

# WEEDS TREES and TURF

JANUARY, 1968



## Weed Control Issue

Bifluid Spray System

Aerial Applicators Meet

Smiths Talk Business

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

# when your season rolls around...



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ES-444

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## The Cover

Helicopters have become workhorses in the vegetation care industry. The Hiller 12-E, piloted by Gil Liming of Reforestation



Services, Salem, Ore., is one of 3 such ships owned by the corporation. It is equipped with Dow Chemical Company's adjustable in-flight swath system spray unit. Partner in the venture with Liming is H. S. Poulin. Most of their work is vegetation control on power line and railroad rights-of-way. The landing pod on the tank truck was built to order for the firm and facilitates landing in heavy brush where the rotors might become entangled. Landing atop the truck also prevents livestock or animals from damaging the rotors at night.

## WTT Mailbox

### A Cooperative Venture

I have not had the opportunity to congratulate you on the fine spread in Weeds Trees and Turf on our aquatic work... We have had several good comments about the article. You will note by the enclosed copy of the letter from Mr. John Underwood of Solo Industries to me that he is also pleased with the spread. Like him we are interested in obtaining copies....

Lyle W. Weldon

Crops Research Division  
Agricultural Research Service,  
USDA  
Ft. Lauderdale, Fla.

### We Are Happy To Oblige

In my work with licensed Windsor sod growers through the country, I have often recommended your magazine as a useful addition to the growers library.

If you would like, I could provide you with names and addresses of 50 potential subscribers who I am sure would appreciate a complimentary copy....

Paul Florence

Manager, Windsor Sod Culture  
and Marketing  
Scotts  
Marysville, Ohio

# WEEDS TREES and TURF

January 1968  
Volume 7, No. 1

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### BPA Application Applied For

WEEDS TREES AND TURF is published monthly by The Harvest Publishing Company. Executive, editorial: 1900 Euclid Ave., Cleveland, Ohio 44115.

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

Subscription Rates: U.S. and possessions, 1 year \$7.00; 2 years \$12.00. All other foreign subscriptions 1 year \$10.00. Change of Address: Three weeks advance notice is necessary for change of address. Both old and new address must be given. Post Office will not forward copies. Controlled circulation postage paid at Fostoria, Ohio 44830 application pending.

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## From Whence Your Help

Where will you find the men you'll be needing this coming season, or a year or even two years from now?

Capable help is in short supply. This isn't true just in isolated sections of the nation. No state or region is exempt. Nor is any one phase of the industry. Tree care companies can't find enough men to justify the time and money it takes to make them safe and competent workmen. Spraymen are even more pressed. More than half the states now have licensing laws. Requirements vary, but all require a licensed foreman with the equipment at all times. Some even require that the crew be licensed as apprentices. Turf care supervisors today have so much expensive equipment and such high investments in turf that they cannot afford to trust any but trained operators.

The existing situation is critical. Federal job training programs are not the answer. Too few trainees have the capability and responsibility to reach the technical level which the vegetation care industry demands. Many of those who could make the grade and reap a satisfying career cannot see the advantages in the business. Welfare payments of one type or another serve as a block to others who could handle at least part-time hourly jobs. This refusal to accept available jobs cannot be blamed on the pay scale. Minimum wage laws kill this argument.

We believe that the solution for spraymen, tree care companies, and others is a self-help training program. This type program must be preceded by a recruiting effort. Operators need to locate young men, sell them on a career in the business, and then train them over a period of years. Pay advances need to be commensurate with the level of responsibility and technical ability of the trainee, and pay will have to compete favorably with the local labor market.

Companies have been recruiting help for years, though it has been largely at the college level. This is true of golf course management now. We believe the recruitment program will need to reach the high-school youngster, well ahead of his graduation. He may be started on summer work, during which time the operator will be able to judge ability and encourage those young men he feels will be able to help his own business grow. Some financial help for technical schooling may well be in order for those trainees who show promise.

School counselors can suggest careers, but only the operator who knows the business can sit down with a young man and point out the coming technological changes which will challenge many young and capable men.

WEEDS TREES AND TURF is the national monthly magazine of urban/industrial vegetation maintenance, including turf management, weed and brush control, and tree care. Readers include "contract applicators," arborists, nurserymen, sod growers, and supervisory personnel with highway departments, railways, utilities, golf courses, and similar areas where vegetation must be enhanced or controlled.

# Bifluid Spray System



## Helps Place Herbicides On Target

By DAVID P. PETERSEN

Vice-President, Stull Chemical Company, San Antonio, Texas

A common problem in many endeavors is our human tendency to get "the cart before the horse". This old cliché is most certainly true in the chemical industry, specifically in the case of chemical pesticides, where a really fantastic array of new insecticides, herbicides, fungicides, etc., have reached the user market in a single score of years since World War II.

A vast majority of these new pesticides work—if you put

them where they belong and keep them there. It is at this point that the post-war cart got before the pre-war horse. Application techniques did not keep pace with product development, and the whole nation heard about some of the consequences through books, magazines, television, congressional investigations, and the courts.

Our own activities in the area of right-of-way brush control contracting brought these

facts home very pointedly. We were applying hormone herbicides from helicopters to narrow strips of brush stretching over thousands of miles of agricultural lands. The exposure rate to susceptible crops was obviously alarming, and we bought a few bales of premium cotton, some of the world's most productive vegetable gardens, and a number of priceless shade trees before we came to the full realization that there had to be a better way to

**Central Power & Light Company utilizes bifluid spray equipment to apply invert herbicide spray for right-of-way brush control inside city limits at Laredo, Tex.**



**U.S. Army installation at Fort Bliss, Tex., uses bifluid system for weed control around quarters areas. System is adaptable for industrial uses such as rights-of-way, fence lines, plant yards, sub-stations.**



apply 2,4-D, 2,4,5-T, and pesticides in general.

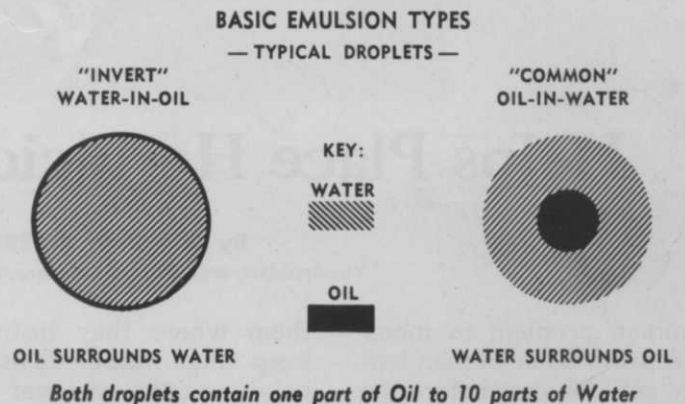
Thus motivated, we undertook a two-fold research program—safer formulations of the basic herbicides, and a safer way to get them from the helicopter to the right-of-way some 75 feet below the aircraft. Our formulation work focused on the water-in-oil (“invert”) emulsions which displayed good qualities of droplet size and drift control. Simultaneously, we developed a bifluid method of proportioning, mixing and spraying the water and oil phases of the emulsion in a continuous process. This was necessary due to the difficulties normally encountered in premixing the heavy, mayonnaise-like, “invert” emulsions and then pumping them into a sprayer for use.

The first commercial applications with the new Stull Bifluid System were made by helicopters on utility rights-of-way in 1959. Almost immediately, it became apparent that the same demands for improved application techniques were common to aerial and ground equipment alike, so the system was translated to all kinds of ground power sprayers for boom, air-blast, or handgun applications as well as to a much larger number of individual herbicide chemicals. In the latter case, a series of neutral spray adjuvants are used to produce “invert” emulsions in combination with the ever increasing number of water soluble, oil soluble, or conventionally emulsifiable herbicides available for selective weed control (See Figure No. 1). These spray adjuvants provide the means to apply one, two, or

## THE STULL BIFLUID SYSTEM

**GENERAL** — The Stull Bifluid System is a scientifically and commercially accepted method for the preparation and dissemination of water-in-oil (invert) emulsions. The major advantages of the system are:

1. Maximum control of spray drift approaching virtual elimination.
2. Absolute accuracy in proportioning of the oil and water components of the emulsion through orifices of known diameter.
3. Maximum mixing of components on a continuous basis, instantaneously, during actual spraying operations, to produce an “invert” emulsion of absolute homogenous composition.
4. Maximum uniformity of droplet size over the entire effective spray swath.
5. Maximum conservation of spray components since all of the chemical reaches its intended target.
6. Maximum versatility since the system may be installed on any type of application vehicle (aerial or ground).



**PRINCIPLE OF OPERATION** — The Stull Bifluid System is basically a process for the simultaneous proportioning, mixing and spraying of an oil-base pesticide chemical formulation and water. These components form an emulsion of water-in-oil, commonly referred to by agriculturists as an “invert” emulsion, rather than the “common” oil-in-water emulsion normally used in agriculture.

Water-in-oil emulsions characteristically have a thick “mayonnaise-like” consistency which in part accounts for their resistance to wind drift. In addition, the water part of the droplet is surrounded by an oil film which nearly eliminates the evaporation rate of droplets as they move through the air. Common oil-in-water emulsion droplets reduce in size rapidly as the outer water film evaporates. This resistance to evaporation by invert emulsions accounts for a part of the drift resistance and for the uniformity of spray pattern since the droplets remain essentially the same size from their point of discharge to their intended target.

**Helicopter applies invert emulsion of 2,4-D to alligatorweed infestation in Texas irrigation canal.**



**Results of early season control shown at the left are still apparent four months following treatment.**





**Figure No. 1. Herbicide Chemicals Now Being Applied Through the Bifluid Spray System**

Basic Herbicide	Formulation	"Inverting" Agent	Remarks
2,4-D and 2,4,5-T	Oil Soluable Amines	Self Emulsifying	Other herbicides may be added to the water phase.
2,4-D and 2,4,5-T 2,4-D, 2,4,5-T and 2,4,5-TP	Water Soluable Amines LV Ester Concentrates	Spray Adjuvant Use with Oil Soluble Amine or spray adjuvant	Emulsify LV Ester concen- trate in the water phase.
Ammonium Sulfamate	Salt	Spray Adjuvant	Dissolve Ammonium Sulfa- mate in water phase.
Dalapon	Sodium Salt	Spray Adjuvant	Dissolve Dalapon in water phase.
Dicamba	Amine Salt	Oil Soluble Amine of 2,4-D or 2,4,5-T, or spray adjuvant	Dissolve Dicamba in water phase.
Diquat	Salt	Oil Soluble Amine of 2,4-D or 2,4,5-T, or spray adjuvant	Dissolve Diquat in water phase.
MSMA	Salt	Oil Soluble Amine of 2,4-D or 2,4,5-T, or spray adjuvant	Dissolve MSMA in water phase.
Picloram	Potassium Salt	Oil Soluble Amine of 2,4-D or 2,4,5-T, or spray adjuvant	Dissolve Picloram in water phase.
Propanil	Emulsifiable Concentrate	Spray Adjuvant	Emulsify Propanil in water phase.

more herbicides at the same time.

**Existing Pumps  
Used In New System**

Simplification of equipment has been a constant goal with the bifluid system since its inception. From a rather complex dual storage, dual pumping, dual discharge, dual mixing nozzle has evolved the simple installation of a mixing device into the suction side of an existing sprayer pump. The discharge of the pump proceeds through existing equipment. There is, of course, a need for an additional storage tank to hold the oil phase of the emulsion, but this is only about one-tenth the size of the regular spray tank, since the mixing ratios involved average one part oil to nine parts water by volume.

Although the bifluid system was designed principally as a safety control in pesticide applications, other advantages presented themselves over a number of years usage (Figure No. 2). Foremost of these advantages appear to be the great reduction in evaporation losses as experienced with conventional emulsions and straight solutions, as well as the greater size uniformity and spreading characteristics available with "invert" emulsion drop-

lets in comparison to other liquid systems.

