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

When Writing to Advertisers Please Mention WEEDS AND TURF

"How to Use Water in Turf Management"

Attracts 275 to 30th Iowa Conference

By DR. ELIOT C. ROBERTS

Turfgrass Research Specialist, Iowa State University, Ames

Over 275 men and women who make some phase of turfgrass management part of their professional responsibility attended the 30th annual Turf Conference at Iowa State University in Ames, March 10-12. Theme of the 1964 meeting, "Water—Its Procurement, Application, and Use by the Grass Plant," was of keen interest since turf managers often encounter extremes in natural moisture levels. Even within one season, turf experts may be confronted with excesses of moisture as well as with drought.

Key points in maintaining turf during periods of excessive rainfall were emphasized by Dr. James R. Watson, Agronomist with Toro Manufacturing Co., Minneapolis, Minn. He stressed the importance of being able to get water through a soil or off the surface without keeping the turf waterlogged for long periods of time.

Need Porous Soil

Soil must be sufficiently porous to provide good internal drainage and graded so that surface runoff will not be hindered by low spots. Soils which tend to be wet compact easily when turf is used for normal recreational activities. Aeration with machines that remove a core of soil and surface spiking help to promote better growth of grass under these conditions, the Toro official commented.

High Humidity Spurs Fungi

Dr. Houston B. Couch, Plant Pathologist at Pennsylvania State University, College Park, explained that there's nothing disease-causing fungi in turf like better than conditions of excess water and high humidity. Under these conditions, watch out for disease.

The type of disease that de-

velops will depend on whether it's warm or cool. Jerry H. Cheesman, Agronomist with the United States Golf Association Green Section, reported that in his studies conducted at Iowa State University bluegrass turf was more susceptible to *Helminthosporium* leaf spot when moisture levels were optimum and when nitrogen supply was high.

Water, Lime Affects Disease

It is becoming more widely recognized that watering, fertilization, and liming practices have an influence on the development of turf that make it either more or less resistant to several disease-causing organisms.

Professor Ted L. Willrich of the Department of Agricultural Engineering at Iowa State University outlined geologic processes that have resulted in the formation of water-bearing gravel and rock deposits.

Before attempting to solve problems of water shortages with expanded irrigation facilities, it is necessary first to determine the quantity of water needed and then to locate a source that will provide this amount.

Impound It or Pump It

In some areas the impounding of surface water is most practical. In others, water must be pumped from driven or dug wells. Local regulations on procurement and use of water must be followed.

Even where water is generally plentiful there are some years when shortages exist and turfgrass irrigation must be curtailed. In other locations watering of golf course fairways and irrigation of park and other large turf acreage is not practical.

Importance of encouraging deep root penetration of turf-

grasses was discussed by Tom Mascaro, president of West Point Products Corp., West Point, Pa. The deeper roots go into the soil the greater the volume of soil available from which moisture and plant food can be extracted, Mascaro observed. Roots penetrate compacted soil with difficulty, but when soil is loosened by use of mechanical aerifiers, roots grow deeper.

It should also be remembered that light, frequent watering helps keep roots near the soil surface and thus this practice should be avoided. Turf is more likely to be injured by hot dry weather if it is soft and succulent from fertilization with too much nitrogen, the speaker concluded.

Check Sprinkler System

In the final analysis, whether or not turf gets the amount of water it needs often depends on the adequacy of the sprinkler system, according to C. H. Dolan of Johns-Manville, who discussed problems of water use. Even distribution of water is important in producing a uniform turf. Such factors as sprinkler sizes, specifications and placement, pipe sizes and specifications, and pump specifications determine how evenly the water is placed over the turf. In some instances an under-designed system makes growth of grass more difficult than no system at all. An investment in high quality fine turf should always be protected by an irrigation system designed to meet the needs of the grass.

It has been estimated that about 70% of the problems which arise in turfgrass management are related to too much or too little water. Since water is essential for plant growth the turf manager cannot escape the responsibility of getting rid of excesses and of finding and applying more during times of shortage. Those who are most successful at these times give credit to a properly maintained and healthy turf for an assist in helping them survive periods of adversity.



