NE Weed Scientists Told to Broadcast Good Side

R ESPONSIBLE weed scientists can no longer afford to remain silent when some of the "popular ecologists and evironmental opportunists" issue "exaggerated or politically motivated claims" about pesticides.

Homer LeBaron of Geigy Agricultural Chemicals Corporation issued this warning and challenge as he opened the 24th annual meeting of the Northeastern Weed Control Conference, Jan. 7-9 in New York City.

Considering how the decisions were made banning the uses of DDT and cyclamates, "politics and emotion, rather than scientific evaluation of data, could control the destiny of a pesticide," he told some 600 weed scientists.

In the more recent attack on 2,4,5-T, he continued, it is impossible to tell which attackers are concerned with environmental quality and which are against the Vietnam war.

Elimination of environmental pollution is one of the announced major commitments of the government for the next decade, LeBaron reminded.

"Most of us in weed science have been motivated by the potential in this field to benefit mankind, to alleviate hunger, to improve the environment. One of our great challenges for the 1970s will be to use herbicides more in the prevention or reduction of environmental pollution, in environmental beautification, and in conservation of crops, land, labor, and natural resources.

"We are entitled to be proud of our accomplishments."

Recent developments indicate, however, that a credibility gap has opened and that our activities are grossly misunderstood by the general public, LeBaron said.

We have always been aware of the hazards from the misuse of chemicals, he continued. "We have always been in favor of proper balance of the three Rs, 'Research, Reason and Regulations.'

"It is clear that we will be more preoccupied in the next decade with four Ps: Pesticides, Pollution, Politics and Public Relations.

"One of our major goals for the 70s must be to more effectively communicate the importance, safety, and potential of herbicides to mankind."

Delaney Clause Ought to Go

LeBaron, the outgoing president of the northeastern group, called for an end of the "Delaney clause" in government pesticide regulations, which, he said, had become as impossible to live with as the "no residue" tolerance clause just recently changed.

The Delaney clause states that no food additive shall be deemed safe if it is found to induce cancer when ingested by man or animal.

A more workable safeguard is needed, said LeBaron, because "so many relatively safe compounds can

"We need a pulling together of all weed scientists to present a unified approach concerning pesticides."

> -Incoming President Dr. John Ahrens



f Herbicide Story



. Above and below, a few of the more than 600 persons attending the Northeastern Weed Science Society meeting.

cause cancer, genetic or other effects, when injected at very high rates in completely artificial conditions of exposure."

Herbicide 'Breakthrough'

Among the 90 research papers delivered before the conference, one from Cornell University is especially timely in the wake of the emotional attachment of pesticides to pollu.ion.

Findings of researchers Robert D. Sweet and Mark R. Lynch are hailed as a breakthrough in harnessing what scientists call "synergistic response" from chemical combinations.

Sweet and Lynch have found that the effect of certain combinations of weed killers becomes 10 to 20 times greater than when such chemicals are applied individually, yet the required dosage in the mixture is many times smaller.

Sweet's formula consists of four ounces of atrazine and one or two ounces of another chemical in a gallon of fruit spray oil. The combination worked on a wide range of weed pests in corn.

Chemicals successfully tested in such combinations included Lasso, diphenamid, nitralin, 2,4-D, trifluralin and some new herbicides yet to be approved for commercial use.

"Results are almost unbelievably good," Sweet said. "What's really sensational is that these combinations greatly reduce the amount of chemicals required and yet they wield far greater weed-killing power.

"The finding is a nice answer to the danger of soil pollution and chemical residues resulting from heavy uses of herbicides."

Sweet and Lynch are credited as the first researchers to succeed in triggering "synergistic response."

Name Changed

Conference delegates approved a name change for their organization. It's now called the Northeastern Weed Science Society.

Outgoing president LeBaron said the board felt the new name was in keeping with objectives but was more appropriate in signifying what the organization does.

Charles W. Middleton of Asplundh Tree Expert Company, membership chairman, reported that fees had exceeded the \$3,000-mark for the first time.

New Officers

Delegates elected Dr. John F. Ahrens of the Connecticut Agricultural Experiment Station, Windsor, as president. Dr. George Bayer of Agway, Inc., Syracuse, N. Y., was elected vice-president; Dr. Arthur Bing, Cornell Ornamentals Research Laboratory, Farmingdale, N. Y., secretary-treasurer; and Dr. H. P. Wilson, Virginia Truck Experiment State, Painter, as secretary-treasurer-elect.

Dr. Ahrens pledged continued em-

phasis on publication of weed science information, and renewed emphasis on public relations. He called for a "pulling together" of all weed scientists to present a unified approach to deal with the pesticide controversy." He urged membership in the Weed Science Society of America.

Dr. Ahrens announced these committee chairmen for the coming year:



Dr. T. R. Flanagan, University of Vermont; Research Coordinating, Dr. Joseph Cialone, Rutgers University; Sustaining Membership, Dr. R. Hansen, Hercules, Inc., Wilmington, Del. Public Relations, Dr. R. W. Feeny, American Cyanamid Co., Princeton, N. J.; Awards, Dr. Homer LeBaron, Geigy Agricultural Chemicals Corporation, Ardsley, N. Y.; Education, Dr. W. A. Genter, Agricultural Research Service, USDA, Beltsville, Md.; Weed Science Society of America representative, Dr. C. T. Dickerson, Jr., Monsanto, Allentown, Pa.

Dr. William B. Duke of Cornell University received the award for the outstanding paper of the conference. It covered his research on the control of quackgrass in established alfalfa.

Capsule Conclusions

A heavy portion of the papers presented were directed toward the agricultural field, but about two dozen were related to the non-crop vegetation industry.

Following are some capsule conclusions:

--Under mulch, dichlobenil at 2 lbs./acre showed the most promise for perennial weed control in highway plantings of trees and shrubs. Dr. Arthur Bing, Cornell University. --A three-year study showed that total vegetation control results for one season were good to excellent with these combinations: atrazineamitrole-fenac; bromacil-amitrolefenac; borate-chlorate. Single herbicide treatments giving good kill included Nia 11092, bromacil and AP 920. Rate was critical in determining the degree of control, specie selectivity and percent bare ground. Doubling the base rate greatly increased control during the first season, but affected residual control to a far lesser extent. Dr. George Bayer, Agway, Inc., Syracuse, N. Y.