**Bifluid System Use  
Is Expanding**

The bifluid system is now finding expanding use throughout the world—from Africa to Australia to Europe to South America, as well as in the United States and Canada. Federal agencies have used the bifluid system in this country over the past several years on increasingly larger acreages for selective brush control programs in forests, rangelands, reservoirs and flood control projects.

Industrial usage has increased rapidly from the initial helicop-

**Figure No. 2. Advantages of the  
Bifluid Spray System Compared to  
Straight Solutions or Conventional  
Emulsions**

- Reduction in evaporation losses.
- Reduction in run-off waste.
- Reduction in spray drift.
- Reduction in application labor.
- Reduction in equipment corrosion.
- Reduction in rain washoff.
- Increase in foliage and stem penetration.
- Increase in droplet spreading characteristics..
- Increase in droplet size uniformity.
- Increase in spray unit capability.

ter applications. Rights-of-way, fence lines, plant yards, and substations are representative of the many industrial non-crop lands which require routine vegetation control maintenance—and more often than not, in close proximity to individual property-owner neighbors whose goodwill would be lost quickly if damages were allowed to occur.

Landscaped areas such as parks and golf courses can now be safely maintained free of broadleaved weeds and many undesirable grasses through the application of combination sprays such as 2,4-D, and MSMA without endangering ornamental plants close by.

We like to feel that the bifluid spray system was a major step forward in getting the horse back in front of the cart. Certainly, it has spurred a lot of worthwhile research and development in other, safer, application techniques since 1959. Agricultural and industrial losses due to undesirable vegetation are one thing—damages paid to a neighbor for perfectly unintentional drift or misplacement are something else—but the two losses come from the same pocket. Proper application with the bifluid spray system can do a very commendable job of eliminating both losses at one time.



**Mechanize and beat the labor problems** which beset many tree care companies today. This is the advice of Ted Smith who finds this 5-ton Alenco crane an indispensable piece of equipment.

**W**ELCOME to Smith Tree & Landscape Service, Inc. So states the opening line of the company's employe manual. It probably should be on their front door, too, since the Smiths are specialists both in their business

**Automated business office operation** has become key to business management for the Smiths. Handling Burroughs sensomatic machine is Mrs. Ardith Donner.



**Management session at breakfast bar** is almost daily occurrence for Smith Tree and Landscape Service, Inc. Key members of management are, left to right: Edwin E. (Ted) Smith, president and general manager; Mrs. (Jane) Smith, secretary-treasurer and landscape architect; Thomas D. Smith, head of spray department and diagnosis; and Henry J. LaBrosse, vice-president and manager of landscape planting and construction.

## Business Acumen and Specialized Training

*provide formula for success  
for  
Smith Tree & Landscape Service, Inc.  
Lansing, Michigan*

and in making clients and visitors feel at home.

Their business, which during the peak season carries 40 employes, is operated from their home. Management sessions are held at the breakfast bar and a fully automated business is carried on in the ground level basement. It's a totally different and expanded company than the Smith Tree Service which originated in 1945 and operated with the dining room and kitchen of their old home as headquarters.

Today, the company consists of 7 divisions, each operated by a specialist in the field. Edwin E. Smith, known coast to coast only as Ted, is president, general manager, and supervisor of the Tree Department. Ted points out that

this department of the business consists of a complete tree service including bracing, cabling, diagnosis, insect control, feeding, etc. Tree moving and planting is a phase of the landscape operation in their organizational structure. He also reports that tree removal is big business now and limited only by available manpower. Dutch elm disease is taking a great toll of the big trees in Michigan as is true in many other areas. The Smiths do a great deal of spraying along with taking out dead trees.

Early in his career, Ted served as a foreman for the city of Lansing and earlier as superintendent of grounds at Willow Run. During his tenure with the city of Lansing, he also did private

spraying on the side, finally deciding along with his wife, Jane, to go into business for themselves. Mr. Smith handled the tree care work plus spraying and Mrs. Smith the telephone, book-keeping, and office work for the new company, with, as she says, only a typewriter and no adding machine.

Today they operate out of a new and modern home, designed specifically for both home and business. It overlooks a spring-fed lake and their nursery. The company's 7 divisions are equipped with the most up-to-the-minute equipment available and manned with longtime, experienced employees. Six key members of the company have college degrees in their specific specialty.

**Broad Range Of Service Equipment**

Equipment considered as a necessity for the company includes a Burroughs office machine for cost accounting, a 5-ton Alenco crane, radio equipment which includes 5 mobile units plus the base station, and the usual trucks, chipper, stone picker, sprayers, and power equipment necessary for vegetation control, tree care, and landscape work.

Success and growth of this company can largely be attributed to two key factors. These are business acumen and specialized training of staff. As to which has been most important, the Smiths do not offer an opinion. Visiting with them brings out the fact that they believe each complements the other and that success might not be possible without both.

Profitable operation demands astute business practice. Yet quality of service and technical knowledge of the specific jobs handled are mandatory if a community is to support the business. The Smiths feel that learning to operate a business has been the factor responsible for permitting them to take advantage of their knowledge and experience in the tree and landscape field.

Ted graduated in 1940 at Mich-

**New and modern dwelling** is designed specifically for both home and business. Entire ground floor is used as office headquarters for the 7 divisions of the company.



**Roger Myers, left, and Mrs. Smith** discuss details of landscape plan which will later be fulfilled by appropriate divisions of the company.



**Tom Smith** who handles spray department and diagnostic work handles radio while working up office report and laying out schedule for coming day.



**Student employee, Dave Muma,** fills tank of chipper at Smith's new service center. Company operates 14 trucks, 4 tractors, 2 cars, and airplane.



igan State University with a degree in forestry. After several years in the business and after the children were born, and growing, Mrs. Smith, or Jane, returned to college full-time and picked up a degree, in 1956, in landscape architecture. Thomas D. Smith, the eldest son, following the lead of his parents and being interested in the business, attended the University of Massachusetts at Amherst for his degree, granted in 1965 in arboriculture. He is in charge of the company spray department and handles all diagnosis work. Jane, besides serving as secretary-treasurer of the organization and office manager, heads a professional landscape design service, a separate division of the company which is operated as Jane Smith & Associates. This professional office engages the services of the tree care, landscape, and nursery divisions as needed. In this way, actually two companies operate from the same business office.

Henry J. LaBrosse, a vice-president, is manager of landscape planting and construction. He, too, has a degree in forestry, and has been with the company since 1951. Harold Mitchell, another vice-president, is manager of tree operations and a company stal-

wart since its inception in 1945. Merrill Wilson, foreman of utility line clearance, joined the company in 1947. Larry Tooker, foreman of the nursery, has been with the company only two years, but has a master's degree in horticulture and is helping expand this end of the business. Roger Myers, another recent employe, is a graduate landscape architect.

#### Management Team Members Each Have Specialty

Each member, including the Smith management team, has made his own place in the company, based on his specialty and ability to develop it into a component part of the overall business. Being able to activate and utilize this talent in a team operation points up the ability of the senior Smiths as personnel managers.

Equally important with staff development has been the Smiths own development through the years as business specialists. They have been able to apply the business principles necessary to successfully manage a growing company. It's at this point that the Smiths give liberal credit to their association friends and groups. They mention specifically the National Arborists, the International Shade Tree

Conference, and a Michigan group known as the Little Six. Jane says they have had help when needed. She and Ted feel that the monies they pay for association memberships and the time and effort expended in working with these groups is the best investment they have made through the years. Businesswise, they believe it a must for a company such as theirs. But beyond the business aspects is the association with others in the same type business on a basis which develops into lifetime friendships.

The Little Six, an association to which the Smiths attribute much of their business training, is an organization of 6 tree and landscape nurserymen groups, headquartered in various sections of the state. Founded in 1942, membership through the years has been maintained at 6. Generally, the groups do not compete for business, and very little of their trade territories overlap.

Little Six members meet 4 times yearly for 2-day sessions on their businesses. Each member lays out his company books and answers all questions regarding same. They discuss individual and mutual problems, along with business principles.

**Bonsai trees** are grown in small nursery greenhouse as sideline to business by Larry Tooker, foreman of nursery. Tooker began seeking out and developing specimens and now has small, but impressive collection.



**Office assistants** who are learning office management phases of business are Mrs. Gerald (Lois) Gable, daughter of the Smiths, left, and Mrs. Thomas (Brenda) Smith, wife of Tom.



They help one another by spotting weaknesses, discussing costs and prices, equipment, and any other factor affecting business. Once a year they meet socially, recently celebrating their 25th anniversary. Besides the meetings of top management, key employees of each are sent to a training meeting once yearly. To date, these employe meetings have been primarily spent on an introduction to management.

In analyzing their own business, the Smiths found that coffee breaks were costing them approximately \$75 daily. A session with the employees led to development of a policy that employees bring their own coffee with them to the job, do not use company vehicles for the purpose, and rigidly maintain 10-minute breaks. Another source of lost time proved to be the so-called "ulcer" hour or starting time each day. Working with foremen, the Smiths were able to organize their way around most of the obstacles here. In both cases, they found employees understanding and helpful.

#### Business Office Is Fully Automated

Automating the business office grew out of various association training programs and as a natural result of growth. The current Burroughs Sensamatic machine will do cost accounting, maintain a running breakout of down or nonproductive hours, and help calculate the various payroll and tax needs. Mrs. Smith feels that this equipment has helped as much as any other single factor in maintaining the growing company on a business basis.

Clients apparently appreciate the businesslike approach to the work which they hire done. The Smiths use a standard form for tree work. This locates trees in relation to the residence and records size and number. Besides his regular job order, each employe also is provided with an additional work authorization in cases when additional work is



Stone picker is another important piece of equipment in the Smith mechanized operation. On large school landscaping job, cost of manual labor saved on this single job paid a big portion of first year's depreciation on the machine.

Jack Parkhurst, assistant manager of landscape planting and construction, unloads rocks from school landscaping project.



called for. Employees do not do additional work without this form and until it is signed by the customer. This authorization tends to eliminate problems in billing and with foremen or employees involved in the work. Each, along with the company, has a clear understanding of procedure.

Employees respect and appreciate the frank manual of policy which each receives on joining the company. This applies both to the 28 key employees and the part-time help, the latter being made up largely of Michigan State University students who are majoring in the field.

The policy manual gives a brief history of the company, lists the officers and foremen along with their positions and provides general policy statements relating to conduct and use of equipment. For example, the manual states that personnel

are expected to maintain personal behavior and appearance which are a credit to the organization.

They are asked to be clean shaven, as neatly attired as the job will permit, and to refrain from liquor or profanity on the job. Common courtesy is to be shown customers and other employees. Key employees of the company participate in a company retirement program which is with Mutual Benefit of Connecticut.

By keeping customers alerted with a double postcard type direct mail piece, offering a 100% guarantee for both labor and material, and maintaining a business approach in dealing with both employe and customers, the Smiths have made theirs an enviable record. Their current monthly volume today often exceeds the yearly gross of five years earlier.



# Algae Control In Inland Water

By S. J. TOTH and D. N. RIEMER

Department of Soils and Crops, Rutgers University, New Brunswick, New Jersey

**I**NLAND water, particularly man-made ponds, have become important nationwide. Some 2-million ponds are used for recreation, irrigation, fire protection, livestock, commercial fish production, and a host of related uses.

Such ponds are becoming more subject to pollution with the population buildup and increased use. Algae is a common problem. Because of this and the fact that copper sulfate is the primary control agent for algae in ponds, we made a special study of how copper sulfate behaves when applied to pond water.

We used an atomic absorption technique for direct, rapid analysis of water. Our goal was to measure the degree of stratification of dissolved copper in treated pond water.

We found that present rates of copper sulfate will control algae in ponds, but not in all cases. At times, proper concentration is not attained. We found that higher rates are needed in some cases since algae and bottom muds take copper

out of solution too quickly for it to be effective. In other ponds, it may be necessary to use lower rates to prevent killing of fish or insects which the fish depend on for food.

## New Jersey Ponds Used In Experiments

We conducted four series of experiments utilizing five different New Jersey ponds identified as A,B,C,D, and E. Ponds A,B and C are located in Warren County, New Jersey and ponds D and E in Monmouth County, New Jersey. Some ponds were treated once and others twice throughout the course of the study. Waters of all five ponds were characterized prior to treatment by determining pH values, conductivities and the concentration of thirteen different elements.