Diversity of the turfgrass industry was evidenced by this gathering of Minnesota conferees. Left to right are John Kinkead, National Mower Co., St. Paul; George Bock, a maintenance superintendent from Robbinsdale; Andrew Windsperger, a school grounds supervisor, also from Robbinsdale; and Carl Wiebold, head engineer and maintenance supervisor, Mapleton Schools, Mapleton, Minn.

Share Your "Secrets," Experts Urge 300 Turf Pros at Minnesota Course

By JOSEPHINE B. NELSON

Extension Assistant Editor, Institute of Agriculture
University of Minnesota, St. Paul

"Share your mistakes, your successes, your secrets."

That was the gist of the advice given to turf managers by Ray Keen, Professor of Horticulture at Kansas State University, Manhattan, during the University of Minnesota's first Turf Management Short Course on March 17.

The short course was attended by some 300 people professionally interested in the care and management of turf for golf courses, sodding, parks, institutional grounds, and recreational areas. D. B. White, Assistant Professor of Horticultural Science at the University of Minnesota, was program coordinator.

"Mistakes in the art of main-

tenance can be fatal—to the grass at least," Keen told the turf managers. "We don't have time to make all the mistakes that can be made. Share your mistakes with others. Confession is good for the soul and the pocketbook in mistakes avoided. A wise man learns from the mistakes of others. That's why, if you share your mistakes, your successes, your secrets, you'll find your profession and your professional status will both grow!"

Seedbed Preparation: First Step to Good Turf

Proper seedbed preparation for turf seeding or sodding requires advance planning, according to George Blake, a professor in the Department of Soil Science at the University of Minnesota.

There are great risks to spring and summer plowing of fine-textured soils, Blake told the turf managers. The decision to plow and plant spots in early spring that were tromped out the year before usually results in a seedbed that is poor in structure and that puddles with the first rains. Although sandy soils can be tilled almost any time, clay soils will be best for seeding if they are plowed in the fall. If spring

seeding is not feasible, a green manure crop plowed under in midsummer will keep the seedbed in good condition for late summer seeding.

Before preparing a seedbed for large areas, give attention to drainage, surface leveling or grading, to lime where needed, and to fertilizer needs, Blake advised. Calcium from lime and phosphorus are the two elements that move very slowly in the soil and are best added before tilling and worked into the seedbed.

If the soil is tilled when it is too wet, great damage can be done to the seedbed. Seedbed preparation when the soil is at the proper moisture content is essential to a good seedbed.

Special soil mixtures may be needed in spots where there is a great deal of traffic. These can



Science and industry combined brains in this meeting between Edward Frederick (left), superintendent of the Southern School of Agriculture and Experiment Station, Waseca, Minn., and Charles Lenhart, St. Paul sales rep for the Toro Co.

be specified only after the sand, soil and peat ingredients are tested and the mixture quantities specified.

Seeding Techniques

In discussing the hows and wherefores of seeding and sodding, Professor White recommended seeding grasses at the following rates:

Bluegrasses—2-3 lbs./1,000 sq. ft.

Creeping red fescues—3-5 lbs./1,000 sq. ft.

Bluegrass-creeping red fescue mixtures—3-4 lbs./1,000 sq. ft. Ryegrass should make up no more than 10% of the mixture.

Mix seed well before sowing. If you sow by hand, divide the seed into four equal lots. Sow



Mutual turfgrass problems were discussed by delegates George Rostron (left) of Shorewood Nursery in Excelsior and T. Geron Bell, park superintendent, North St. Paul.

Common Ragweed (*Ambrosia artemisiifolia*)



Common ragweed (left) is an annual, reproducing by seed only. It is widespread throughout North America in fields and waste places. Each fall, ragweed produces large stocks of irritating pollen which contribute to the suffering of "hay fever" victims. A second species, giant ragweed (*Ambrosia trifida*) (right) is also an annual and an equally bothersome pollen producer. Giant ragweed has large, hairy, three-lobed leaves; common ragweed has hairy, multilobed leaves, each with a distinct midrib.

Stems are similar in both species: coarse, rough, and hairy. Giant ragweed has stiffer hairs. Height of common ragweed seldom exceeds 4 feet, but giant ragweed can attain 18 feet in moist fertile soil. Mature woody stems and stubble of both species persist into the following spring.