Utility Rights-of-Way

—Use of picloram plus 2,4,5-T applied as a basal or dormant stem spray offers a method of adequately controlling most brush species found on utility rights-of-way. Particularly noteworthy is the virtually complete control obtained with 1 lb. picloram plus 4 lbs. of 2,4,5-T aehg on the principal species which tend to resprout after treatment (aspen, locust, maple, oak, sassafras, sumac). C. S. Williams, B. C. Byrd, W. G. Wright, Dow Chemical Company, Midland, Mich.

-Five years of field data indicate the new herbicial compound, m-(3,3-dimethylureido) phenyl tertbutylcarbamate (NIA 11092, is (1) herbicidally active; (2) non-selective in crops and (3) persistent in its control. NIA is worthy of development and use as a soil sterilant. Edward E. Hagood, Niagara Chemical Division, FMC Corporation, Middleport, N. Y.

-Paraquat was found to be most successful in controlling early weed competition to establishing crown vetch, while damaging crown vetch the least of chemicals tested. D. L. Linscott, Cornell University.

—Use of aerial photography with black and white and color infrared



Leadership for the coming year includes, from the left: Dr. Homer LeBaron of Geigy Agricultural Chemicals Corp., past president and chairman of the awards committee; Dr. C. T. Dickerson, Jr., of Monsanto Co., representative to the Weed Science Society of America; Dr. George H. Bayer of Agway, Inc., vice-president; Dr. John F. Ahrens of Connecticut Agricultural Experiment Station, president; Dr. R. Hansen of Hercules, Inc., chairman of the sustaining membership committee; Dr. R. W. Feeny of American Cyanamid Co., chairman of public relations; Dr. Joseph Cialone of Rutgers University, chairman of the research coordinating committee; and Dr. Arthur Bing of Cornell Ornamentals Research Laboratory, secretary-treasurer. Not present for the picture were Dr. H. P. Wilson of Virginia Truck Experiment Station, secretary-treasurer elect; Dr. T. R. Flanagan of the University of Vermont, program chairman; and Dr. W. A. Genter of USDA's Agricultural Research Service, education chairman.



Further individual discussion of papers presented was frequent. John Reingold, left, listens to additional comments from Mike Watson of Potomac Edison Company concerning the use of a knapsack mistblower for chemical brush control along utility rights-of-way.

film is valuable in taking the guesswork out of evaluating the effectiveness of chemical spraying along utility rights-of-way. J. Baribeau and J. Rivest, Hydro-Quebec, Montreal, Canada.

-Bromacil, NIA 11092, atrazine, prometone and Geigy 14254 were found to be more effective on heavier soil whereas diuron and Daxtron were more effective on a lighter soil. On a medium loam soil, mixtures of herbicides generally had control ratings between the ratings of the two component herbicides used singly. Exceptions were mixtures containing picloram which tended to have lower control ratings than either of the two components. The value of some mixtures of herbicides may be their effectiveness in the control of a broader spectrum of weeds and grasses over a wider range of soil types and growing conditions. W. R. Effer, Ontario Hydro Research Division, Toronto, Canada.

Aquatic Weed Control

—Submersed application of diquat dibromide at 4 lbs. cation per acre was found to be effective in controlling *Potamogeton robbinsii* in Greenwood Lake in New Jersey. The submersed application technique appeared useful in applying liquid herbicides in deep water. The lake depth was a maximum of 35 feet and averaged 7 feet. Submersed nozzles released the treatment at an average of 18 to 24 inches from the lake bottom. C. E. Gilbert and J. M. Cortell, Allied Biological Control Corp., Chester, N. J.

—Safe and successful algae control and maintenance program involves a total approach, considering these factors: Water temperature and lake depths; amounts of dissolved oxygen; nutrient levels; light penetration, true and apparent color; algae to be controlled and the possibility of endotoxins. C. L. Noyes and J. M. Cortell, Allied Biological Control Corp.

Weeds in Turf

—The experimental herbicide RP 17623 (2-tert. butyl-4-(2, 4-cichloro-5-isopropyloxyopenyl)-5-oxo-1,3,4oxadiazoline) has inherent ability to give major reductions in crabgrass and knotweed from tests in Merion Kentucky bluegrass turf. R. E. Engel and R. D. Ilnicki, Rutgers University.

-Effective crabgrass control with only slight turfgrass injury was obtained from standard materials. such as bandane, benefin, bensulide, DCPA, nitralin, siduron and terbutol. Some thinning of fescue was noted from DCPA. New materials that appear promising and/or deserve further study are CP-53619, D-292, NC-5651, M-3251 and RP-17623. Half rates of bandane, bensulide, DCPA, nitralin and siduron in the second year after previous spring treatment produced good to excellent crabgrass control. Siduron alone or combinations of DSMA with either bensulide, DCPA or siduron produced good to excellent control of crabgrass when treated in the 1-2 leaf stage. When plants were in the 4-5 leaf stage, siduron produced good control and the combination of DSMA plus siduron produced excellent control. John A. Jagschitz, Ag Experiment Station, Kingston, R. I. -Bensulide, lead arsenate and tri-calcium arsenate treatments for several years in putting-green turf resulted in good control of annual bluegrass (Poa annua). Use of ethrel, MH or MF-415 and 416 appeared promising for preventing seed production of Poa annua. John A. Jagschitz.



"Dingwall, there, likes everyone to know he caught a sawfish when he went deep-sea fishing."

A Siberian Fish . .

A fish from the icy waters of the Amur River in Siberia may provide a partial solution to Florida's problems with water hyacinths and other waterweeds.

The white amur feeds entirely on aquatic vegetation, and scientists at the Plantation Field Laboratory in Fort Lauderdale (an agricultural experiment station of the University of Florida) are hoping this fish will prove practical as a biological control of Florida's waterweeds.

"Of all the biological control agents we have considered," said Robert D. Blackburn, U. S. Department of Agriculture botanist directing the aquatic weed research, "the white amur is the most promising."