Material used was #8 mesh, granulated copper sulfate with a particle size varying from approximately  $\frac{1}{8}$  to  $\frac{1}{4}$  inch. The copper sulfate was applied with a hand-operated granular spreader and it was observed that the particles sank immediately to the bottom. In one instance, the

## Looking Ahead

*Copper sulfate is widely used to control algae in ponds. Present dosages give control. But findings in this study show that the concentration of copper sulfate obtained by present dosages do not reach recommended levels in some ponds. This happens when copper sulfate goes out of solution more rapidly than expected. Thus, more precise and possibly higher dosage rates than those now recommended may have to be used.*

copper sulfate was dissolved prior to application and applied to the pond surface with a watering can.

Surface water samples were taken in plastic bottles directly from the top of the pond. Samples from other depths were taken with a 3-liter, plastic, Kemmerrer-type water sampler. This device samples a column of water 20 inches high, so that samples from any given depth actually consisted of a column of water which extended 10 inches above and 10 inches below the stated depth.

On each date that water samples were collected, a vertical

**Table I. Analyses of pond waters used for Cu SO<sub>4</sub> experiments.**

	Pond A		Pond B		Pond C		Pond D	Pond E
	Top	Bottom	Top	Bottom	Top	Bottom		
pH	6.5	7.0	8.2	8.4	7.5	7.5	8.8	7.4
Conductivity	128	142	400	400	170	155	300	220
Cl (ppm)	37.5	37.5	22.8	22.8	15.2	15.2	52.5	37.5
SO <sub>4</sub>	15.0	15.0	90.0	90.0	30.0	30.0	80.0	70.0
Si	12.0	10.0	3.0	3.0	2.0	2.5	6.0	2.0
Al	0.08	0.05	0.05	0.03	0.10	0.05	0.06	0.13
Na	10.4	14.0	4.0	4.2	3.5	3.5	7.8	9.2
K	0.6	1.0	1.6	1.6	0.4	0.4	2.2	5.0
Ca	4.6	6.0	25	25	10.6	10.6	11.2	8.0
Mg	3.0	3.0	28	28	7.4	7.0	14.4	9.0
Cu	0.012	0.023	0.009	0.012	0.009	0.023	0.012	0.015
Mn	0.004	0.720	0.001	0.010	0.050	0.068	0.004	0.007
Zn	0.008	0.078	0.008	1.40	0.013	0.013	0.008	0.032
Fe	0.090	1.250	0.030	0.160	0.160	0.160	0.040	0.013
Ni	0.001	0.003	0.006	0.018	0.001	0.003	0.004	0.005

**Series III Tests**

Since little or no stratification of copper was observed in the first two series of tests, Series III was conducted to determine whether or not stratification occurred within the first few hours after treatment. Granular copper sulfate was applied to pond C on August 23 to yield 0.375 ppm copper. Samples were taken after 1,2,4 and 24 hours. The results of the copper analyses are given in Table IV, which shows a slight degree of stratification at 2 and 4 hours. As in the previous two series of tests, there is a large difference between the theoretical copper concentration expected in the water and that which was actually found to be present.

**Series IV Tests**

In this series, copper sulfate was not applied in the granular form, but was dissolved in water and sprinkled on the water surface with a sprinkling can. Treatments were made on ponds D and E to yield 0.50 ppm copper. Samples for copper analysis were taken after 2, 4, 24, 48 and 72 hours. Results of the analysis are given in Table V. It can be seen from this table that the copper concentration in pond D came much closer to the theoretical value than in any of the previous tests. The concentration in pond E was slightly closer to the calculated value but not necessarily as close as in pond D. This can probably be attributed to the fact that pond E had a heavy bloom of algae at the time of treatment and pond D did not. It appears that the algae in pond E absorbed the copper very quickly and removed it from solution. Another indication of the difference in actual copper concentrations is that large numbers of fathead minnows and northern brown bullheads died in pond D while no fish died in E. No fish were killed during the first three series of tests.

**Conclusions**

*From our investigations, the following conclusions can be drawn:*  
 1. When copper sulfate is applied to ponds in the form of granules

temperature profile of the pond was determined at 1-foot intervals of depth. All samples were then filtered and analyzed.

Results of the analyses of the water in each of the five ponds before treatment are given in Table I. Temperature profiles revealed that no strong thermocline existed in any of the ponds during the investigation.

**Series I Tests**

Granulated copper sulfate was applied to pond A to yield 0.187 ppm copper and to ponds B and C to yield 0.250 ppm copper. During the summer of 1966, treatments were made on June 14 and samples taken June 15, 16, 20, 24 and 30 and July 7. Copper content at the depths and dates indicated is given in Table II. From this table, two facts are apparent. First, copper concentration in the water never approached the theoretical stratification of 0.187 and 0.250 ppm. Second, the expected stratifica-

tion with a heavy concentration at the bottom did not occur, or if it did occur, it did not persist for 24 hours at which time the first samples were taken. In ponds A and C an inverse stratification was observed at 24 hours.

**Series II Tests**

Granulated copper sulfate was applied to ponds D and E to yield 0.50 ppm copper. Treatments were made August 8 and samples taken August 9, 10, 12, 15 and 17. Copper content of the water at depths and dates indicated is given in Table III. Again, the theoretical value of 0.50 ppm copper was not even approached. In pond D a stratification of copper was observed after 24 hours, with a slightly heavier concentration at the bottom than at the top. This condition was not observed after 48 hours. In pond E no significant degree of stratification was observed.

**Table II. Copper contents in ppm of pond waters treated with granular copper sulfate in Series I.**

Pond	Depth	Time in Days						Initial Cu Content
		1	2	6	10	16	23	
Pond A*	Surface	0.07	0.04	0.03	0.02	0.02	0.01	Top = 0.01 Bottom = 0.02
	3'	0.07	0.08	0.06	0.04	0.04	0.03	
	6'	0.04	0.05	0.03	0.03	0.03	0.03	
	9'	0.02	0.02	0.01	0.05	0.02	0.01	
Pond B**	Surface	0.12	0.12	0.10	0.07	0.03	0.01	Tops = 0.01 Bottom = 0.01
	2'	0.12	0.18	0.10	0.10	0.04	0.03	
	4'	0.12	0.18	0.09	0.08	0.03	0.03	
	6'	0.12	0.18	0.09	0.08	NS***	NS	
Pond C**	Surface	0.08	0.09	0.02	0.01	0.01	0.01	Top = 0.01 Bottom = 0.01
	2'	0.09	0.10	0.02	0.01	0.02	0.02	
	4'	0.09	0.09	0.09	0.01	0.02	0.02	
	6'	0.04	0.08	0.02	0.01	0.02	0.02	

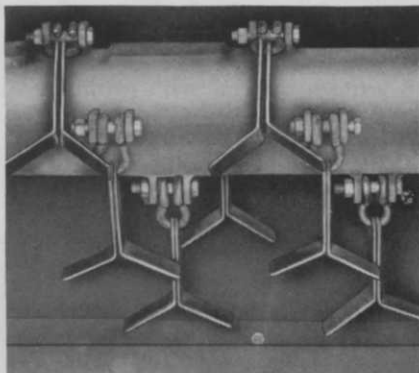
\*Treated with Cu SO<sub>4</sub>•5H<sub>2</sub>O to yield 0.187 ppm Cu

Applied 6/14

\*\*Treated with Cu SO<sub>4</sub>•5H<sub>2</sub>O to yield 0.250 ppm Cu

\*\*\*No sample—water level went down and pond was only a little over 4 feet deep.

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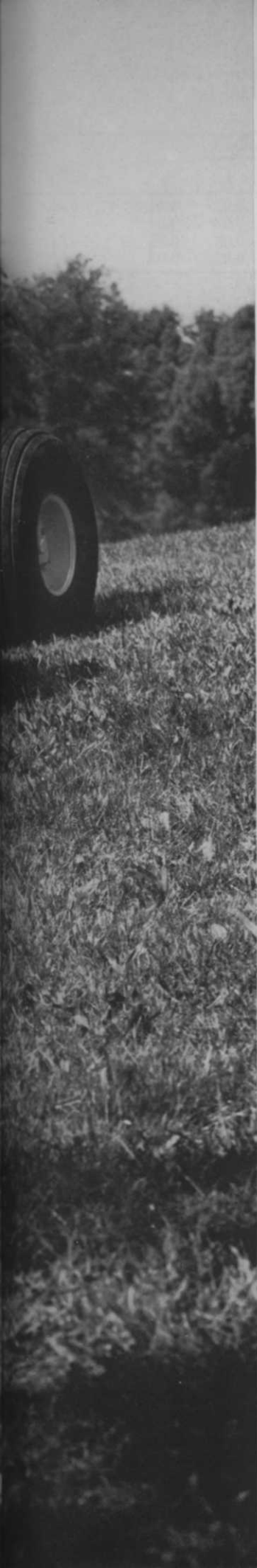
Reverse them to double their life. Knives can be resharpened individually. Does a better mowing job than a cutterbar mower even with dull knives. Cutting height is adjustable from  $\frac{3}{4}$  to 5 inches.



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So safe with thrown debris that many purchasing agents insist on a flail-type mower. And you get the aggressive cutting action of a rotary cutter with the safety of a reel mower.





# Quiet. Safe. Thrifty. What a mowing team!

## New International 2444 tractor and 70 flail mower.

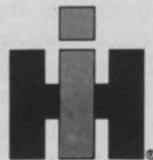
**Quiet tractor.** New 2444 shushes along. Won't bother the operator or others. *Quiet mower.* No noisy, vibrating housing. It's contour-formed to the heavy frame. Then continuous bead-welded to the frame to last.

**Safe tractor.** New 2444 has great sidehill stability. A low center of gravity. A low profile. Big, wide grass tires. A differential lock reduces wheel spin, turf gouging, tractor drifting. 8.5-foot turning radius with 70-inch wheelbase and easy hydrostatic power steering. *Safe flail mower.* Knife action throws debris straight to the ground, not out. Rugged rubber (not canvas) safety shield won't rot, rip, shred. For added safety, the universal joint is shielded.

**Thrifty team!** Choose your transmission. Standard hi-lo with 8 speeds forward, 2 reverse. Or optional 8 and 8. And save on mower maintenance. One man can change any flail blade individually without removing every knife in the row. See your dealer for additional worth-more features and an International 2444 tractor demonstration—with a 5 or 7-foot 70 flail mower. His finance plan can help you write this new equipment into the budget.

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which sink to the bottom, the amount of copper which actually gets into solution is much lower than the expected theoretical value. We suspect that this is associated with absorption by bottom muds.

2. Copper which does get into solution in the water, mixes rapidly throughout the entire depth of the pond and does not form a uniform, heavy concentration near the bottom.

3. If copper sulfate is dissolved in water and applied to the surface of a pond, the amount of copper found in solution in the pond is greater than if the copper sulfate is applied in granulated form.

4. A heavy bloom of algae appears to have the capacity to rapidly reduce the amount of copper in the water of a treated pond.

## Herbicides Offer

### Practical Weed Control For Industrial Sites

In most cases, weed control by herbicides is cheaper and more effective around industrial areas. The main consideration is using chemicals safely, a Humble Oil and Refining Company official said during the recent Industrial Weed Control Conference at Texas A&M University, College Station, Tex.

The official, James W. Hammond of Houston, said Humble found that it could save about 60 percent in costs by utilizing herbicides over hand and machine cutting. The herbicides also removed fire-spreading stubble.

"Chemical method of weed control is a way of industrial operation," he said. "Therefore, we need to learn to use these substances safely."

Hammond, director of industrial hygiene for Humble, said the firm's review of herbicides included more than 90 different commercial chemicals and several hundred mixtures of these substances. Those selected combined safety and efficiency.