Flowers are unisexual in both species, that is, male and female flowers are found separately on the same plant. Tiny light-green male flowers, which produce pollen, are found in alternating rows on terminal portions of stems. Rows of male flowers are about 6 inches long. Inconspicuous female flowers are found where the leaves join the stems and at forks in stems near the tops of each plant.

Seeds are enclosed in a woody hull $\frac{1}{8}$ inch long. Hulls are ridged with blunt spines surrounding the seed tip. Roots of both species are easily pulled from soil since they are annuals. Roots are classed as taproots.

A third species, perennial or western ragweed, *A. psilostachya*, is a common inhabitant in the Mississippi Valley and westward. It is distinguished from common ragweed mainly by its spreading root-stalks, its occurrence in dense patches, and its finely divided, lobed leaves. It also seldom exceeds two feet height. Flowers and seeds are somewhat similar to other ragweeds.

All of these ragweed species can be controlled effectively with 2,4-D while they are in the fast-growing stage before midsummer. Repeat applications may be necessary. Later attempts at control are unsuccessful because stems become increasingly woody. All three species are susceptible to semi-permanent soil-applied herbicides.

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

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

each lot in a different direction.

For sowing mechanically, divide the seed into two lots and sow in two directions perpendicular to each other.

If seed is drilled, it should be drilled in at least three directions. Approximately 10% of the seed should be showing after the seed is covered.

When rolling seed in, do it with a light roller only, White advised. If it is a water-tank roller, it should be no more than a third full.

An area to be sodded should be prepared in the same manner as a seedbed. Sod should be laid across a slope and staked as needed. Joints should be staggered.

If peat sod is used, work some peat into the topsoil before laying the sod.