The white amur can tolerate an extremely wide range of climatic conditions. It has been used to control aquatic plants in Russia, Czechoslovakia, Poland and India.

"Research seems to indicate the white amur will not spawn in our waters unless artificially injected with hormones," Blackburn said. This would be an advantage for keeping the white amur in check, since the fish grows from $3\frac{1}{2}$ to 5 pounds a year and can reach weights from 50 to 60 pounds.

The Plantation Field Laboratory has acquired 300 white amurs for testing. "We will try them on different plants," Blackburn said, "and stock other fishes with them. We have to be cautious that there's no adverse effect on sport fishing or on the overall aquatic environment from the white amur."

Blackburn pointed out that the white amur is a welcome source of food in some parts of the world. "It tastes a lot like catfish," he said. The white amur will strike artificial lures, so it is a possibility for sport fishing.

Besides the white amur, other possible biological controls are being evaluated at the Plantation Field Lab. Among them are two types of South American snail, the alligatorwood flea beetle.

A Latin Beetle . .

Weed-eating insects that do not attack useful plants have considerably greater potential for use in biological control programs than has been generally recognized, a U. S. Department of Agriculture scientist says.

Dr. Lloyd A. Andres, an entomologist of USDA's Agricultural Research Service, spoke on the use of weed-eating insects at the annual meeting of the American Association for the Advancement of Science, Boston.

"If one considers that almost half of the 540 major weed species in the United States are introduced plants, and that 13 out of the 15 top weed species originated in other countries, the use of their natural insect enemies obtained from abroad—will continue to offer a fertile approach to biological weed control," Dr. Andres said. "In the United States, the losses caused by alien and native weeds are believed to equal the combined losses from insects and diseases."

Dr. Andres cited examples of successful results with about a dozen species of weed-eating insects that were brought to the United States for release after scientists had determined that the insects would not harm crops or ornamental plantings. The most spectacular success achieved to date was control of the Klamath weed in California. More recently, highly promising results have been achieved in weed-choked Florida waterways by Dr. Andres' associates who, in 1964, released 250 Agasicles beetles that they found in South America.

"Within a year, hundreds of thousands of the beetles developed, and the release site became essentially free of alligatorwood."

The rapid buildup of the beetles permitted collection and distribution of the insects for subsequent release in eight other states. Insects that eat weeds infesting dry rangelands also have been released in western states, Dr. Andres said. The 300-year-old white oak tree that witnessed the birth of Abraham Lincoln is alive and well.

Well enough, in fact, to receive more than 400,000 visitors a year from all over the world. Last summer arborists of The Davey Tree Expert Company did tree surgery on this sole survivor of all that was alive on Thomas Lincoln's Sinking Spring Farm on Feb. 12, 1809, the day Abe Lincoln was born.

R. W. Niedert, Jr., Davey representative, explained that the tree was pruned and fed several hundred pounds of high-nitrogen fertilizer to maintain the vigor. The Boundary Oak is 90 feet high, has a trunk diameter of six feet, and a branch spread of 115 feet.

The giant white oak served as a boundary marker for the first survey of this land in Kentucky made in 1805. As many as 6,000 visitors a day come to the Abraham Lincoln Birthplace National Historic Site on U. S. Route 31-E, a few miles south of Hodgenville. Ky., to see the memorial which houses the birthplace cabin, the sinking spring, audio-visual programs at the visitors' center, and the famous tree. The birthplace site is administered by the National Park Service, U. S. Department of the Interior.

Davey Tree Cares for Lincoln Oak



Accelerated Research Asked To Control Gypsy Moth

The National Gypsy Moth Advisory Council, meeting with the U.S. Department of Agriculture, has recommended research to provide a more reliable and sound method of gypsy moth control—the insect some members term the Number 1 hardwood pest in the United States.

Action is urgently needed because

DDT and other persistent pesticides, though effective, can no longer be legally used, says Ray Brush, secretary of the American Association of Nurserymen and Council member.

The gypsy moth is a defoliator of hardwood and softwood forests and is capable of killing hardwood trees in two to three defoliations, and softwoods in a single defoliation.

Council members noted the growing difficulty of preventing the spread of the gypsy moth because



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of the mobility of Americans. The egg masses are found attached to the underparts of camper trailers, and mobile homes. Boxes, crates, forest products, and equipment left in the woods for some time frequently harbor these egg masses and are transported to other areas.

U. S. Senator Richard S. Schweiker of Pennsylvania has noted that 10 of 15 million acres of forest land in his state are already susceptible to attack by gypsy moths. He warned, "As the gypsy moth moves southward and westward from Pennsylvania, it eventually will eat its way through the hardwood forests of the Appalachians and into the Ozarks, an area encompassing more than 100 million acres of timberland."

Currently, the gypsy moth inhabits most of New England, Eastern New York, New Jersey, Eastern Pennsylvania, and parts of southeast Canada. It is spreading into Delaware, Maryland, and is threatening other southern and midwestern states.

NASA Plans High Recon Of Minnesota Forests

A high-flying reconnaissance airplane of the National Aeronautics and Space Agency (NASA) Earth Resources Division will be used next summer to study tree diseases in northeastern Minnesota in a project with the University of Minnesota's School of Forestry.

University forestry researchers are no strangers to the NASA aircraft. Professors Arnett C. Mace, Jr., and Merle P. Meyer utilized the cameraand instrument-laden NASA aircraft late last August to gather information on a forest watershed study area in Itasca County.

Last summer's work was part of the world-wide preparation for the launching of the Earth Resource Technology Satellite (ERTS) in 1972. Meyer said the satellite would provide information on broad forest, cropland and rangeland conditions and changes.

Mace and Meyer were expecting to go to the NASA Manned Space Center in Houston to review the aerial photographs and other data produced by last summer's flight.

Meanwhile, Meyer and Professor David W. French of the University Department of Plant Pathology are making plans for flights this coming summer. Meyer and French said the aerial detection studies of the "dwarf mistletoe" disease in black spruce will be done in northeastern Minnesota. A grant from NASA will help finance the project.