Factors other than worker's risk also were studied. These included livestock, land poisoning,

**Table III. Copper contents in ppm of pond water treated with granular copper sulfate to yield 0.50 ppm Cu. Applied 8/8/66.**

Pond	Depth	Time in Days					Initial Content
		1	2	4	7	9	
D	Top	0.05	0.04	0.03	0.02	0.01	0.01
	Bottom	0.09	0.04	0.03	0.02	0.01	
E	Top	0.04	0.03	0.03	0.03	0.01	0.01
	Bottom	0.04	0.03	0.02	0.02	0.02	

**Table IV. Pond C—Treated with granular CuSO<sub>4</sub> August 23, 1966 to yield 0.375 ppm Cu.**

	Copper, ppm			
	Surface	2 Feet	4 Feet	6 Feet
Initial (before treatment)	0.01	0.03	0.02	0.01
1 Hour	0.10	0.11	0.09	0.11
2 Hours	0.11	0.13	0.17	0.09
4 Hours	0.11	0.11	0.15	0.17
24 Hours	0.11	0.11	0.11	0.11

**Table V. Copper contents of pond waters treated with copper sulfate to yield 0.50 ppm Cu. Applied in solution form to water surface. Treated September 6, 1966.**

		Copper, ppm					
		Initial	2 hrs.	4 hrs.	24 hrs.	48 hrs.	72 hrs.
Pond D	Top	0.05	0.42	0.31	0.26	0.23	0.19
	Bottom	0.03	0.22	0.20	0.20	0.21	0.20
Pond E	Top	0.05	0.14	0.14	0.13	0.11	0.11
	Bottom	0.03	0.06	0.06	0.13	0.13	0.09

economic crops, fish and wildlife, children and pets.

He said there are ways to measure worker exposure to chemicals. Urinary lead, arsenic, mercury, pentachlorophenol and dinitrophenol are related to exposure levels. These results, like the anti-cholinesterase agents, may be used to keep tab on degree of exposure on an integrated basis.

Organic herbicides, Hammond said, have a minimum degree of hazard associated with normal use. Chemical manufacturers give sufficient data on container labels to allow use without danger.

"As with all chemicals, human, livestock, wildlife, fish and economic plant exposures should be carefully evaluated on each application," the speaker cautioned.

"These exposures should be kept to the minimum practical to

accomplish the task at hand."

The Humble official outlined precautions to take in protecting eyes, skin and lungs. And he also touched on the subject of public liability.

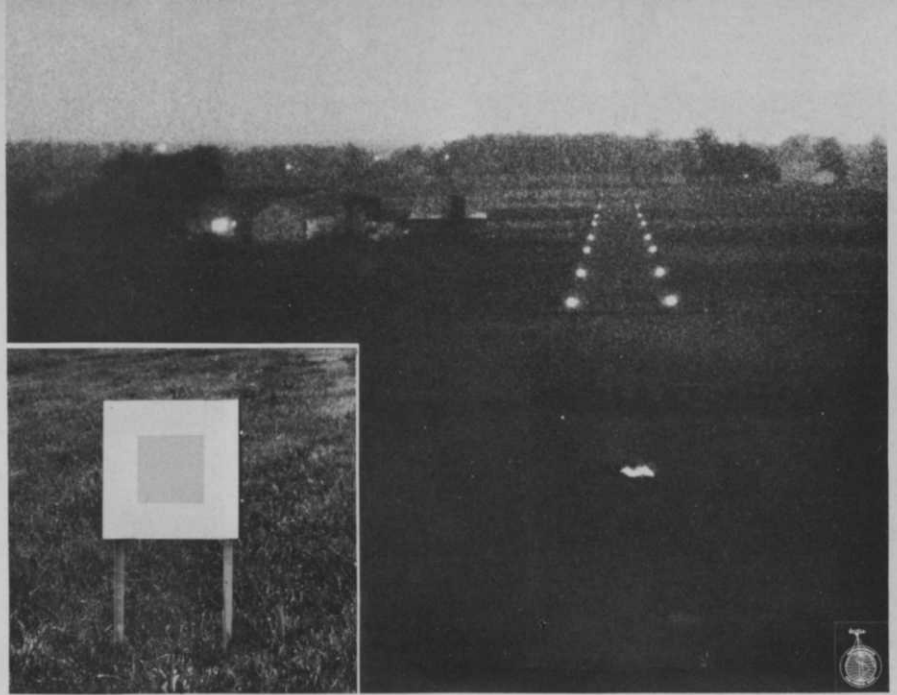
"Some substances, like the hormone types, carry more public liability than others because of the danger of drifts to economic crops and by producing unpalatable flavor in drinking water and the fish that may live in these streams and lakes," Hammond said.

Another speaker, Roy S. Rodman, supervising landscape architect for the Texas Highway Department, said Texas highway landscaping can be divided into four broad classes: Erosion control, landscaping, wildflowers and rest areas.

Of primary importance is establishment of grass or turf on

(Continued on page 33)

# New For Unlighted Landing Strips



Night photo demonstrates view of reflectors at night. Above units are on 2000-ft. strip. Plane is  $\frac{1}{2}$  mile out at 175 feet, and is equipped with 100 watt 12 volt light. Z-type power line marker can be spotted in foreground. Inset in picture is close-up of reflector unit which is mounted on aluminum legs. Units are portable.

## REFLECTOR LANDING SYSTEM

A reflector system has made a night landing safe on unlighted air strips. For the aerial applicator, the flying farmer sod producer, and others who operate from unlighted private fields, the new system promises the extra flying hours often needed.

Developed and sold by Janox Corporation, Arcanum, O., the new system consists of runway and boundary markers. Runway markers are red, boundary markers green. Reflective material for each type is specially produced for Janox by Minnesota Mining

and Manufacturing Company. A complete system, consisting of 20 markers which will light a 2000-ft. strip costs the operator exactly \$262. Additional markers for longer landing strips are available at the prorated cost per unit. Besides runway and boundary markers, Janox makes available a Z-type power line marker which is of the same reflective material and is hung on power lines near strip approach zones. Obstacle markers to be used at ground level are also available. Markers are set at 300-ft. intervals. Recommended strip width for lane of markers is 150 ft., though they are being used at 200 ft. in some cases.

For locating the strip at night and making the approach, a 150-watt yellow bulb has been found adequate to spot the strip. This assumes, of course, that the strip is in an open area. Otherwise, a rotating beacon light is needed.

Landing light equipment on  
(Continued on page 31)



Holding marker is Daniel Yeomans, director of Janox. With him are Mrs. Yeomans, secretary of Janox, and Charles L. Weidner, advertising and sales director. They demonstrated the units at the National Aerial Applicators December meeting at Dallas, Tex.



General Chairman of the convention committee John F. Neace, Bell Helicopter Company, Ft. Worth, Tex., opened the first annual conference of the NAAA. Neace received plaudits of the membership for his efforts in organizing the conference.



Officer slate for '68, left to right: Robert Phillips, Phillips Aero Ag. Co., Ceres, Calif., president; Harold C. Tapley, Tapley Flying Service, Shaw, Miss., vice-president; F. Dale Simpson, Simpson Aero Co., Tribune, Kan., secretary; and Robert G. Ueding, Ueding Flying Service, Vincennes, Ind., treasurer.

# N-TRIPLE A FLY-IN

## National Aerial Applicators Stage First Annual Conference at Dallas

APPLYING chemicals and plant food by air is big business. A visit with aerial applicators offers convincing proof that the industry plans to keep pace with demands for its services.

Aerial applicators have been organized as a national group

less than a year, but their first annual meeting demonstrated a depth and maturity seldom equalled in new associations. First president of the group, Richard Reade, Mid-Continent Aircraft, Hayti, Mo., pointed to cooperation among applicators as the key to success during the

initial year. He reported that the organization was fortunate in overcoming regional differences and in becoming financially self-sufficient in the early months. In his formal remarks to applicators, Reade stated that NAAA, called N-Triple A by members, will undoubtedly establish criteria for pilot training programs. Training schools will need to follow the program requirements in order to place their graduate pilots with N-Triple A members. Reade predicts that NAAA members will comprise 92% of all applicators. Agrinauts, the term accepted for ag pilots, will have to be management and sales oriented as well as being professional technicians, according to Reade, a pilot with 20 years' experience as an applicator.

Further goals of the association of applicator pilots, Reade reported, will be to continue fostering and promoting state aerial applicator associations. He predicted 5 new state groups



George S. Sanders, left, Aerial Dispersal Systems general manager, presents Agrinaut of the Year award to Richard Reade, Mid-Continent Aircraft Co., Hayti, Mo. Reade also received a plaque from the NAAA group for his outstanding service as president during the '67 year.



Exhibitor Bob Chambers, Dusters & Sprayer Supply, Inc., Chickasha, Okla., left, discusses equipment with Otto M. Neidert, Ulysses Air Service, Ulysses, Kan.



Stanley W. Strew, vice-president, Colloidal Products Co., left, and John C. Coulston, McLoughlin Dusters, Oxnard, Calif., discussed trends and safety.

within as many years. This figure included Iowa operators who have just formed a state group. N-Triple A will help research aerial use of existing and new products and will promote chemicals designed exclusively for aerial application, he said. Reade believes the association can become the leader in creating new and sound credit policy guidelines.

A subject of concern to operators is the high cost of maintaining insurance and the close tie between insurance costs and safety. John C. Coulston, McLoughlin Dusters, Oxnard, Calif., emphasized that safety is money. "What you save (by keeping insurance costs down as a result of a safe operation) goes right on to that slim profit you make," he told the group. "Conversely," Coulston said, "what extra insurance costs over normal expense comes off the slim margin of profit."

Coulston feels that safety for the aerial applicator comes from awareness by someone in charge. He urged operators to check their operations personally, to watch their pilots fly, and to do so on a weekly basis. He suggested letting crews know the safety goals demanded and make them aware that the operator will personally return to check compliance.

In agreement with Coulston, Bill Marsh, Marsh Aviation, Litchfield Park, Ariz., and a vet-

eran pilot and operator, said that operators need to be sure that their pilots know the individual pilot's own capability and the limits of the aircraft which he is flying. Most pilots think they know, Marsh said, but he predicted that on a dead engine landing, that many would undershoot the strip. He urged operators to instruct their pilots on stall recovery techniques at low altitudes. Further, Marsh reported his belief that operating aerial applicators should report all violations of safety regulations for the good of the industry.

### Few New Compounds In Aerial Picture

Trends in chemicals for aerial use were discussed by Stanley W. Strew, vice-president, Colloidal Products Co., Sausalito, Calif. Strew pointed to the severe restrictions on efforts of chemical companies in placing new compounds on the market. Because of development costs ranging up to \$5 million and a 5-7 year development period, he expects few new compounds to reach the market during the next few years. Registration requirements for new chemicals are more and more complex.

Greetings proved to be first order of business. Chris D. Stoltzfus, Stoltzfus & Associates, Coatesville, Pa., left, is welcomed by Asa Burroughs, executive-secretary of the Texas AAA, Stonewall, Tex. At the right is Corley Tedder, Tedder Aviation Corp., Texarkana, Tex.





**Insurance specialist Charles W. Harper**, vice-president, Rebsamen and East, Little Rock, Ark., left, visits with **Billy J. Williams**, Williams Flying Service, Tutwiler, Miss., center, and **Robert A. Phillips**, Ceres, Calif. Phillips who was elected president for 1968 served the group as vice-president last year.

Strew pointed out, and uncertainty of future regulations, along with changes in federal, state, and even local laws serve to restrict company progress.

Relatively new in the field of chemical production are the pharmaceutical manufacturers, Strew said. He believes their technology in the environmental health field, their screening programs, and their library of biologically active chemicals will enable such companies to produce some very useful compounds.

Among newer trends, Strew reported, are hormones which are being studied for use in stopping an insect's development, as opposed to killing it outright. Such hormones would likely be safe for use around non-target insects, animals, and humans.

Research on plane dispersal systems, which is being done extensively at Mississippi State University, Starksville, Miss., was discussed by Mike Smith. Smith is a member of the department of Aerospace and Aerophysics at the institution. He said that dispersal systems greatly affect the performance level of planes. The load, he said, is not the most important item. More important, Smith said, is the drag created by the dispersal system.