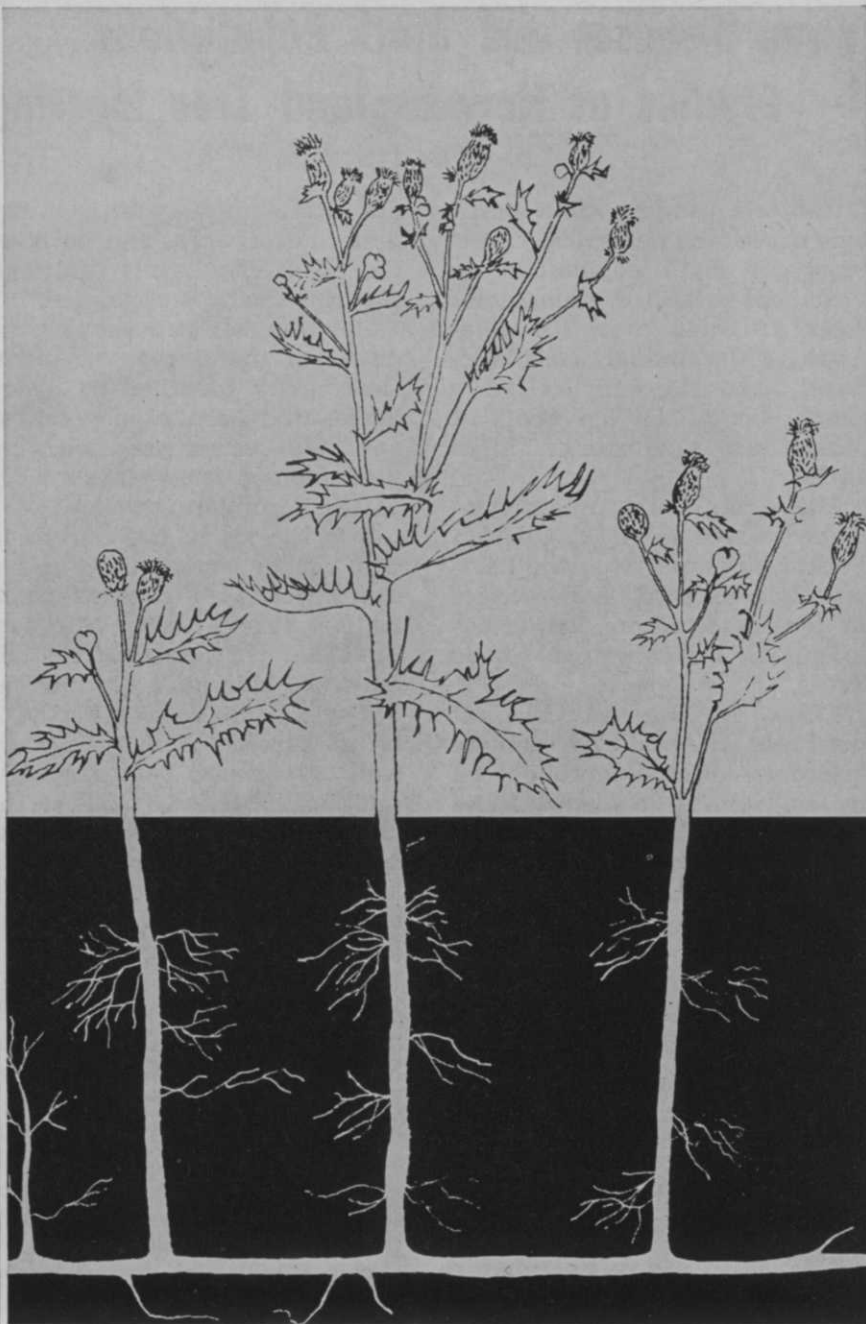
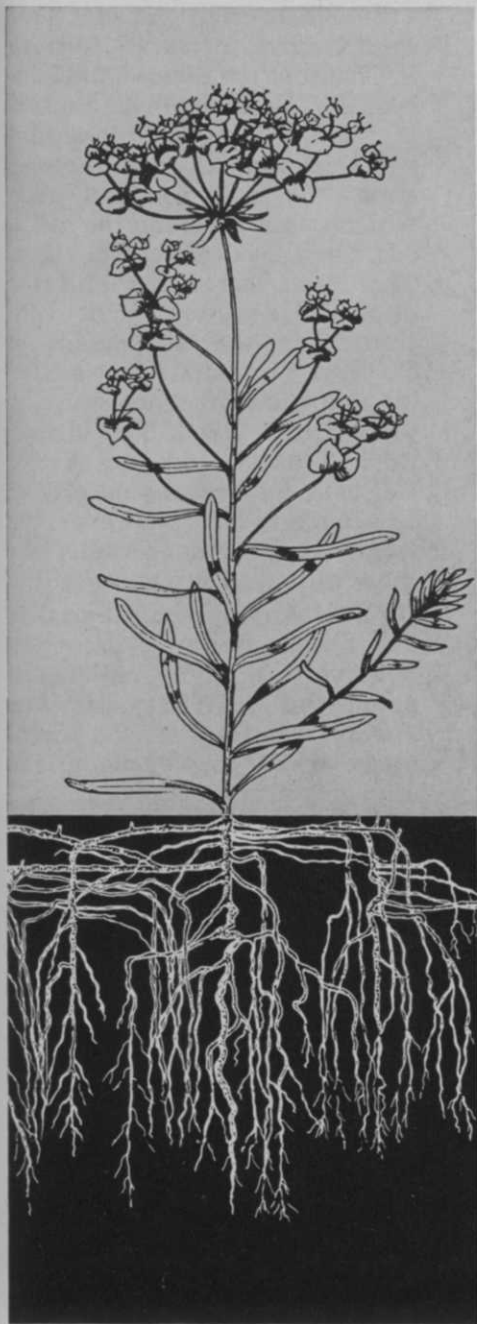
After it is laid, sod should be soaked and then watered well for three weeks or until it is well knit to the soil.

Fertilizer Tips

The highly soluble forms of nitrogen and potash are easily leached from the soil and will burn when improperly applied at high rates. R. S. Farnham, Assistant Professor of Soil Science at the University, warned the group.

Slow-release or controlled-availability fertilizers are relatively new and offer many advantages over the conventional-type fertilizers used on turf grass. Among the advantages of slow-release fertilizers are: (1) a single application may be sufficient; (2) they will never burn if improperly applied; (3) they release plant nutrients when needed; (4) they give uniform grass growth instead of periodic flush periods of growth; (5) they result in less leaching; and (6) they can be stored better.

Slow-release fertilizers for turf include both the organic and inorganic types. Sewage sludge and ammoniated peats are natural organic forms and the synthetics include forms of
(Continued on page 32)



For root-deep control of leafy spurge and Canada thistle use Hooker sodium chlorate

For over 35 years, it's been dependably destroying such pests as Canada thistle, leafy spurge, bindweed, Johnson grass and Russian knapweed.