The University researchers will be using panchromatic, color and infrared films and thermal heat sensors in the aerial surveys to detect the disease and study its characteristics. Information from the flights will be used to design detection and control programs both in Minnesota and in other parts of the United States and the world.

Tree Damage Increasing From Salt Use on Highways

Premature defoliation and dying of roadside trees has been occurring over widespread areas of the U.S. and Canada, reports John M. Skelly, plant pathologist at Virginia Tech.

Roadside maples have been declining at a rapid rate in recent years as have white pines, hemlocks and other coniferous species, he said.

Use of salt on the highway is causing the damage, Skelly explained. Relief from this type of damage—if salt use is to be continued—involves preplanning highway construction, through the use of drainage ditches and/or placement of trees to be planted, Skelly said. Under forested conditions, no feasible control has been developed except through road planning, he added, but roadside trees may be helped through heavy watering and fertilization practices.

Salt damage symptoms are seen on the leaves during the following season and usually involve a marginal scorch, premature leaf coloration and dying branches accompanied by a gradual decline in vigor, he said. If severe decline develops death will follow, he added.

Symptoms on hemlocks, white pines or other conifers involve brown needles, stunted growth, sparse foliage, lack of vigor, and again death.

Occurrence of salt damage depends upon the location of the trees with respect to the slope of the road. Obviously, trees located below the road or on drainage areas will receive the greatest amounts of salt in the melted snow runoff.



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Available on all models.

For More Details Circle (111) on Reply Card



Hemco Corporation, Independence, Mo., announces a new "Supreme" line of fiberglass tanks from 60- to 500-gallon capacity. The tanks are constructed of fiberglass woven roving to offer maximum structural and impact strength. They feature the new armorcoated interior of isophthalic resin applied to eliminate glass fraying and possible chemical attack to the interior. Accessories available include manholes, P.V.C. coated glassed-in cast iron fittings, baffles, sumps, flat areas and saddles. For more details, circle (701) on reply card.



Servis Equipment Company, Dallas, has introduced a light rotary cutter called the "Chico." The five-foot-wide to designed for grass mowing for small acreages and ebuildings. Features include all-welded unitized construct precision-engineered gear box, dishpan-type blade of smooth undercarriage, and full-length skid shoes. Chico a about 600 pounds and is for wheel-type tractors with point hitch and drawbar rating between 20 hp and to For more details, circle (702) on reply card.



American Pulley Company, Philadelphia, offers a compact sprayer with tractor hitch and is equipped with a four-nozzle boom to distribute spray over a five-foot swath. Spraying time is reduced up to 80% compared with models that must be hand drawn, the company says. Delivers three gallons of spray per minute, has 15- and 30-gallon tank sizes, offers adjustable pressure from 20 to 300 psi. For more details, circle (705) on reply card.





Century Engineering Corporation, Cedar Rapids, Ia., introduces an a full-length mechanical agitator for chemical spray tanks. This as can be added at any time to 125- to 400-gallon tanks which have end surfaces for sealing. No pump capacity is required for mech agitation, so smaller, lower-priced pumps, hoses and fittings a used. Fully-enclosed electric motor can be front, side or rear ma Five double paddles turn at less than 200 rpm. For more details, (706) on reply card.

Industrial Scientific Instruments, Ltd., Montreal, Quebec, and Rouses Point, N.Y., has developed a buyer's calculator. The pocket-size device calculates: Total cost for any given quantity and cost each, or alternatively cost each for any given quantity and total price with or without discounts; selling price, to give any required percent markup on cost, or to give any required percent profit on selling price; percentage profit on cost or on selling price. It's easy to use, even by per-sons unaccustomed to a slide rule. The Calculator is $4\frac{1}{2}$ " in diameter and is made from high grade opal white acrylic material with fully engraved scales. The \$7.95 unit is supplied with a plastic case. For more details, circle (709) on reply card.



Davies Can Company, Cleveland Ohio, offers this new five-gallo polyethylene pail suitable for cor rosive materials. Ideal for agricu tural chemicals and acids. Der resistant, one-piece construction. Fo details, circle (710) on reply card.





ingineering Development Corporation, San Angelo, Tex., in entirely new concept in applying pesticides and herbitom spraying. The foam, that looks and sticks like a good lather, allows spray chemicals to be placed where needed drift. Foamicide Spray is credited with reducing the of chemical needed by eliminating costly waste and inabsorption. Foamicide can be applied using anything endgun to helicopter. For details, circle (703) on reply card.



Tryco Manufacturing Company, Inc., Decatur, Ill., has introduced a new line of pressurized doubleseal suspension and mixed-liquids pumps. In the Sealsaver line, a liquid under pressure in the seal chamber lubricates the seals and the liquid pressure inside the chamber is always higher than pressure of liquid being pumped, so no abrasive can reach the seal face to wear it down. For more details, circle (704) on reply card.



Funigants, Hazelwood, Mo., announces a new p, throw-away container for its gelled methyl soil fumigant formulations. The "PresTaner" is to be the first non-returnable container to receive U. S. Transportation Department approval for this product. A special "Eagle Claw" can puncturing permits the forcing of air or nitrogen pressure in to force the gelled fumigant out the bottom. For tails, circle (707) on reply card.

systems, Bell-III., has a new prottling valve for ly adjusting the te to booms and to olution agitators. ton be set at any from open to comshut. It's built for to 125 psi. Conmaterials include duminum, stainless d steel. The valve nd seat are made n to provide longsurfaces and posi-1-off. Long, tapered surfaces assure aclow rate control at ustments. Adjustindle designed with to hold position of For more details, 11) on reply card.





Practical Products Corporation, Tulsa, Okla., has added to its pump line Model K301-5420. It's a 20 gpm @ 600 psi, 4-cylinder, H.D. pump, ball-bearing, ni resist cylinders, stainless steel valves. Kohler 4 hp engine with 6-1 reduction and electric starter and generator. Weight -350 lbs., Length-43", Width-20", Height-25". Ideal for big-tree spraying and wide-area weed and brush control. For more details, circle (708) on reply card.