Research has shown, according to Mississippi work, that the best

rate of climb for a plane will be near the stall speed. A stall speed indicator is valuable as a working tool for the aerial applicator pilot, Smith said. At slower speeds, the power requirement increases greatly.

#### **Dispersal Equipment Causes Excessive Drag**

Drag, caused by applicator equipment on the plane, costs many extra dollars when measured by the extra fuel needed per hour. Equipment used today, Smith believes, causes more excessive drag than can be justified. For example, he said that studies have shown that an engine-powered spray system (hydraulic system) can decrease drag from a 55 horsepower requirement down to 10 hp or possibly 12 hp. Another adjustment needed to gain this big saving in horsepower is moving the boom of the spray system up into the wing wake. Proper location of the boom has been found to be critical within one-half inch. The wing wake, Smith said, is very narrow in range. But when the boom is properly located and the engine-powered spray system used, drag becomes a minor factor and climb performance is found to be very close to that of a clean airplane.

Closely attuned to the thinking of Smith was Carl W. Heimer, Piper Aircraft Corporation, Lock-

haven, Pa. Heimer pointed out that a plane is no more than a flying platform. The choice of plane for practically any use is on the market now, he said. Areas needing development, according to Heimer, are safety, which concerns the development of a capsule-type cockpit area, and development of dispersal equipment for aerial application. Heimer believes the aircraft companies must begin more testing programs in both these areas. He stated that dispersal equipment was the greatest current need.

Discussing insurance losses, Charles W. Harper, vice-president, Rebsamen and Ease Insurance, Little Rock, Ark., said that one of the chief causes of losses is the unwillingness of the operator to refuse risky assignments. There are times, Harper told the operators, when they should avoid the risk in the name of "professionalism." Loss control, he said, is one of the practical steps in getting the cost of insurance down.

Members of N-Triple A complimented F. Farrell Higbee, executive director of the group, for his efforts during this first year of organization. Higbee, in his report to the group, said that he will write a weekly letter to the officers and board of directors of the group. Special effort, he said, will be made to form new state associations.

**Richard Reade**, outgoing NAAA president, left, and **Terrell P. Kirk, Jr.**, Grumman Aircraft, Elmira, N.Y., look over specifications at Grumman's exhibit booth.





**Dr. W. Wayne Allen, agricultural consultant, College Station, Tex., left, and Dr. John Long, director, Biochemistry Research, O. M. Scott and Sons Co., Marysville, O., discuss growth inhibitors at Texas turf session. Dr. Allen serves as executive secretary of the Texas Turfgrass Association.**

for the protection of the user.

Athletic field care continues to challenge the personnel responsible for maintaining appearance and utility at the same time the area is being heavily used. This is particularly true of football fields. Dr. J. R. Watson, Toro Manufacturing Corporation, Minneapolis, Minn., discussed some of the problems in this type management. He said proper management of football fields can be a great aid in keeping down injuries, particularly among elementary and high school players.

Dr. Watson pointed out that footing for the athlete is usually good if the grass is in good condition. This requires proper fertilizer balance. When the field is properly fertilized, turf is less likely to be torn by cleats. He went on to say that bermudagrass is the best and most popular football field grass for Texas, though some selections can do a better job with proper management. Ryegrass, Dr. Watson said, is strong and competitive, and can be seeded just prior to the season. It can also be reseeded. Common bermuda can be used, particularly if it is overseeded early in the season, and reseeded lightly through the season. This reseeded, Dr. Watson said, serves to introduce

## Texas Turfgrass Conference Features Intensive 3-Day Technical Training

**TURFGRASS** in Texas is big business. Yearly cost of turf maintenance in the state is set at more than \$211 million. This adds up to 1/7 of the total value of all agricultural crops.

Grass varieties are primarily bermudagrass and St. Augustinegrass. Bermudagrass accounts for 41% of that used on home lawns, St. Augustinegrass for 56%. Miscellaneous varieties make up the other 3%. These are also the primary grasses which concern professional personnel who are responsible for turf maintenance, though specialty types are used as needed. Most of these and their care were key topics at the 3-day Texas Turfgrass Conference, Dec. 4-6.

Dr. W. Wayne Allen, agricultural consultant, College Station, Tex., and executive-secretary of the group said that those attending the Conference were largely concerned with golf courses, parks, cemeteries, institutions, schools, industrial areas, and rights-of-way maintenance on highways, utility lines, and railroads.

In discussing disease control

with the group, Dr. Bob Miller, E. I. du Pont and Co., Wilmington, Del., pointed out that chemicals are for aid in solving problems. They are not intended, he said, to replace the man in management. He urged turf specialists to read and then heed the labels. These, he stressed, are

**New officers of the Texas Turfgrass Association, elected for 1968 at the Texas Turfgrass Conference are: Jim Holub, golf superintendent, River Oaks Country Club, Houston, Tex., president, left; and Phil Huey, superintendent, Parks Department, Dallas, Tex., vice-president.**



young healthy plants into the mature turf.

Topdressing athletic fields helps to level out turf and improve footing. And topdressing will also aid thatch control, according to Dr. Watson. He suggested a topdressing of organic matter gained by use of peat, cobs, sawdust and possibly other materials in compost form.

#### **Growth Inhibitors May Become Turf Help**

Growth inhibitors are relatively new and promise to become a management factor in turf care during the coming years. Dr. John Long, director, Biochemistry Research, O. M. Scott and Sons Company, Marysville, O., discussed his work with a number of experimental chemicals. His evaluation of growth inhibitors for use on turf is that too many limitations exist at the present time.

Performance of turf treated by a growth inhibitor can be predicted fairly accurately, according to Dr. Long. While types and varieties of grasses react differently to the several types of inhibitors he has used, all grasses will show a less intense color level after treatment. Less dense areas of turf fill in more slowly. Any mechanical damage to turf is much slower to recover. There is a greater than normal growth of grass when the inhibitor dissipates.

For the specialist who plans to use a growth inhibitor on turf, Dr. Long specified the optimum conditions of grass for treatment. First, he said that grass should be in an active growth stage. High turf density is needed, along with an adequate fertilizer level. An adequate soil moisture level is mandatory. Pest control is also necessary.

More than 250 turf specialists attended the Conference which was held at Texas A&M University and co-sponsored by the Texas Turfgrass Association and the University. Jim Holub, golf superintendent, River Oaks Country Club, Houston, Tex., was elected president. The group named Phil Huey, superintendent, Parks Department,

Dallas, Tex., as vice-president, and Dr. W. Wayne Allen, agricultural consultant, College Station, Tex., as executive secretary. The 1968 Conference will be held December 2-4.

#### **Roadside Management On New England Chemical Conference Agenda**

Turfgrass is a valuable asset for roadside rights-of-way. But maintaining all roadsides in turf is an expensive factor in highway maintenance. R. B. Thorton, manager of the U.S. National Plant Materials Center, Beltsville, Md., says that some use of other covers in selected areas can reduce maintenance costs. Thorton, speaking to 150 delegates at the recent New England Chemical Conference, Concord, N. H., believes that use of crown vetch, low growing lespedezas and similar plants could be increased. He suggested using woody plants for screen effects, beauty spots and for erosion control.

W. J. Garmhausen, chief landscape architect for the Ohio Department of Highways, pointed out that necessity and economics have often dictated development of land transportation systems. Today, he said, highway systems are so complex that specialists in all areas are demanded. But to the usual engineering and other speciality areas must be added aesthetics, pleasure and recreation. Views and vistas, Garm-



**Roadside development** today is no longer an embellishment, but is planned for the needs of citizens, according to Conference speaker W. L. Hottenstein, above, U.S. Department of Interior.

hausen said, are as important now as grades and curves.

J. A. Dietrich concluded, however, that beautification without maintenance could well lead to ugly dilapidation. Dietrich, Superintendent of Parks and Trees for Greenwich, Connecticut, and also past president of the Natural Shade Tree Association, told the delegates that "one of the most pressing challenges for the individual is the depression and the tension resulting from existence in a world which is increasingly less pleasing to the eye". He went on, however, to show how "beauty can become a reality in any community if properly controlled and organized and our nation will become a more delight-

*(Continued on page 32)*

**W. I. Boyd, E.I. du Pont de Nemours Chemical Co., left,** and Dr. H. E. Wave, University of Maine, discuss New England Chemical Conference program. Boyd discussed highway brush control with group. Dr. Wave served as the Conference chairman.





# System of Management Underway At Summit Hall To Protect Sod Root Zone and Eliminate Reseeding



Fully mechanized system of sod harvesting on Summit Hall Turf Farm, Inc., is designed to prevent soil compaction. John Nunes sod harvester, above, and International Harvester forklift are on flotation tires. Forklift moves palletted sod to trucks located on hard surfaced roads.

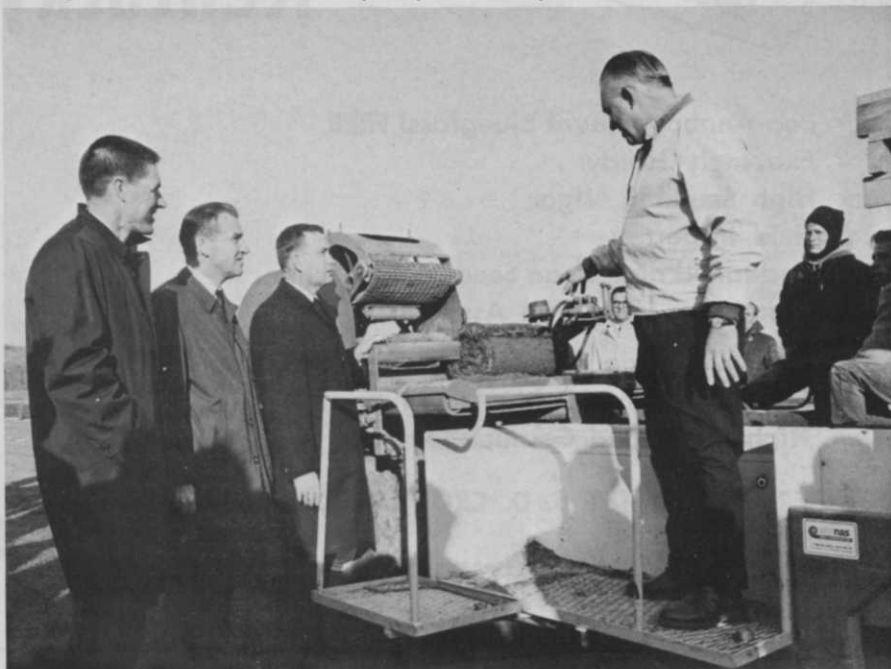
**S**OD PRODUCTION is a new industry. New methods of growing and handling sod can be expected. The same is true in selling the freshly harvested product. Good producers across the country are shaking down various methods of handling the product and moving it into wholesale and retail channels.

A veteran in the business, Bill Wilmot, founder and manager of Summit Hall Turf Farm, Inc., Gaithersburg, Md., is combining cultural and harvesting methods to cut overall management costs. He is also working to improve marketing practices.

His most recent project is development of a system of management which will eliminate reseeding after harvesting the sod crop. The fact that sod rhizomes below the surface, if not damaged by compaction, will recover and grow new sod as quickly as that established by a new seeding is the basis for his new system.

In the past, Wilmot says, trucks, tractors, and harvesting equipment in general have compacted rhizomes to the point

**Bill Wilmot, Summit Hall founder and manager, explains rolling mechanism on Nunes harvester to American Society of Agronomy group which toured farm during recent national meeting. Harvester will handle 1200 square yards of sod per hour with crew of three men.**



that too many do not recover, or that recovery is too slow. Today, flotation wheels for all types of equipment enable the operator who uses care in management to all but eliminate compaction.

Wilmot is using a John Nunes sod harvester equipped with high flotation wheels. He uses the harvester for rolling and palleting Merion sod. For Meyer Zoysia, he locks the rolling head out of the way on the harvester and uses it for padding sod. A new International Harvester forklift, also on high flotation wheels, is used to carry pallets from field to trucks on hard roads. The idea is to literally float the sod off the field and onto waiting trucks.