Hooker sodium chlorate reaches deep into the soil to kill growing roots and germinating seeds. It goes on working for months.

Costs pennies. For only 25¢, you can sterilize 100 square feet of drainage ditch, fence line, or roadway for at least a year.

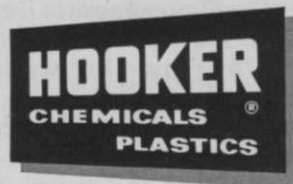
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AGRICULTURAL CHEMICALS

Virus Diseases and Moth Populations Studied at New England Tree Meeting

By TERRY STOCK

Subjects ranging from pesticide usage, and numerical trends of gypsy moth populations to virus diseases of ornamental trees attracted over 700 delegates to the annual Tree Wardens, Arborists, and Utilities Conference at the University of Massachusetts, Amherst, March 16-20.

Highlights of the program included a speech by Dr. Johnson Parker, physiologist at the Bartlett Tree Research Laboratories in Stamford, Conn., on "Non-infectious Diseases of Shade Trees."

These various physiological disorders, he said, are climate disorders—disorders brought on by soil problems, and those problems induced by atmospheric disturbances such as air pollution.

Assails Air Pollution

Contributing to air pollution, Parker said, are noxious vapors from exhausts of automobiles and trucks, organic compounds present in smog, and fumes from industrial sites. The nitric oxides from exhausts, Parker explained, give rise to ozone in the presence of sunlight and oxygen, and excess ozone causes leaf damage.

According to Dr. Parker, air pollution is the latest in a series of increasingly numerous physiological disorders, or noninfectious diseases, that are troubling trees in urban and suburban communities. These disorders account for fully 50% of all tree ailments, he noted.

"Policies of the Moth Superintendent's Duties," was the title of a speech delivered by Charles S. Hood, chief superintendent of the Bureau of Insect Pest Control of the Massachusetts Department of Natural Resources, Boston, during the weeklong program.

"There is a vast difference between the duties of the local superintendent and those of the tree warden. The tree warden's

duties include very little if any pest control work, and he is an elected official, while the moth superintendent is appointed."

Hood further stressed that the duties of the Bureau of Insect Control are governed by policy based on reason as opposed to specific recommendation, and that common sense plays a large part in formulating policy.

It is the job of the Bureau to help rid the communities of diseased trees, but suggestions in method vary with the situation. The final decision is usually left up to the individual community.

For example, Hood said, "DDT or methoxychlor work equally well as dormant sprays against elm bark beetles. DDT is the cheaper of the two, but the community may prefer to spend more money and use the insecticide less toxic to other forms of life—namely Methoxychlor."

Speaking on "Some Trends in Municipal Government and Administration," Dr. Robert A. Shanley, assistant director of the Bureau of Government Research at the University of Massachusetts, said, "American municipal government has been shaken to its roots by galloping urbanization over the past 20 years."

Shanley explained that trends have shown a preference for consolidating parks and recreation into one department rather than having separate departments.

"One trend of particular concern in Massachusetts," he noted, "is the loss of existing city park land. In Boston, for example, park land has been dwindling at an estimated rate of 5% per year, and 412 park land acres were transferred from 1952-1962.

"It is difficult to retain existing park and recreation acreage and to secure adequate recreation space for future urban needs," he concluded. "Federal encouragement through soundly administered urban renewal programs can do much to redress park attrition."

In his speech, "Shade Tree Pest Control for 1964," Clifford S. Chater of the Shade Tree Laboratory, Waltham Field Station at the University of Massachusetts, presented information about the most common pests which attack trees and the methods being used to control them. The birch leaf miner and the elm leaf beetle may be controlled by the application of carbaryl (Union Carbide's Sevin), but the application must be precise, he warned. This chemical may also be used to control fall cankerworms, as may DDT and methoxychlor; however, the larger the worms become, the more difficult they are to kill.

"Salt Injury to Roadside Trees" was the topic presented by Avery E. Rich, pathologist from the University of New Hampshire. He told of a recent study on 550 maples along U.S. Highway 4 in Northwood.

"The study significantly showed," he said, "that there was an inverse relationship between distance from the road and salt injury symptoms." The results of this and other experiments indicate that "salt plays an important role in maple decline in New Hampshire. Most of the injury occurs to trees within 30 feet of the edge of the pavement."