Orline Products, Los Angeles, Calif., has introduced the Orline Yard-Arm power tool that prunes small tree limbs, edges walks and flower beds, shapes unruly bushes, cuts tall weeds, clears brush, and performs a variety of other chores. The Orline Yard-Arm is a six-foot power pole with engine at one end and several attachments at the other. Weighs 11 lbs. and is powered by 1 h.p. O&R industrial engine. It comes with an 8-inch circular saw and an 8-inch edging blade. For details, circle (712) on the reply card.



A Suggested Landscape Maintenance Contrac

The following proposal, when signed by both parties, constitutes a contract for landscape maintenance to be per-

TOTI	(Business name and address)
ру	(Name of maintenance firm)
This	s maintenance contract covers the period (season) from
57.52	(Date) to (Date)
GE	NERAL MAINTENANCE
	Complete policing (litter pick-up) of all landscaped areas
	times per month.
	Complete sprinkler system servicing as needed, includ-
	ing (1) labor and (2) parts.
	Complete landscape lighting servicing as needed, includ-
-	ing (1) labor and (2) parts.
	Annual returbishing (repair, clean, paint or varnish, etc.)
	Protective winter storage of all container plants
Н	Repair and replenish all decorative stone or gravel
-	areas, including plastic and edging.
	Snow removal of defined areas (sidewalks, drives, park-
	ing lots, etc.) Specify
(11)11	
LA	WN MAINTENANCE
	Mowing, trimming and edging all lawn areas
	times per month from
	or as needed.
	Fertilize all lawn areas
_	Type Rate
H	Complete chemical weed control. Including materials.
H	Complete chemical fungus control. Including materials.
ī	Watering of all lawn areas times per month
	(Number)
	Reseed and/or re-sod bare or weak lawn areas
	Annual de-thatching of all lawn areas.
	Annual sowing of Rye grass for winter color on all lawn
	areas (Southern U.S. only).
TD	CE CUDID & SUDIB.BED MAINTENANCE
	Complete trimming edging, weeding of all shrubs and
	shrub-beds times per month.
-	(Number)
	Fertilize and mulch shrubs and shrub-beds
	times per year. Type

- Spike and fertilize all trees times per year. (Number) Type
- Annual tree pruning and/or shaping.
- Complete insect and disease control of all trees and shrubs including (1) labor and (2) materials.

- Tree surgery as needed.
- Watering of all trees, shrubs and shrub-beds times per month unless unnecessary due to adequate rainfall.

FLOWER BED AND/OR HERBACEOUS GROUNDCOVERS

- Complete weeding, trimming, edging of all flowerbeds and groundcovers times per month.

color. Specify:

- Fertilize and/or mulch all flower beds and ground-
- Replant or "re-stick" all damaged or thin areas in ground cover beds.
- Complete insect and disease control on all flower and groundcover beds including (1) labor and (2) materials.
- □ Watering of all bed areas times per week unless unnecessary due to adequate rainfall.

OTHER SERVICES

All items not checked on this contract will be considered "extras" and will be charged for under separate purchase order according to the nature of the item.

Guarantee and/or replacement policy:

(Written by Individual company)

except due to "Acts of God." Acts of God are defined as damage or death of plant material due to wind, storm, hail, fire, flood, freezing, vandalism, theft or other willful acts over which the maintenance company has no control.

Based on a 12-month contract, the total cost of the above checked service item is \$....., payable in monthly installments of \$, due on the of each month. A % service charge per month will be levied on all overdue accounts. This contract may be canceled by either party on 60 days' written notice, provided the account is paid in full up to date of cancellation.

Owner Title Company Date Maint. Firm Title Company Date

LANDSCAPE nurserymen are experiencing an increasing demand for landscape maintenance.

As more industrial firms and institutions have become aware of the need to protect their plantings with proper maintenance, many have sought professional maintenance service, rather than establishing their own grounds maintenance departments.

Some firms in metropolitan centers now specialize in maintenance work; and in other meas, landscape nursery firms have established landscape maintenance departments.

To assist its members interested in landscape maintenance contracts, the National Landscape Nurserymen's Association in cooperation with the American Association of Nurserymen has asked firms known to be active in maintenance work to suggest items which might be covered in a maintenance contract.

The following list of items are offered to you in a format which will be helpful to you and your attorney in preparing for your own firm's contract.

Not all items are practical in every region of the country. Being a specialist, you know the horticultural practices which do apply in your business area.

Be alert for changes; periodically review your contract and the rates you charge.

Six DDT Manufacturers Contest USDA's Ban

Six pesticide manufacturers have challenged USDA's cancellation of the federal registration of certain uses of DDT.

The six companies contesting the action are Allied Chemical, Black Leaf Products Co., Carolina Chemicals, Inc., Diamond Shamrock Corp., Lebanon Chemical Corp., and Stauffer Chemical. They have requested a public hearing or the appointment of an advisory committee to review the cancellation action taken in November, 1969, by USDA's Agricultural Research Service. The companies have the right to the two methods of review under authority of the Federal Insecticide, Fungicide, and Rodenticide Act.

ARS is in the process of requesting the National Academy of Sciences to appoint a committee to review the ruling.

On Nov. 20, 1969, ARS canceled the federal registration of DDT for use against shade trees pests; tobacco pests; house and garden pests; and pests in aquatic sites such as marshes, wetlands, and swamps. About 35% of the total amount of DDT used annually in the U.S. is marketed for these purposes.

The six companies are entitled to continue to produce and sell their DDT products in interstate commerce pending the outcome of the statutory proceedings. About 1,300 products marketed by about 400 manufacturers were affected by the cancellation order.

Landscape Council Folds

For lack of interest, the Landscape Council has been cancelled. That's the report from William Flemer III, president of the American Association of Nurserymen.

The plan was to get a national sales development program under way to promote the nursery business. Financing was to come through membership dues.

A spring program had been planned and the time had arrived to make firm commitments for advertising space and radio time. With only 400-plus members singed up and 15% of the necessary funds pledged, Flemer said, it was obvious that our membership was not quite ready for a national promotion and advertising program.