Wilmot is now tooled up and running the first trial with the system. He expects irrigation to be more critical, but has the equipment and controls in the form of a power roll system to handle the problem. Wilmot expects Meyer Zoysia to recover

within 18 months and about the same period for Merion bluegrass. This, of course, would vary in other regions where temperature ranges differ.

Big advantage of the system is the fact that the agricultural phases of reseeding are eliminated. However, Wilmot believes that some light overseeding and scarifying may be necessary. Another major plus which the system promises is that an entire field does not have to be cleaned up before grass recovery begins.

Most of the 300 acres in sod on the Summit Hall Turf Farm, River Farm, is in Merion bluegrass. In fact, Wilmot was one of the early producers of this variety. He supplied the first Merion which went into the East Garden of the White House lawn during the tenure of President Harry S. Truman. This was in the early 1950's.

Wilmot also grows a good percentage of Meyer Z-52 Zoysia.

In addition, he grows Scott's Windsor and will harvest his first 0217 Brand, Fylking Kentucky bluegrass this coming summer. He has high hopes for this latter variety, reporting that it looks very good right now.

For cutting sod ahead of the Nunes harvester, Wilmot uses Ryan sod cutters. The Ryan 18" unit is used for rolls, being mostly Merion. The 15" head is used when sod is folded, and the 12" head for padding Zoysia.

Marketing demands time and effort for Wilmot. He keys his efforts on a number of markets, most of which are in the Washington, D. C., and adjoining areas. In order to guarantee delivery of fresh sod, Wilmot says that sod is cut the morning of delivery and sales are restricted to distances of 200 miles. To do this, he has his crews on the job an hour earlier than formerly. They report in at 6:00 a.m. during the harvesting period.

Summit Hall turf is sold wholesale, retail, and by mail. In fact, the mail-order business for Zoysia plugs continues to be a thrifty one. Wholesale business is via landscapers and retail garden centers. This latter group, particularly the large, chain garden centers, have become big outlets for Summit Hall. Wilmot says the retail end of the business consists of two installation crews which are kept busy the entire season.

Important to the sod producing industry, Wilmot believes, is proper care of the newly laid sod. Since much is sold through outlets other than the farm, Summit Hall furnishes information leaflets on how to care for the new sod. A flyer is provided the buyer for each type of sod purchased. Wilmot has flyers for Zoysia and Merion sods and uses O. M. Scott and Son's Windsor folder when he sells Windsor. Every customer is furnished the proper folder, whether he is purchasing 10 yards or 1000 yards of sod.



**NOW-for the First Time**

# South Dakota Certified Kentucky Bluegrass

- ★ Poa Annu (Annual Bluegrass) FREE
- ★ Extremely Hardy
- ★ High Seedling Vigor
- ★ Field Inspected
- ★ Uncleaned and Clean Seed Lot Inspection
- ★ Laboratory Inspection Assured

Free from Noxious and Objectionable Weeds  
Free from Other Cultivated Crops  
High Purity and Germination

**CERTIFIED BY THE S. D. CROP IMPROVEMENT ASSN.**

**SOUTH DAKOTA KENTUCKY BLUEGRASS ASSN.**

**BOX 823 HURON, S.D. 57350**





George Hammond, left, secretary-treasurer of the American Sod Producers Association, Columbus, O., and Mr. and Mrs. Ben Warren, Warren's Turf Nursery, Palos Park, Ill., discuss proceedings at ASPA luncheon held during the Ohio Turf Foundation Conference at Cleveland, O. (WTT will carry a complete report on the Ohio Turf Foundation Conference in the February issue).

### American Sod Producers Hold Luncheon Conference Dec. 12 At Cleveland

Sod producers attending the Ohio Turf Foundation Conference and Show met for a luncheon session Dec. 12. Bringing the 80 producers up to date on activities of the American Sod Producers Association were Ben Warren, ASPA president, and George B. Hammond, ASPA secretary-treasurer.

Warren told the group, which represented 6 sod producing states, that among plans of the new national sod association was varietal testing. This program will be carried out with leading seed breeders and distributors and at university research stations across the nation.

Warren believes that a varietal testing program will answer the current problem which producers face in selecting the best grass seed for their own future production. He emphasized that the chief value of the seed testing program will be that variety tests can be conducted under actual field conditions on sod farms, and over broad areas of the nation. This will produce results, Warren said, of value to both producers and breeders.

Hammond reported on the substantial progress made by the ASPA since its initial organiza-

tion at Lansing, Mich., last July. He told the group that ASPA now has producer members in 17 states, plus a growing list of associate memberships among material and equipment suppliers.

Also discussed by Hammond were plans for the first annual meeting of the national sod association. This is being held in conjunction with the Golf Course Superintendents conference at San Francisco, Calif., Feb. 18-23. Hammond reported that the ASPA section of the program is being directed to practical sod production and marketing problems. The ASPA, he said, will have a booth at the GCSA exhibit area.

Raymond C. Kinch, professor of agronomy at South Dakota State University, conducts a field inspection of a stand of South Dakota Certified Kentucky Bluegrass. Fields producing certified seed must be at least 10 years old.



### South Dakota Growers Are Now Marketing Own State Certified Seed

A new source of Certified Kentucky Bluegrass has been established on the plains of South Dakota where extreme environmental stresses and a vigorous natural selection process have combined to produce a rugged, hardy grass.

South Dakota Certified Kentucky Bluegrass is harvested from stands which are at least 10 years old—some of them nearly 50 years old—containing thousands of genetically different types. The seed is hardy and has a wide genetic base, available only in South Dakota.

J. Duane Colburn, manager of the Seed Certification Service, points out that the planters of South Dakota Certified Kentucky Bluegrass will be assured that all seed has met rigid standards as follows: Inspection of all fields which have been into native Kentucky Bluegrass sod for at least 10 years with proper isolation; Yard and plant inspection of both uncleaned seed lots and final cleaned lots; Careful processing by one of seven seed plants approved for processing Kentucky Bluegrass seed by the South Dakota Crop Improvement Association; and Laboratory Inspection, where minimum standards require 95 per cent pure seed, 85 per cent germination, no noxious or objectionable weed seeds, 0.1 per cent weed seed, 0.1

(Continued on page 31)

## Meeting Dates



**Helicopter Association Annual,** Stardust Hotel, Las Vegas, Nev., Jan. 21-24.

**Associated Landscape Contractors of America, Annual Meeting,** Conference Center, Williamsburg, Va., Jan. 21-24.

**California Weed Conference, 20th Annual,** El Rancho Hotel, Sacramento, Calif., Jan. 22-24.

**Virginia Turfgrass Conference,** Virginia Turfgrass Council and V.P.I., Golden Triangle Motel, Norfolk, Va., Jan. 23-24.

**California Weed Conference, El Rancho Hotel,** Sacramento, Calif., Jan. 22-24.

**California Agricultural Aircraft Association, Annual Meeting,** Sahara Tahoe Hotel, Lake Tahoe, Calif., Jan. 24-27.

**Arizona Aerial Applicators Association, Annual Meeting,** Francisco Grande, Casa Grande, Ariz., Feb. 1-2.

**Weed Society of America, 1968 Meeting,** Jung Hotel, New Orleans, La., Feb. 5-8.

**Maryland Arborists, Nurserymen, and Florists Days,** Center of Adult Education, University of Maryland, College Park, Md. A day for each in order listed, Feb. 13, 14 and 15.

**Annual Agricultural Chemical Conference, Oklahoma State University,** Student Union, O.S.U., Stillwater, Okla., Feb. 14-15.

**National Arborists Association Mid-Winter Meeting,** International Inn, Tampa, Fla., Feb. 18-21.

**American Sod Producers Association, First Annual Meeting,** In conjunction with Golf Course Superintendents Assn. Convention, San Francisco Hilton Hotel, San Francisco, Calif., Feb. 18-23.

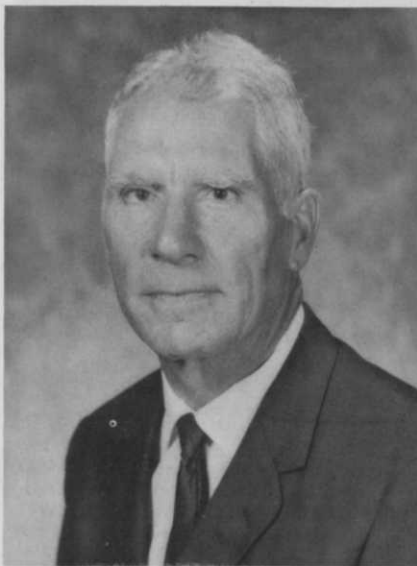
**Massachusetts Fine Turf Conference,** White House Inn, Chicopee, Mass., Mar. 6-8.

**Midwest Regional Turf Conference,** Midwest Regional Turf Foundation, Purdue University, Lafayette, Ind., Mar. 4-6.

**Western Society of Weed Science, formerly Western Weed Control Conference,** Owyhee Hotel, Boise, Idaho, Mar. 19-21.

**Michigan Turfgrass Conference, Annual Meeting,** Kellogg Center, Michigan State University, East Lansing, Mich., Mar. 20-21.

## Dr. A. O. Leonard Will Author Feature Know Your Species



O. A. Leonard

Beginning with the January issue, Dr. O. A. Leonard will write the "Know Your Species" feature for WEEDS TREES AND TURF. Miss June McCaskill, Senior Herbarium Botanist, is assisting him.

Dr. Leonard, who holds B.S. and M.S. degrees in botany and chemistry from Washington State College and a Ph.D. from Iowa State College is a native of Washington, the evergreen state. After receiving his Ph.D. from Iowa State College, he taught at Texas A&M. In 1939, he then joined the Agricultural Experiment Station in Mississippi, where he conducted some of the first studies on chemical weed control in cotton.

Since 1950, Dr. Leonard has been with the Botany Department of the University of California at Davis. His main responsibility at Davis has been the conducting of research on chemical control of woody plants; however, other important research has been on weed control in vineyards, which has been cooperative with the Department of Viticulture. He has published numerous papers on weed and brush control, as well as on transport of herbicides in woody plants.

## Turf Stand Density Up With Fall Fertilization

Fall application of fertilizer will increase turf density the next year. This is a finding of The Lawn Institute, Marysville, O.

Director of the Institute, Dr. Robert Schery, reports that heavy autumn fertilization increased the bluegrass turf stand by 48% over an untreated check area.

Goal of the tests was to study any burn from over-application of fertilizer. Rates up to 4 times that recommended by the manufacturer were used in the fall of 1966. Mid-summer grass counts in 1967 showed an average of 428 grass culms or shoots per square foot in treated turf. The untreated check strip averaged 288 culms per square foot.

## Foreword Know Your Species

*The desirability of native woody plants depends upon the situation under which they occur. There are probably no native woody species which we would desire to have completely eliminated. This is strangely true, even for poison oak (Rhus diversiloba). This shrub adds color to our landscape and need not be controlled except where human contact is likely to be frequent or where its presence is economically detrimental. Woody species may be wanted or unwanted for a variety of reasons. For example, sprouting woody species may be especially detrimental to the establishment of a new coniferous forest after a forest fire; on the other hand, these same species may not be detrimental once the forest has become established. Also, most woody species are troublesome nuisances and create a fire danger when growing beneath utility rights-of-way. Attractive natural landscapes can be developed by the selective removal of unwanted shrubs and trees. Herbicides have become a valuable tool in achieving the above objectives and in shifting the ecology of plants in the directions desired.*

O. A. Leonard

## POISON OAK

(*Rhus diversiloba*)



Drawing from: California Range Brushlands and Browse Plants by Arthur W. Sampson and Beryl S. Jespersen. Calif. Agric. Expt. Sta. — Ext. Ser. Manual 33.

Prepared by: O. A. Leonard, Botanist, Assisted by B. J. McCaskill Senior Herbarium Botanist, Botany Department, University of California, Davis, California

Poison oak (*Rhus diversiloba*) of western North America is similar in appearance to its relatives poison oak and poison ivy of the eastern United States. Much of what can be said for one species is also true for the others. For example, each species can grow as a ground cover, or climb trees, or stand alone as shrubs.