Richard E. Abbott, arborist with the Central Hudson Gas and Electric Corp. of Poughkeepsie, N.Y., said, "Trees are a major cause of interruptions to electric service, particularly during storms when falling trees and branches may account for upwards of 90% of the interruptions to electric service. Therefore, the primary functions and duties of a utility arborist should contribute to an improvement of electric service continuity."

The conference was sponsored by the Massachusetts Tree Wardens' and Foresters' Association in cooperation with the Electric Council of New England, the Massachusetts Arborists Association, the New England Telephone & Telegraph Co., and the University of Massachusetts Departments of Entomology and Plant Pathology.

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Five years of research and extensive field testing is behind THURICIDE 90T FLOWABLE microbial insecticide. It is the product of a new era in science. Now Stauffer makes it available in quantity to the pest control industry.

Man lives in a veritable sea of microorganisms—we are literally surrounded by them. Fortunately, the overwhelming majority are friendly, useful organisms. Some of these are antagonistic to other lower forms of life. This is the principle behind THURICIDE 90T FLOWABLE!

THURICIDE 90T FLOWABLE is a microbial insecticide, not a chemical. It is a suspension of spores of *Bacillus thuringiensis* Berliner — a useful bacterium in suspended animation.

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THURICIDE 90T FLOWABLE is stable. It can be stored under normal conditions for an indefinite period of time without losing potency. It spreads well and sticks to foliage and remains completely inert until eaten by caterpillars.

Use THURICIDE 90T FLOWABLE the next time you have a worm problem. It is the new approach—the selective approach that produces results with greatly reduced risks.

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New Snow S-2C Airplane Said to Be Greatly Improved

A new, wider wingspan is the basis of greatly improved performance in the 1964 Snow S-2C agricultural airplane, reports its manufacturer, Snow Aeronautical Corp.

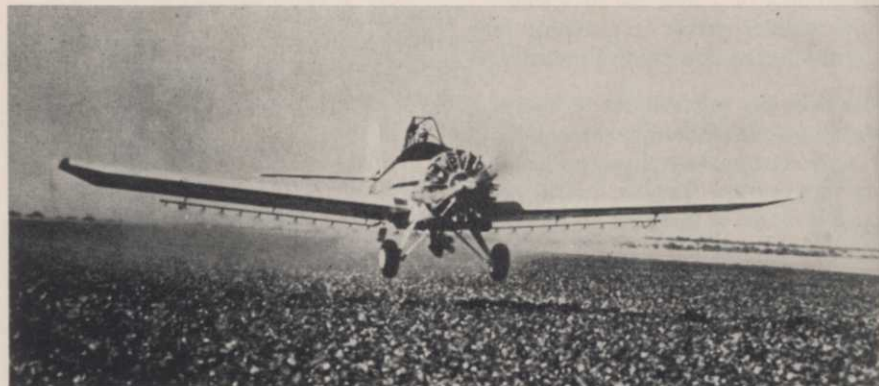
Featuring new wingtips designed specifically for low-speed flying and larger ailerons for better maneuverability, the new S-2C can be safely turned in less time, allowing the operator to profitably serve growers with smaller fields. The larger ailerons are balanced to give exceptionally light stick forces, Snow says.

An additional 4½ feet of wing combines with the S-2C's new tips to permit shorter take-offs, better climb and glide characteristics, and a lower stall speed. This permits the operator to use the heavy-load-carrying S-2C on smaller fields, providing better coverage for the grower, it is reported.

Modern lines of the plane give the pilot the necessary overall good visibility for maximum safety in ag-operations. There is a choice of engines (450 or 600 hp, Pratt & Whitney).

A complete line of dispersal equipment is available for the S-2C which is engineered for quick, easy changeover to permit use of the best suited system for each particular job, whether for seeding, dusting, fertilizing, or spraying.

For a color brochure and more information write Leland Snow, president, Snow Aeronautical Corp., Box 516, Olney, Texas.



The New Snow S-2C agricultural airplane offers ag-operators and growers a wider, more uniform swath resulting from the increased span and new wingtips. Designed specifically for aerial application use, the single low wing combines the best features of downwash and vortex action to evenly distribute spray or dust, Snow reports.