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Jewel among lawngrasses, originating in Svalof, Sweden, Fylking has an entire complement of desirable features. Unusual density due to an abundance of sideshoots creates a weed-free lawn. It colors early to deep green emerald. Blades stay unblemished, brilliant through fall, because it's more disease resistant. Winter hardy and drought resistant, Fylking grows thicker in summer. Doesn't produce ugly seedheads, mixes well with other varieties, gradually dominating. Fine, thick texture can be cut low as $\frac{1}{2}$ inch. Proven in 12 years of international testing by noted authorities. Ask for 0217® Fylking Kentucky bluegrass (U. S. Plant Patent 2887) at your seed distributor. Write Jacklin Seed Co., Dishman, Wa. 99213, for information.

For More Details Circle (102) on Reply Card



A check for \$2,000 is exchanging hands. Robert L. Adler, left, newly elected president of the Missouri Valley Turfgrass Association, is giving it to Elmer R. Kiehl, dean of the College of Agriculture at the University of Missouri-Columbia. Looking on is John H. Dunn, UMC assistant professor of horticulture. The turfgrass association, which met recently in conjunction with the Missouri Lawn & Turf Conference in Columbia, has periodically provided money to support turfgrass research. MVTA was organized in 1965 for the specific purpose of cooperating with the University of Missouri and other agencies interested in developing better turf.

Texans Hear Principles Of Labor Management

You hear it everywhere. Labor is the problem.

It has to be the toughest management puzzle for turf businesses, suggested Ken Wolf, economist at Texas A & M. About 60% of total costs of establishing and maintaining a turfed area are wrapped up in getting and keeping good labor, he said.

Wolf expressed his principles of labor management to some 250 persons attending the December 24th annual Texas Turfgrass Conference. Those attending the three-day session included persons who manage golf courses, parks, landscaped industrial sites, cemeteries and other turfed areas.

First, do a good hiring job, Wolf advised. This includes selection of the employee on the basis of attitude and skills, and then making sure he knows what the job is all about.

One of the best applicant sources comes through recommendations from current employees, he said.

In breaking in a new worker, the economist suggested a re-interview as the first step. Cite the company rules to him, company benefits, and then have his immediate supervisor introduce him to fellow employees.

Show the new worker how to do a certain job, let him do it, and then explain why the task is done that way.

Wolf emphasized that an employee should have only one boss. Other-

wise, there will be confusion and resentment.

He said one of the big secrets of employee contentment is incentive payment and various profit-sharing plans in which the workers are rewarded for extra production and jobs well done.

Another speaker cautioned that planting a tree in a turfed area should be anything but a haphazard operation.

Among factors to be considered, said floriculturist A. F. DeWerth, are tree size, overall form, rate of growth, and whether the tree is deciduous or evergreen.

A tree with erect growth traits is preferred over a spreading variety



[&]quot;Am I glad to see you!"

for cramped spaces. If shade is the objective, position as related to sun movement is vital. Large trees are beautiful in open spaces, but may be unsuitable for modern homesites in which the dwellings are one-story and the lots are small.

Growth rate is an increasingly important factor. Years ago, DeWerth said, the slow-growing tree was aeemed the most desirable. With houses and buildings now being built on open ground, size and shade are needed in a hurry.

"If a homeowner is in his 20s, and figures he is settled for a long time in one house, then a slowgrowing, long-lived tree choice is fine," DeWerth said. "But a middleaged man had better plant something that grows rapidly if he expects to enjoy any shade."

Forest Service Announces Reduced Use of Endrin

The Forest Service is reducing concentrations and use of endrin, a persistent pesticide that controls rodents that eat conifer seeds used for reforestation of National Forest lands.

USDA officials said the newly adopted concentration of endrin in solution for these seeding operations is a half percent. The concentration was one percent.

Endrin is one of the pesticides suspended from use in July pending a review. The evaluation of use was just recently completed.

Endrin has been in use to control seed-eating rodents in reforestation programs for about a decade. In recent years, the treatment has involved about 50,000 acres annually.

Stauffer Chemical To Move From NYC to Connecticut

Stauffer Chemical Company plans to relocate its corporate headquarters from New York City to Westport, Conn.

Its first step in relocating came in December with an application to the Westport Planning and Zoning Commission in Westport for approval to construct a new world headquarters office building on a 52-acre site in that community.

Roger W. Gunder, president and chief executive officer, said the company plans to build a campus-type structure. Completion of the project is expected by 1971. About 680 employees will be involved in the move.

Letters to the Editor

A clipping attached to the following letter told of Ponderosa Pine damage in California. Trees —some more than 100 feet high and 700 years old—are reported to be dying by the thousands from the smog ingredient ozone. Winds carry the smog 60 miles from Los Angeles and into the 60,000 acres of Ponderosa in the San Bernardino and San Jacinto Mountains. Experts estimate that 75% of the trees—1.7 million—are dying.

In our consulting business, where we examine many trees for valuation in connection with expropriations, etc., we have noticed similar effects here in Canada in the built-up metro areas and in heavily traveled highway areas.

This decline of condition is not noticeable to the average person because he does not have any reason to observe closely the condition of evergreens from time to time. **NORMAN J. SCOTT**, Canadian Horticultural Consulting Co., Ltd., Willowdale, Ontario.

Successful Applicators' School

On Jan. 8, we had the first of 10 sessions of schooling for the applicators, operators and associate members of the Pacific Northwest Pesticide Applicators, Inc. It was a real success. Fifty-six members turned out to hear the laws and regulations discussed by Art Lousey, Grain and Chemical Division, and Clark Brown, chief of the Pesticide Division from the State Department of Agriculture. **BUD JOHNSON**, manager, Washington Tree Service, Inc., Seattle.

Appreciates Sole Supporter

I am sure those following the allied facets of agriculture really appreciate the magazine which soley supports the latest research and applications of keeping vegetative growth under control with advanced techniques and knowledge . . . I for one. **ED MALNAR**, Kansas City, Kan.

Offers Pest Handbook

A number of letters from turf industry friends have asked, when they read the subject article (letter asking for chart on turf diseases, WTT, November), that we remind you of our Turf Pest Management Handbook. They've found it better than any chart, regarding good information on turf diseases and how to identify and control them.