In all, there are about 150 species of *Rhus* (sumacs) consisting of evergreen and deciduous shrubs and trees. Some of these, including sugar bush (*R. ovata*) and staghorn sumac (*R. typhina*), are valuable as ornamentals. *Rhus* is a member of the Cashew family, which includes trees with edible nuts — the cashew (*Anacardium occidentale*) and the pistachio (*Pistacia vera*),—and fruit, mango (*Mangifera indicam*).

Poison oak is widely distributed from southern British Columbia to Baja California. It is most common in California in the Coast Ranges and in the lower mountain slopes of the Sierra Nevada. It becomes especially abundant in areas where competing vegetation has

been removed; thus one can see hillsides in the lower mountain slopes containing nearly solid stands of this shrub; these same hillsides had been converted from mixed stands of woody plants to solid poison oak by periodic burning and erratic browsing by goats, sheep, or horses. Such animals are rarely poisoned by it.

This shrub is a vigorous sprouter from the underground stems. The leaves are trifoliate, 3 to 6 inches long and deciduous. The leaflets are variously lobed, toothed and sometimes entire, and 1 to 4 inches long. These leaves remain green for varying periods of time, largely depending on the moisture status of the site. However, sooner or later they become yellow and often a beautiful red as the plants become moisture stressed. Reddening of leaves can be seen in different areas from May through October. Flowers are greenish-white, appearing with the leaves in April or May. The fruit is a brown or whitish drupe, about 1/4 inch in diameter.

Poison oak forms an oily substance which is non-volatile at normal temperature, but is volatilized by fire. This substance occurs in all parts of the plant, from which skin irritation can result following contact. It can be transmitted indirectly through contact with contaminated clothing, animal fur, etc. It can even be contacted by inhaling fumes from burning plants, often causing severe effects.

The main interest in controlling this shrub rests in its poisonous allergic properties to many people. There are several herbicides which can be used to kill it. Most important, irrespective of herbicide used, is persistence if complete kill of all plants is to be achieved. Complete eradication may require several years of effort.

Amino triazole and ammonium sulfamate are good herbicides to use around the home. If care is used in application, little injury should be experienced on most other nearby shrubs or trees. Amino triazole can be applied after the poison oak is well leafed out and is moderately effective until foliage begins to yellow.

Poison oak can be controlled with brush killer mixtures of 2,4-D and 2,4,5-T or by 2,4,5-T alone. Silvex (2,4,5-TP) appears to be slightly superior to the previously mentioned herbicides. Careful use of these herbicides is necessary to avoid injury to ornamentals or crops.

When just a limited number of poison oak plants is to be controlled, a satisfactory method is to apply the esters of brush killer mixtures of 2,4-D and 2,4,5-T dissolved in oil. These mixtures should be applied to the basal crown and bark, being careful not to spray other shrubbery. This treatment can be applied at any time of year, although winter and spring are preferable.

Picloram is the most effective herbicide available for poison oak control. However, it is also the most difficult to use, as it may injure other plants having roots beneath the treated areas. Its application should be left to experts.

# New Products . . .

## Designed for the Vegetation Care Industry



**New turf sprayer with a swivel-front high flotation axle** and adjustable dry boom is now available. Royalette 1010, with 300 gallon tank, has a 10 gpm pump that delivers up to 500 psi. Unit is powered by a 6 $\frac{1}{4}$  hp gasoline engine. Axle, mounted on a swivel, allows short turning radius for the two front 9.60 x 8-inch flotation tires. Rear flotation wheels are 12.50 x 16 inches. Unit has 21-foot dry boom with 13 adjustable nozzles. Write John Bean Division, 1305 S. Cedar St., Lansing, Mich. 48909.



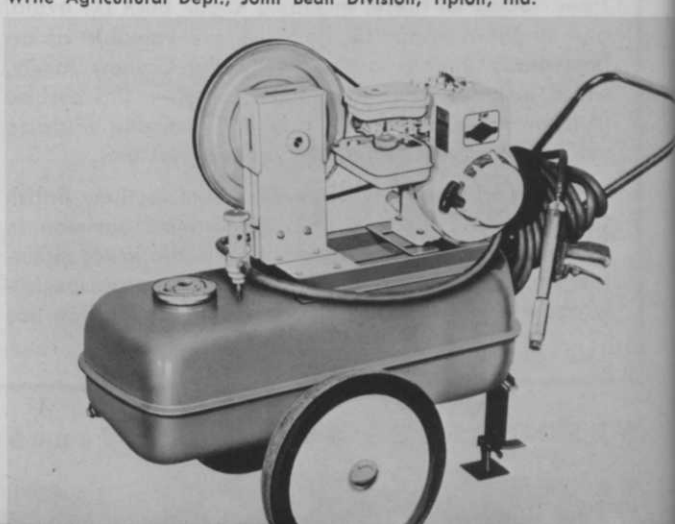
**Plastic tank protector** withstands temperature from 70 degrees below zero to "Death Valley" extremes. Flame-proof covers extend life of the tank's paint for 5 years. Protects hoses, prevents corrosion. Write R. L. Harris Associates, Box 667, Beatrice, Nebraska 68310.



**New line of plastic industrial hand pumps** for use in removing corrosive liquids from drums and carboys range in price from \$6.95 to \$19.95, depending on size and the material to be pumped. All are self-priming. Write Beckson Manufacturing, Inc., P. O. Box 3336, Bridgeport, Conn. 06605.

**Precision mobile turf sprayer** designed for use on greens and other areas where accuracy and uniform turf chemical coverage are necessary, below, features corrosion resistant construction and eight non-drip nozzles on an 80-inch adjustable-height boom. Unit may be pulled, to apply a spray pattern not tracked by the wheels or the operator. Price is \$189.50. Contact Mallinckrodt, 2nd and Mallinckrodt Sts., St. Louis, Mo. 63160.

**New high-pressure turf maintenance sprayer** is powered by a 2 hp air-cooled engine. Porcelain coated, 15-gallon steel tank sprayer, with high-pressure jet agitation, handles all types of liquids, fertilizers and disinfectants. Features V-belt drive off the engine, 1 $\frac{1}{2}$  gpm single piston pump, pressure up to 200 psi. Unit has 25 feet of high pressure hose attached to Spraymiser gun. With finger tip controls, gun adjusts from a fine mist to a solid stream at any pre-set pattern. Write Agricultural Dept., John Bean Division, Tipton, Ind.



## 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.

Rates: "Position Wanted" 10c per word, minimum \$3.00. All other classifications 20c per word, minimum \$4.00. All classified ads must be received by Publisher the 10th of the month preceding publication date and be accompanied by cash or money order covering full payment.

### FOR SALE

**For Sale: Daymon Sod Roller, used, 24-inch, excellent condition, \$3000.00. Green Acres Turf Farm, Inc., 1663 Holt Rd., Mason, Michigan 48854. Phone 517 676-2362.**

**NEW AND USED HOMELITE chain saws and John Bean sprayers. Hardie 55 gallon sprayer, \$200.00; Bean 55-GPM pump, \$200.00; Homelite XL-12, \$100.00; KWH Mistblower-duster, \$125.00. Write for current bargains. Lanphear Supply, 1884 S. Green Rd., Cleveland, Ohio 44121. 216 381-1700.**

### WANTED TO BUY

**SPRAYING COMPANY in Ohio, now doing utility, highways, railways and industrial work wants to buy or merge with established company. Box 29, Weeds, Trees and Turf, 9800 Detroit Ave., Cleveland, Ohio 44102.**

**South Dakota Growers**  
(from page 27)

per cent other native species and 5 per cent inert material.

However, Colburn reports, samples collected during late summer are being reported out of the laboratory well above these minimums. These have a test weight of 26 to 28 pounds per bushel—indicating a heavy plump seed which should have good seedling vigor.

For instance, one large lot carried an inspection report of 98.99 per cent purity, 1.01 per cent inert matter, 95 per cent germination, with no other crop or weed seeds present.

"Our producers intend to maintain this high standard," Colburn adds, pointing out that the upper Great Plains' climate and environmental conditions (including temperatures ranging from 38 degrees below zero to 118 degrees above) prevent non-hardy types from surviving. Annual Bluegrass (*Poa Annua*) is not found in the South Dakota plains area. A vigorous natural selection process that goes on all the time keeps annual bluegrass out of this hardy Kentucky bluegrass sod.

*Poa annua*, an annual reseed-ing bluegrass declared noxious by several states, is a troublesome weed in lawns and turfs. It has very erratic growing habits (rapid growth in cool weather and quick disappearance in hot weather). Scattered infestations show up as rough dry patches of dead grass by middle summer in otherwise green lawns and golf courses. All of the new South Dakota certified seed is guaranteed free of noxious weed seeds.

Cleaned seed will not be tagged until each lot is completely processed, Colburn says. During the cleaning process, pint or 200-gram representative samples are taken. Lot volume is restricted to a maximum of 10,000 pounds. The lots will also be spot sampled before the South Dakota Crop Improvement Association seal and tag are affixed. Approximately 8,451 acres were certified in South Dakota this year, Colburn says. Seed may be obtained from the S.D. Bluegrass Assn., Box 873, Huron, S. Dak.

### New Bermudagrass Released By Clemson University

A new bermudagrass has been released by Clemson University, Clemson, S.C. Known as Pee Dee 102, the new grass is a fine stemmed type which is expected to be useful on lawns and golf greens.

John B. Pitner, Clemson agronomist who did the selection and testing, reports that the grass is a mutation from an early South Carolina planting of Tifton 328. He made the selection from turf on a Florence, S. C. golf course.

Pitner says that the new bermudagrass is darker green in color, gives coverage more quickly, and has added disease resistance. It has fewer seed heads following stress conditions, and less upright growth than the parent Tifton 328 variety. Pee Dee 102 is completely male-sterile and does not produce viable seed. Grass is increased by sprigs.

Vegetation propagating sod is available at the Pee Dee Experiment Station, Florence, S.C., and at the Sandhill Experiment Station, Pontiac, S.C. Application to receive this sod must be made to the South Carolina Foundation Seed Association, Clemson, S.C.

## Advertisers

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### Shade Tree Symposium Set For Penn State University

A 3-day symposium on shade trees has been set for Feb. 7-9 at Pennsylvania State University, University Park, Pa. This will be the third annual event of this type held by the University and the Pennsylvania-Delaware Chapter of the International Shade Tree Conference.

Dr. J. Robert Nuss, Extension Ornamental Horticulturist at Penn State, says formal sessions will include plant selection, air pollution, shade tree commission problems, and tree care. Program plans center on problems of community officials, shade tree commissioners, civic groups, garden clubs, nurserymen, arborists and citizens interested in trees.

### Reflector Landing System

(from page 19)

the plane is normally adequate for use with the system. The 100 watts at 12 volts which is considered the minimum needed for aircraft will pick up the reflectors well over 1 mile from the strip. The 200-watt units which are found on most aircraft pick up the reflectors 2 to 2½ miles out. Slight fanning of the rudder enables the plane light, once the pilot is in the approach zone and within range, to pick up the reflector lanes.

Lights on the plane have to be of the clear lens type, rather than the prism lens found on some planes. Lights also need to be set at a 7°-approach angle to match the 7° angle of the marker mountings. This angle is standard on most planes, but adjustments must be made on the Cherokee and Piper Tri-Pacer, as well as a few other types.

## Rotary Riding Mowers Need Standard Controls

Riding power mowers of the rotary type need standard controls, according to W. H. McConnell, Institute of Agricultural Medicine, University of Iowa, Iowa City, Ia. In a discussion of injuries resulting from the use of this type mower, McConnell also called for design changes. He said new designs are needed to protect the operator from his own errors.

On the program at the winter meeting of the American Society of Agricultural Engineers, McConnell related results of 45 injury cases. These, he said, show that in a panic situation the operator may resort to earlier patterns of learned behavior. For example, McConnell said, controls on such mowers are intended to begin motion as they do in an automobile. But on some mowers, control movement is just opposite that of an automobile. Even different models by the same manufacturer may vary, he said.

