



**Pin Oak, *Quercus palustris*.** Age, 17 years from seed; height, 37 feet; diameter 11.8 inches; crown spread, 40 feet. Located on OARDC campus, Gerlaugh Hall.

cluded. However, some of these require further testing according to Dr. O. D. Diller. The elms, silver maple, catalpa, mulberry, and the poplars are not recommended.

Equally as important as size or scope of the mature tree is hardiness. Ability to withstand insects and disease and adapt to the ex-

isting environment is a strong measure of any tree's worth. City planners are increasingly concerned that trees be easy to maintain and service. Increased labor costs dictate that trees require little in the way of pruning or care beyond the city's regular fertility and spraying program.

Thus, trees must be selected



**Ginkgo, *Ginkgo biloba*.** Age, 58 years from seed; height, 48 feet; diameter, 22.9 inches; crown spread, 48 feet. Female tree, though fruitless male trees are preferred.

for their natural ability to fit the specific elevation, air pollutants, climate, and either available moisture or the moisture which can be made available to the tree. Trees for street use must also be free from odor such as that of the fruit from the female ginkgo. They cannot possess root systems which clog sewerlines, a characteristic of the Lombardy poplars. Nor can they be readily susceptible to disease such as the canker stain and anthracnose of sycamores. Problems throughout the country with Dutch elm disease point up the extreme hazard and expense of losing large inventories of trees.

Public moneys are normally responsible for a large percentage of any major city's trees. Few cities provide more than the nominal percentage funds desired by the city forester or other planners. Thus, smaller than desired trees or fewer trees may be used. Because of these factors, it is even more necessary that careful variety selection be made for new plantings. Competent landscape architects and arborists are mandatory during planning. Proper planting and follow-up care by trained personnel can then insure that trees live and provide the beauty and use intended.

By way of summary, remember that people expect beauty around them, though they may not be aware that trees reduce glare and add to their comfort. Trees must be selected which can adapt to the often unnatural site as well as being able to resist pollution, insects and disease. More important, they must fit into the city's regular program of maintenance. Fortunately, today we find many such trees available.

*A WTT staff report based on an interview with Dr. O. D. Diller, curator of Secrest Arboretum, a 115-acre development now established as an independent unit of the Ohio Agricultural Research and Development Center at Wooster, Ohio. Dr. Diller served as chairman of the Center's forestry department from 1950 to 1965, serving on the Center's staff since 1937.*

# Can You Spot

# Evergreen Diseases

BY DONALD F. SCHOENEWEISS

Assistant Plant Pathologist  
Illinois Natural History Survey, Urbana, Illinois

EVERGREENS have long been considered relatively free of insect and disease problems as compared with shade and ornamental trees and shrubs. Low maintenance costs in the nursery as well as in the permanent planting site have provided a positive stimulus leading to the extensive, and at times overenthusiastic, use of evergreen varieties in landscape plantings. Intensive cultivation of large numbers of evergreens over the past 20 to 30 years, however, has resulted in a tremendous increase in diseases and insect pests. Measures to control them are frequently required to realize a profit on evergreens in the nursery, landscaping and arborist industries.

Although research on control of pests has lagged behind both production of evergreens and introduction of new varieties and selections, effective control measures have been worked out for many evergreen pests and should be employed wherever possible. The effective use of proven pest control practices will not only benefit the plants being injured but will aid in preventing the buildup of disease organisms and insect populations. This, in turn, will help prevent the spread of these pests to other potential host plants. Control recommendations for many plant pests may be obtained from state

and federal research organizations and are usually based on scientific experimentation. Such recommendations, if followed closely, will give better results in the long run than hit-or-miss measures suggested by the untrained or poorly informed.

Because of similarities in symptoms and control measures, diseases of evergreens may be separated into four categories: leaf or needle diseases, twig and stem diseases, root diseases, and diseases or injuries not resulting from disease-causing organisms. Control practices for specific diseases within each category are usually quite similar, and some of the practices are effective on several diseases within the group.