The handbook is available free to turf managers from any Mallinckrodt distributor, or we'll send one. **STAN FREDERIKSEN**, Mallinckrodt Chemical Works, P.O. Box 5439, St. Louis, Mo. 63160.

October Issue Exemplary

As a fisheries biologist in South Florida, I have frequent requests of control measures for aquatic vegetation. Your October, 1969, issue is an exemplary concise look at our expanding problem. **ROGER A. MARTZ**, Game and Fresh Water Fish Commission, Fort Lauderdale, Fla.

Europeans Visited Others

Your December issue provided fine editorial coverage of the Orag Inter, Ltd., distributor group's visit to the Ryan Equipment Co. in October. May I point out, however, that an incorrect impression was given in your opening paragraph. The true sponsor of this three-week business and pleasure trip was Orag Inter, Ltd., of Baden, Switzerland (not Ryan).

Among others, Jacobsen was host to this same group, who spent four days at our headquarters in Racine and another day at our Johnston Division in Brookhaven, Miss. **MRS. LOIS J. MEDGYESY**, public relations assistant, Jacobsen Mfg. Co., Racine, Wis.



European distributors study the features and operation of the new Jacobsen —Sod Master Division's "Mete-R-Matic" powered top dresser. The group spent four days at the firm's Racine, Wis., headquarters.

Trimmings -

A DEAD TREE has become a live issue, reports the newsletter of the Connecticut Tree Protective Association:

"The 400-year-old Ledyard Oak died (officially) in 1969. The 90-ft. skeleton with a trunk diameter of better than seven feet (22-23-ft. circumference) will be left standing. Rumor has it that the dead oak will be sprayed with wood preservative and cabled and braced where needed to retain the gross form.

"At one time, the tree shaded an acre of ground, and was used as a temporary shelter for meetings of Pequot Indians in Colonial times. Now the dead oak will occupy a park from land donated to Ledyard by a group of residents.

"In the year 2369? Who knows? At least we feel certain that the people who banned DDT and let the gypsy moths finish the Ledyard oak in 1968 will have been long forgotten!"

HERE'S A POSTSCRIPT to the removal of sod (to make way for artificial turf) from Candlestick Park in San Francisco. Nunes Turfgrass Nurseries didn't move quite all of the sod to McLaren Park. Baseball great Gaylord Perry and 49'er John Brodie took some sod home to plant for sentimental reasons.

AT LEAST TWO SIDE BENEFITS were realized by Continental Grain Company from the weed control demonstration conducted around its Savage, Minn., facilities (story on page 16.) Employees' disposition improved when they no longer got soaking wet on a heavy-dew morning walking through waist-high weeds. Secondly, the rat population was reduced to a tenth of what it was before weed control, through elimination of nesting sites.

Vocational Horticulture Training Survey Published

A unique survey of post high school vocational horticulture schools conducted by the American Association of Nurserymen, in cooperation with three other national associations has been completed and sent to the colleges surveyed and the four cooperating associations.

Cooperating with the AAN were the National Arborist Association, Associated Landscape Contractors of America and the National Landscape Nurserymen's Association.

"The survey was sent to the 100 post high school training institutions listed by the Office of Education as teaching ornamental horticulture. The study was designed to determine the number of students majoring in each area of landscape horticulture, number of years the course had been under way, length of the course, and whether it required pratical work experience," said F. Raymond Brush, AAN secretary.

Of the schools surveyed, 72 reported they have one-, two- or three-year training programs in general landscape horticulture or in the following specialty areas: NURSERY (production, propagation, digging, storage and retailing); LANDSCAPE (designing, planting and contracting); ARBORICULTURE (tree care and maintenance); LANDSCAPE GARDENER (planting and maintenance of grounds); TURFGRASS (sod production, grass maintenance); FLORICULTURE (production, flower arranging, retail).

"The great majority of the 72 colleges listed in the study initiated their horticulture programs after 1963—when the first Vocational Education Act was passed. Many col-

It's Renewal Time! Your Renewal Card is Bound in Above

To continue your free subscription to WEEDS TREES and TURF magazine, it is a requirement of our national auditing service that we annually verify (to its satisfaction) who you are and what you do. This is necessary because only selected recipients are permitted to receive this magazine free of charge. Information on the card above is confidential. It's used only to determine your eligibility to receive WTT at no charge. We ask you to fill out the card and return it to us now in order to keep your subscription current. Thank you. leges reported that their graduates are in heavy demand and that all their graduates accepted employment offers prior to graduation. One college reported that its graduating class of seven had been offered a total of 101 employment opportunities," Brush said.

Copies of "National Survey of Post High School Vocational Horticulture Training" are available on request from: American Association of Nurserymen, 835 Southern Building, Washington, D. C. 20005.

Rohm and Haas Announces New Kerb 75W Herbicide

Kerb 75W, a new selective herbicide, has been introduced on an experimental basis by Rohm and Haas Co., Philadelphia, Pa.

Kerb 75W has shown particular promise, the company says, for control of annual bluegrass, cheatgrass and other annual grasses. It also shows good activity against chickweed, mustards, nightshade, pigweed and other annual broadleaf weeds. The product has been used successfully in tests to control bluegrass in Bermudagrass turf throughout the South.

The herbicide may be applied in pre-emergence or post-emergence sprays. It acts through root absorption in most susceptible species. A rate of ¼ to two pounds of active Kerb per acre is suggested. Shallow incorporation is advised in warm, dry weather or with furrow irrigation. Best results have been obtained under cool, moist conditions in fall, winter and early spring.

Formerly coded RH-315, Kerb is available only to qualified investigators and is supplied as a 75% wettable powder. Limited quantities of granular formulations are also available on special request. For additional information, circle (714) on the reply card.

Diagnosis of Plant Disease

A new manual entitled "Diagnosis of Plant Disease" and compiled by Dr. R. B. Streets is available from the University of Arizona.

Copies are \$2, regardless of quantity. Purchase orders or checks should be made out to "Cooperative Extension Service, University of Arizonia."

Send requests to Joe McClelland, Information Specialist, Cooperative Extension Service, University of Arizona, Tucson, Ariz. 85721.