Meeting Dates



International Shade Tree Conference Western Chapter Meeting, Ben Franklin Hotel, Seattle, Wash., June 21-24.

Hyacinth Control Society Fourth Annual Meeting, Holiday Inn, Tallahassee, Fla., June 28-30.

American Society of Landscape Architects Annual Convention, Hotel Baker, Dallas, Tex., June 28-July 1.

American Association of Nurserymen Annual Convention, Statler-Hilton Hotel, Boston, Mass., July 19-22.

International Shade Tree Conference, Shamrock Hilton Hotel, Houston, Tex., August 15-21.

National Agricultural Chemicals Assn. Annual Convention, The Greenbrier, White Sulphur Springs, W.Va., Sept. 8-11.

Midwest Regional Turf Field Days, Purdue Univ., Lafayette, Ind., Sept. 14-15.

Society of American Foresters Annual Meeting, Hilton Hotel, Denver, Colo., Sept. 27-30.

USDA's New Lab Set

A regional weed research laboratory will be established at Stoneville, Miss., USDA Secretary of Agriculture Orville L. Freeman announced recently. Site selection and other preliminary discussions are currently underway.

The new laboratory is expected to be in operation in 1966, and will be the center from which USDA will make a concerted attack on weed problems in the South.

Report on Aerial Application of *Bacillus Thuringiensis*

Connecticut Experiment Station tests of a new formulation of *B. thuringiensis*, Thuricide 90T, showed variable results in a 250-acre trial last summer in Portland. Larvae of the gypsy moth and of geometrids, or loopers, were numerous in the test area of Meshomasic State Forest.

Entomologists Charles C. Doane and Stephen W. Hitchcock of the station report that one gallon to the acre of Thuricide 90T, applied from a helicopter, controlled defoliation rather well in one 50-acre plot but was less effective in a nearby plot.

Drs. Doane and Hitchcock suggest that the uneven effect of the sprays may be partly explained by cool weather in mid-May following 10 warm days.

Reports from responsible sources indicate there was no immediate effect of the spray on aquatic insects, the bird population, or small animals.

A complete report on 1963 tests of *Bacillus thuringiensis* is

available as Bulletin 665 of the Connecticut Agricultural Experiment Station, "Field Tests With an Aerial Application of *Bacillus thuringiensis*." Address requests to Publications, Box 1106, New Haven, Conn. 06504.

Lethelin Offers Borer Killer

Lethelin's new Borer Killer Concentrate is now available to those who are faced with a widespread borer problem. This product contains 95% active material of which 20% is lindane.

It is mixed with either hard or soft water and sprayed or painted on the infested trees or shrubs.

For information write to Lethelin Products Co., Inc., Mt. Vernon, New York.

CSEA to Meet July 28-Aug. 1

The 38th annual conference of the California School Employee's Association will be held July 28 through August 1, 1964, in Long Beach, California. Special emphasis on turfgrass maintenance



The new lightweight fiberglass tank is designed to provide mobile storage of water and chemical solutions. Available in 40, 80, 150, 200, 300, and 550-gallon capacities, the tank has covers constructed so that hose reels and pumps can be mounted to form compact units. For information write Plastic Products Div., The Ansul Co., Marinette, Wis.

nance will be stressed during Education Day, Friday, July 31.

During a morning session of the association, July 31, Clifton C. Willoughby will be chairman of the Committee on Gardening and Grounds. A talk on turf fertilization is to be given by Howard H. Hawkins, past president of the California Fertilizer Association and a former member of the California Soil Improvement Committee.

Triple-Action CHLOREA[®] GRANULAR MOST POWERFUL WEED & GRASS KILLER

A dry, granular combination of 3 proven chemicals . . . for use around buildings, storage yards, parking lots, fences and other areas where complete, long-lasting control of weeds and grass is needed. Requires only 1 to 1½ pounds per 100 square feet . . . easily applied by hand or with mechanical spreader. Saves labor . . . improves maintenance . . . prevents vegetation fire hazard.

KILLS ALL VEGETATION

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Soil surface action kills shallow-rooted weeds and grasses; also prevents seedling growth.

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Long-lasting residual action stops growth for at least a season; usually much longer.

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Chemical penetrates deep in the soil . . . kills deep-rooted perennial weeds and grasses.