In some injury cases, McConnell said that the operator appeared to revert to behavior learned on the tricycle. In an emergency, the operator tried to put a foot down to stop the mower in place, or to jump off. This calls for a design to prevent dangling hands or feet, and to prevent either from being placed where they will contact the blade or rotating wheels of the machine. Riding rotary mowers also need to be designed, he said, to force the operator to mount and dismount from the side opposite the discharge chute.

Efforts also need to be made to increase the stability of the machine, McConnell advised, since a riding rotary power lawn mower can vary in weight from 150 to approximately 750 pounds. Further, it carries an operator who may vary in weight from as little as 60 (when children are allowed to operate them) to as much or more than 200 pounds. The addition of a rider results in a rearward and upward displacement of the center of gravity, he explained.

## Roadside Management (from page 24)

ful spot in which to live and enjoy."

Mrs. Jean L. Hennesey, Chairman of the New Hampshire Governor's committee on natural beauty, told of the ongoing efforts in the state to protect historic as well as aesthetic factors along this state's roads. However, F. R. Brush, of the American Association of Nurserymen, warned the group that we, as a nation, have not made as much progress as we could or should. He noted, though, that some states had created new sections, new departments, and were now utilizing the assistance of landscape people, agronomists and horticulturists.

The U.S. Department of the Interior, Bureau of Public Roads, was represented by W. L. Hottenstein and Larry Issacson of Washington, D.C. Hottenstein noted that landscaping in the "old days" was thought of as "embellishment" and useful for only erosion control, while today, roadside development considers the needs of the people in relation to their environment, that roadsides must enhance as well as provide for safety and utility.

Norman H. Dill elaborated on the beauty inherent in roadside vegetation management. Dill, of the Right-of-way Resources of America and also on the staff of Delaware State College, Dover, urged the use of selective herbicidal control and added that some botanical knowledge was as important to the spray applicator as manual dexterity. He stressed the need for utilizing ecological principles in the improvement of roadside vegetation and also the usefulness of maintaining shrub or grass cover by careful selection and application of the proper herbicides.

Conference chairman for 1967 was Dr. H. E. Wave, University of Massachusetts Extension Service, now with the University of Maine; the chairman-elect for 1968 is Dr. M. G. Savos, extension Entomologist and Pesticide Safety Coordinator for Connecticut.

## Trimnings

**A Job For Everyone.** At a recent University of Hawaii turf conference, Urban Renewal Coordinator Robert A. Nui pinned down the elements for success of the Beautification Program. "Unless the residents of our neighborhoods are interested and willing to participate . . . the job becomes almost impossible," he said. And further, "It would seem that the role of government is not to ride roughshod over a neighborhood with an improvement program, but to work hand in hand with the people . . ." His point is well taken, along with the reminder that there are more than 250 current projects for which federal funds can be obtained to augment local spending.

**D.E.D. Conference Tips.** At the recent Delaware, O., session, the question of using helicopters for spraying elms received both pro and con opinions. Dean F. Lovitt, Michigan Department of Agriculture, and Russell W. Whitten, Worthington, O., reported good coverage with chopper spraying. David F. Devoto, city forester at Evanston, Ill., said at helicopter speeds the pilots couldn't pick out the elms and they also had trouble with parked cars in the streets.

**Fertilizer Prices Climb.** Plant food will cost more by spring, probably another 5%. Marketing V-P Jaral Aston of Olin Mathieson gives four reasons: Sulfur prices are up 40%, sulfur supply is limited, labor, warehousing and transportation costs have climbed steadily, and phosphate costs are on the upswing as a result of labor in handling and processing. Yet, since '59, with farm real estate up 100%, farm wages booming by 70%, and farm machinery by 50%, fertilizer prices in the same 8-year period jumped less than 5%.

**Are Home Golf Greens Now the In Thing?** Could be you'll be getting calls to install, or more likely advise on, backyard golf greens. Turf man Dr. G. C. Horn at Florida State says minimum space needed for this type lawn project is 1000 sq. ft., more if possible. But he says the backyard green doesn't have to meet the standards for professional greens. Lawn greens are primarily for putting, rather than pitching or chipping. He says minimum costs will run \$1000, if the homeowner hires it done. And it takes lots of water, plant food, and mowing.

**Twin Landscape Contracts For Highways.** State highway departments usually don't plan for the follow-up care needed on new highway landscaping. F. Raymond Brush, secretary of the American Association of Nurserymen, believes there should be a second contract in addition to that covering planting and the short guarantee period. He feels a second contract should be let to cover a 2 to 5-year establishment period. This latter contract would provide for fertilizing, watering, pruning, insect and disease control, and maintenance. And, he says, it would boost survival and cut the worry of state highway groups.



(from page 18)

unpaved areas of the right-of-way. Not only does turf prevent erosion, but it also provides a neat, attractive highway.

"Our thinking is that a good turf with a minimum number of large trees and shrubs, well maintained, is roughly nine-tenths of the aesthetic qualities, and that all other additions in plantings are more or less frosting on the cake," Redman said.

One of the most popular features of Texas highway landscaping, he added is the preservation and protection given to native wild flowers. It is common in the spring to see the right-of-way blanketed in various shades of blue, red, white and other colors as far as the eye can see.

"But we have learned that we cannot have our wild flowers and a heavy turf," the speaker said. "Also, we cannot have our wild flowers in the urban areas because we must mow too often to permit the plants to reseed, as a higher type of maintenance is required.

A major problem, Rodman emphasized, is weed control around sign posts, guard posts, bridge abutments and other tight spots along rights-of-way. Mowing equipment cannot do the job. Experiments are being done with chemicals.

"At this time, as far as my knowledge is concerned, I do not think there is a chemical on the market that will accomplish the control that the department would like to have for these areas. The reason I make this statement is that we can establish a pure stand of any particular grass during construction and within a period of three or four years, you would be surprised at what you will find growing in that area.

"All the trucks traveling the highway, the wind that we have in this state, and the water carrying the additional seed from adjoining areas, will bring in vegetation which you do not desire, and it is almost impossible to eliminate," the landscape architect explained.

## Insect Report

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

### Insects of Ornamentals

#### SPOTTED CUCUMBER BEETLE

(*Diabrotica undecimpunctata howardi*)

**Alabama:** Adults heavy and widespread on camellias, chrysanthemums, and many other blossoms throughout Mobile County; adult feeding heavy on late rose blooms and other blossoms this fall and early winter throughout southern and central areas.

#### ALFALFA LOOPER

(*Authographa californica*)

**California:** Moderate on chrysanthemum nursery stock in Half Moon Bay, San Mateo County.

#### AN ARMORED SCALE

(*Rhizaspidiotus dearnessi*)

**Florida:** All stages on some partridge-pea (*Cassia* sp.) plants at Stuart, Martin County.

#### ARMORED SCALES

**Florida:** *Lepidosaphes maskelli* severe on stems and leaves of variegated juniper inspected at nursery in Winter Haven, Polk County. *Gymnaspiis aechmeae* adult damage severe on leaves of billbergia at nursery in Brooksville, Hernando County; plants under quarantine. Adults infested 60 of 100 bromeliad torch plants at nursery in Lake Worth, Palm Beach County. *Pseudaonidia clavigera* moderate to severe on all common and sasanqua camellias at nursery in Tampa, Hillsborough County. **California:** *Diaspis cocois* heavy on palm in Carpenteria, Santa Barbara County. *D. echinocacti* heavy on cactus nursery stock in Yucca Valley, San Bernardino County; very active in 1967. *Aulacaspis rosae* heavy on roses in Gonzales, Monterey County. *Parlatoria oleae* heavy on lilac nursery stock in Santa Maria, Santa Barbara County.

#### CAMPHOR SCALE

(*Pseudaonidia duplex*)

**Florida:** Found on stems and leaves of camellia at nursery in Suwannee River area, Gilchrist County, November 30; all females parasitized. This is a new county record.

#### YELLOW SCALE

(*Aonidiella citrina*)

**Florida:** All stages moderate on leaves on 40 of 200 Japan fatsia plants at nursery in Apopka, Orange County; controls recommended. This is a new host record.

#### WHITEFLIES

**New Mexico:** Heavy on poinsettias in 2 commercial greenhouses in northern area; foliage discolored.

### Tree Insects

#### WHITE-PINE APHID

(*Cinara strobi*)

**Virginia:** Active on white pine in Prince Edward County; severe discoloration in Charlotte, Pittsylvania, and Orange Counties. **Maryland:** Eggs heavy on several young white pines at Fallston, Harford County.

#### BARK BEETLES

**Virginia:** *Dendroctonus* spp. active in City of Chesapeake, and in Orange, Westmoreland, and 14 southern counties; *Ips avulsus* major pest in October although *D. frontalis* generally very active. *D. frontalis* killed loblolly pine in one-acre spot in King William and Chesterfield Counties; active in small spots in Nottoway and Lunenburg Counties.

#### PINE SAWFLIES

(*Neodiprion* spp.)

**Virginia:** *N. lecontei* larvae active on some loblolly pines in Westmoreland, King George, and Pittsylvania Counties; damage averaged 0.9 percent of total sample of trees in observation areas. *N. pinetum* found on several white pines at 2 locations in Orange County.

#### AN ARMORED SCALE

(*Aspidiotus cryptomeriae*)

**Maryland:** Collected from Canadian hemlock by C. W. McComb at Rockville, Montgomery County. This is a new state record.

#### AN ARMORED SCALE

(*Clavaspis ulmi*)

**California:** Light on catalpa trees in Burlingame, San Mateo County.

#### PINE TORTOISE SCALE

(*Toumeyella numismaticum*)

**Iowa:** Infesting pine at Wadena, Fayette County. **Virginia:** Light on 6 Virginia pines at Frederick County location.

#### PINE WEBWORM

(*Tetralopha robustella*)

**Virginia:** Common or scattered plantation seedlings in Lunenburg and Bedford Counties. **Florida:** Larvae locally infesting leaves of 47 of 471 loblolly pines in Plant City, Hillsborough County.

#### WHITE-PINE WEEVIL

(*Pissodes strobi*)

**Virginia:** Damage light to 3 plantations in Giles and Craig Counties. Damage averaged 1 percent of total sample of trees in observation areas; static population indicated.

Compiled from information furnished by the U. S. Department of Agriculture, university staffs, and WTT readers. Turf and tree specialists are urged to send reports of insect problems noted in their areas to: Insect Reports, WEEDS TREES AND TURF, 1900 Euclid Ave., Cleveland, Ohio 44115.



# RYAN GROUNDS GROOMER

*Keeps large turf areas in tip-top condition*



## **Renovates, removes thatch, sweeps and flail mows in one operation**

The Ryan GROUNDS GROOMER attaches to a tractor equipped with a 3-point hitch and PTO. The operator can adjust blade height or depth, as well as empty the 5-cubic-yard hopper without leaving the tractor seat.

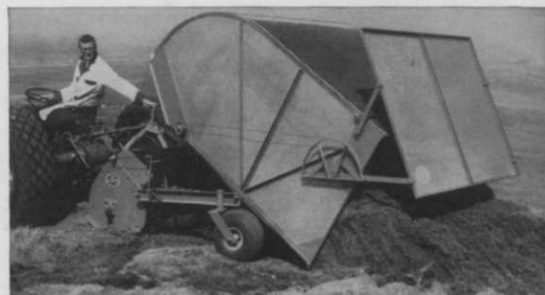
The hopper has a double steel door. At the top of the hopper is a wire screen to prevent stones, etc., from being thrown out.

Its 5-foot-swath reel is equipped with four rows of combination mowing and slicing blades. The reel can also be easily changed to all mowing blades, making it a "flail" mower.

Blade cutting ranges are from 2" into the ground for vertical slicing - to 3" above ground for rough mowing. All blades are "free-swinging" and rotate in reverse. This design creates air turbulence which blows leaves, thatch, clippings, etc., into the hopper.



The GROUNDS GROOMER picks up thatch, clippings and debris in a 5-foot path.



The operator easily empties the 5-cubic-yard hopper from the tractor seat.



*Write for more information*

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