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, bookkeeping, 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 employes. 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 employe, 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 stalwart 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 employes 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 employes led to development of a policy that employes 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 employes understanding and helpful.

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.

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 called for. Employes 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 employes involved in the work. Each, along with the company, has a clear understanding of procedure.

Employes respect and appreciate the frank manual of policy which each receives on joining the company. This applies both to the 28 key employes 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 employes. Key employes 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

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.

INLAND 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 ⅛ to ¼ 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 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, Kemmerer-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_4 experiments.

	Pond A Top	Pond A Bottom	Pond B Top	Pond B Bottom	Pond C Top	Pond C Bottom	Pond D	Pond E
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_4 "	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

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

*Treated with Cu $SO_4 \cdot 5H_2O$ to yield 0.187 ppm Cu — Applied 6/14
**Treated with Cu $SO_4 \cdot 5H_20$ to yield 0.250 ppm Cu
***No sample—water level went down and pond was only a little over 4 feet deep.

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.

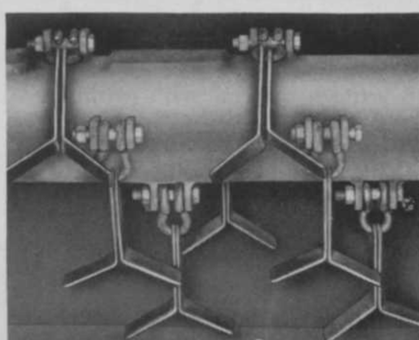
Series IV Tests

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

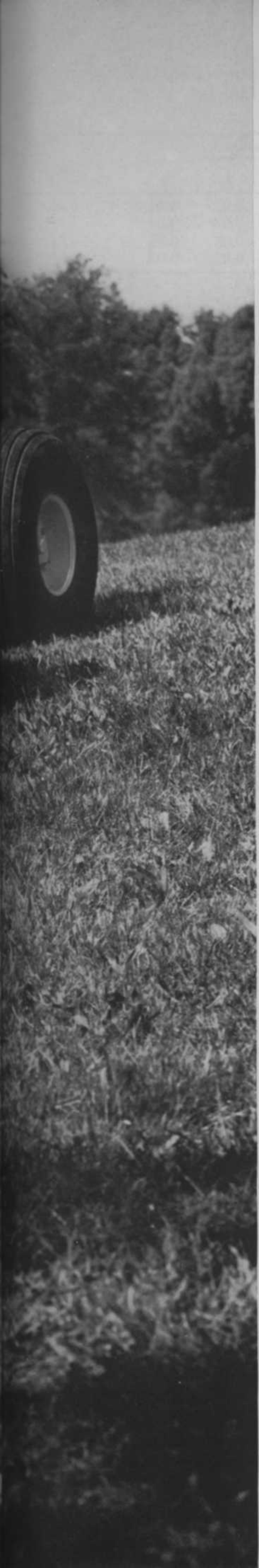
From our investigations, the following conclusions can be drawn:
1. When copper sulfate is applied to ponds in the form of granules

ASK ABOUT OUR WORTH-MORE FEATURES



Reversible, double-edge knives
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 ¾ to 5 inches.

Heavy rubber safety curtain
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.

INDUSTRIAL EQUIPMENT

Wheel and crawler tractors • loaders • backhoes dozers • forklifts • mowers • special duty tools

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.

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

		Time in Days					
Pond	Depth	1	2	4	7	9	Initial Cu Content
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 $CuSO_4$ 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

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, 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.

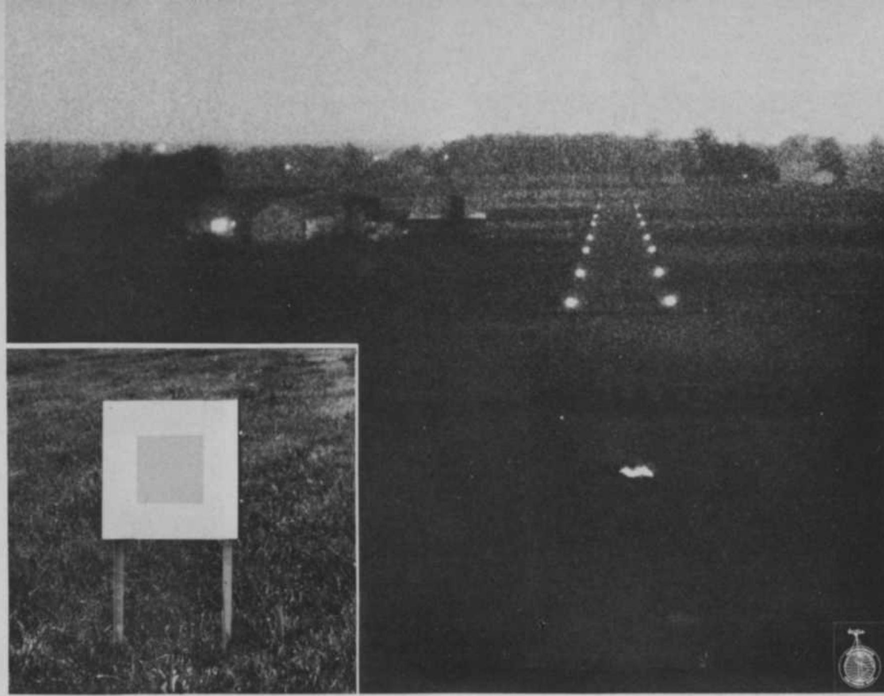
"Some substances, like the hormone types, carry more public liability than others because of the danger of drifts to economic crops and by producing unpalatable flavor in drinking water and the fish that may live in these streams and lakes," Hammond said.

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 ½ 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 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.

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.

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)

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.