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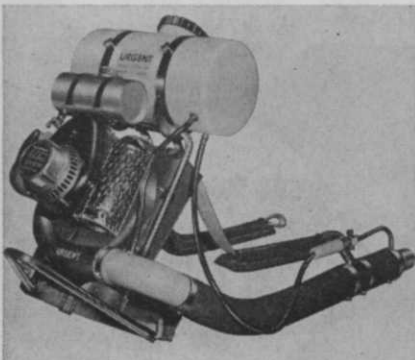
The New No. 101 "King Kemp" shreds up to 101 cubic yards of wet or dry soil an hour. Kemp shredders are used for topsoil, bedding, litter, mulch, and other materials requiring quick, uniform shredding, grinding or pulverizing.

Kemp Shredder Has High Output

The new No. 101 "King Kemp" has a capacity of up to 101 cu. yds. an hour and is now being offered topsoil suppliers, turf supervisors, contractors, and other users. "No matter how fast you load the feed drum, the shredding drum will not be overloaded," says Lyman N. Kemp, president, Kemp Mfg. Co.

Hanson Imports Power Sprayer

Hanson Equipment Co. is now the exclusive importer of the Saturnus "Urgent" power knapsack sprayer, it was announced recently by Howard C. Hanson, president of the firm. Distribution of the sprayer is through farm equipment wholesalers who are currently selling the Hanson



The Saturnus "Urgent" knapsack sprayer which is imported by Hanson Co. of Beloit, Wis., is latest entry into this line of equipment.

The shredder processes both wet or dry soil, and has synchronized feed and shredding drums that assure evenly shredded and blended soil. It throws soil up to 25 to 30 feet for stockpiling, automatically separating stones and hurling them beyond the soil pile, Kemp says.

Complete information is available from the company at 750 Kemp Bldg., Erie, Pa. 16512.

line of agricultural spraying equipment.

The "Urgent" sprayer is manufactured in Holland, and is a self-contained and portable mist unit for agricultural spraying application. The sale and complete parts and service facilities are being developed by Hanson and will include the United States and Canada.

Full details may be obtained from the company at Beloit, Wis.

Rhodia Introduces "Crylde"

"Cryldé," a new material that reportedly protects the fruits and flowers of shrubs and trees from bird depredation, is now available from Rhodia, Inc.

Similar to a spider's weblike mesh, Cryldé is said to be resistant to wind, weather, and soil. It can also be used on newly seeded lawns and home gardens. Write Rhodia, Inc., 60 East 56th St., New York, N.Y., for data.

Suppliers Personnel Changes

Amchem Products, Inc., announced recently that it has added George G. Johnston to its sales staff in order to better serve the dealers and distributors of its agricultural chemicals in the state of Arkansas. Johnston was formerly with Pennsalt Chemicals, and is a member of the Louisiana Turf Grass Assn., the Agricultural Assn. of the same state and the Arkansas Pesticide Assn.

California Chemical Co. recently named L. R. Hamilton as Assistant National Sales Manager-Fertilizer for its Ortho Division. With Calchem for ten years, Hamilton was previously assistant to the manager of supply and distribution. His new responsibilities will include sales of fertilizers manufactured at Richmond, Calif.; Kennewick; and Fort Madison, Iowa. The company also appointed William Hancock as sales representative for its Ortho Division; he will handle sales of pesticides and fertilizers for garden and home use in Nebraska and Iowa.

Morton Chemical Co., a division of Morton Salt Co., has appointed Dr. Raymond P. Seven to be general manager of its Agricultural Department. Dr. Seven, formerly assistant general manager of this department, will continue his active supervision of Morton's expanding activities in the marketing of agricultural chemicals.

Pennsalt Chemicals Corp. has assigned Dr. Edward E. Ivy to their technological center near Philadelphia, Pa., where Dr. Ivy will serve as entomologist, Technical Development Department. Named to a newly created position by Pennsalt is Benjamin J. Stonoga who is Product Manager, BK/Pennswim Department, Chemical Specialties Division.

United States Borax & Chemical Corp. in the Pacific Northwest, headquartered in Portland, now has Ronald B. Pearson as a sales representative. Pearson succeeds G. L. Holt who recently was transferred to Chicago and named Midwest technical representative-plant food development.