Classifieds -

When answering ads where box number only is given, please address as follows: Box number, c/o Weeds Trees and Turf, 9800 Detroit Ave., Cleveland, Ohio 44102.

"Position Wanted" 10¢ per word, minimum \$3.00. All other classifications 20¢ per word, minimum \$4.00. All classified ads must be re-ceived by Publisher the 10th of the month preceding publication date and be accompanied by cash or money order covering full payment. Boldface rule box: \$25.00 per column inch.

FOR SALE

AUSTRALIAN BUSINESS - Agricultural Chemicals — Custom Ap-plicators. This firm specializes in plicators. Agricultural and Industrial Weed Control. It is firmly established in three eastern States and there is potential for expansion to the re-maining States and New Zealand. Opportunities in allied fields are excellent. An ideal proposition for a chemical or pest control company seeking a comprehensive introduc-tion to the Australian Market. Any reasonable proposition will be confidentially considered by the Founder-Manager who is anxious to ensure the future of this unique organization before retiring. Address all inquiries to: "Chemicals," P.O. Box 767 G, G.P.O. Melbourne, 3001, Vic., Australia.

SALESMAN WANTED

SALES REPRESENTATIVE - For sprinkler and irrigation controls, controller wire and accessories. Large income opportunity for experienced representatives who know their territory and their customers. Our complete line includes sprinkler and irrigation controllers, controller wire, and accessories. Forward a

detailed resume including present lines, territories covered, and experience in this field to: Mr. Steve Stearns c/o the American Granby Company, A Division of Ground Water Industries, Inc., Milford, Connecticut 06460.

USED EQUIPMENT

7 GANG Roseman mower, \$1,295. 10' Brillion seeder, \$500. Ryan 18" sod cutter Ryder-roller, \$1,295; 40 horsepower electric pump 6" column with controls \$1,200; 20 horsepower electric pump 5" column with con-trols \$500.; 7½ horsepower electric pump 4" column, \$200; 8 Mc 6" col-umn RA drive, \$1,000. Phone Fall River. Wisconsin 414, 326-5267. River, Wisconsin 414 326-5267.

WANTED: Locke Triplex mower, 5 fork lift tractor, wide G and y spreader. For Sale: Set of gang roll-ers, Ferguson 35 turf special with front loader. Jay Frick, 1301 Hempstead Road, Dayton, Ohio 45429.

MIST BLOWERS, Hardie L-80A Aero-mist. 14,000 C.F.M., 150 M.P.H., Ford Industrial 4 cylinder. Com-Pletely reconditioned, \$1,250.00 each. Equipment Sales Company, 4744 Sunrise Highway, Massapequa Park, N.Y. 11762. Phone 516 799-7619.

SPRAYERS, chippers, log splitters and other equipment at large sav-ings. Let us know your needs. Equipment Sales Company, 4744 Equipment Sales Company, 4744 Sunrise Highway, Massapequa Park, N. Y. 11762.

RODGERS SWEEPER, model 720. Three point type. Like new, less than 100 hours. Will take \$895.00. Joe C. Davis, Okemah, Okla. 74859.

WANTED - Used Stump Cutter, state condition, make and price.

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Ra-Pid-Gro Corp	
Ryan Equipment Company	
Sabre Saw Chain, Inc	
Stihl American, Inc	

Westville Tree and Saw Service, Adams St., Westville, Illinois 61883.

HELP WANTED

NURSERY MANAGER: Experienced working nursery manager to completely supervise landscape nursery in central Pennsylvania near Harrisburg. Salary and 6 room home along with an attractive in-centive program. Forward complete resume of education and experience plus reference to: Mrs. N. G. Wiest, Davis Nurseries, Inc., 18 North 27th Street, Harrisburg, Pa. 17103. Phone: 717 233-1629.

WANTED, man to take charge of irrigation, maintenance, and repair in connection with one of Colorado's leading bluegrass sod farms. Contact Green Valley Turf Co., 7951 S. Santa Fe, Littleton, Colorado.

Industry People On the Move



Dr. A. E. Dudeck, nationally known turfgrass specialist, has joined the staff of the University of Florida's Plantation Field Laboratory in Fort Lauderdale. He comes from the University of Nebraska where he earned a national reputation for his research on roadside grasses and their management under highway conditions.

Gale Harold has been elected president of the Colorado Weed Control Conference for 1970. Harold is area manager for Colorado, southeast Wyoming, western Kansas, and the Nebraska Panhandle for Stauffer Chemical Company. * *

Charles Machine Works, Perry, Okla., has promoted Etsell Emde from director of western sales for Ditch Witch to manager of the technical services and training department.

Houston Landscape Nurserymen's Association has elected Carl B. Minton, Jr., of Tree Transplant, Inc., as president. Minton is the youngest president in the organization's history.

Kearney-National, Inc., New York, has appointed Roger L. Keech as vice-president, lawn and turf products. Keech's group now includes Hahn-Eclipse, West Point, and Milbradt Manufacturing Co. He'll be headquartered at Evansville, Ind., location of the Hahn-Eclipse and West Point operations.

Diamond Shamrock Chemical Company has named Roger Gilmore manager of turf products. He had been district sales supervisor for Ohio, Kentucky and West Virginia.

* * *

Carl E. Keiser, formerly with McGraw Edison, Cushman Motors and The Broyhill Co., has formed a sales and marketing research firm at Springfield, Mo. The Keiser Company hopes to provide sales, training, product evaluation and application studies, and sales promotion ideas for equipment manufacturers aiming at the industrial, agricultural, municipal and recreational markets.

Toro Manufacturing Corporation has named Chairman David M. Lilly to the additional post of president after the resignation Dec. 30 of President E. S. Conover. Conover, a 24-year employee, cited "personal reasons" for his decision.

Wilt not, want not

Are you winning the war against winter kill, summer scald and transplant shock? Thousands of growers, nurserymen, grounds maintenance men, landscapers and foresters minimize wilting losses with WILT PRUF. The world's number one antidesiccant, WILT PRUF was proved 40 to 50 times more effective in stopping excess water-loss than leading substitutes. Test details on request. Write on your letterhead for 50-page technical manual of applications.



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