Many needle diseases of evergreens are common and widely distributed; others rarely occur except when climatic conditions are optimum for disease development. Some cause little damage and are of interest only on specimen plants, whereas others can result in severe injury and loss of desirable plants. Nurserymen, landscapers, and arborists alike should become familiar with most of the common needle diseases and their control measures. Those evergreen diseases which occur most frequently in the Midwest will be discussed in this paper.

Cedar-apple and cedar-haw-

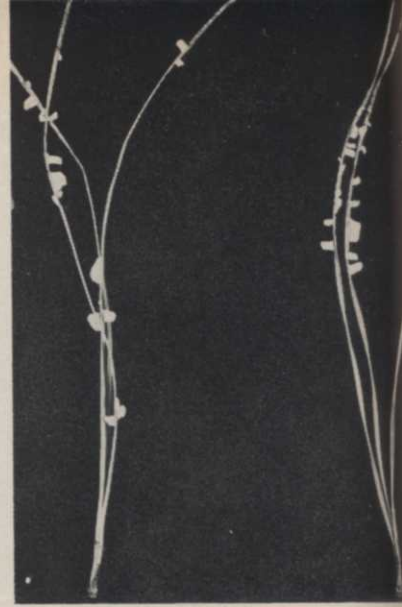
thorn rust are two of the most prevalent and widespread evergreen diseases in the Midwest. Cedar-quince rust also occurs, but is less common.

## Woody Galls Formed

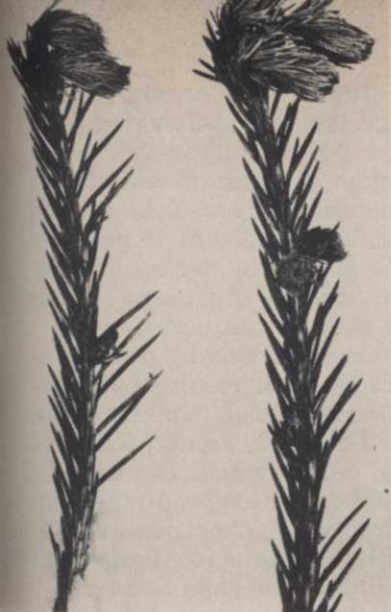
The cedar rust fungi invade the needles of susceptible juniper varieties. As the disease progresses, small to large, green, woody galls are formed by the cedar-apple and cedar-hawthorn rust fungi, and pustules are formed on stems by the cedar-quince rust fungus. Occasionally the galls or pustules enlarge and stem tissues are invaded by the fungus to the point where the stem is girdled. When this happens, the portion of the branch extending outward from the girdle dies.

During moist periods in the spring, bright orange, sticky spore horns form on the galls, giving them a striking, unsightly appearance. When the spore horns dry up, masses of spores are released and may be blown to alternate pomaceous hosts, such as susceptible crabs and hawthorns, causing leaf spot and defoliation. Alternate infections of evergreen and pomaceous hosts are necessary for the cedar rust fungi to complete their life cycle.

Several measures are useful in controlling the cedar rust fungi. One simple but effective meas-



Pustules on needles of red pine caused by the needle rust fungus *Coleosporium*.



**Diplodia tip blight** symptoms on young shoots of Norway spruce.



**Lophodermium needle cast fungus** fruiting bodies on needles of *Pinus contorta*.



**White pine blister rust canker** caused by the fungus *Cronartium ribicola*.

ure is to pick or prune the galls or pustules from affected evergreens in late fall or early spring before the spore horns form. This will not only get rid of the unsightly galls, but will prevent spread of the rust fungi to the alternate hosts. If many diseased plants are involved, as in nursery or large juniper plantings, or if this method is impractical for other reasons, affected plants may be sprayed with cycloheximide (Acti-dione as Acti-Spray tablets) following the recommendations on the package. One spray should be applied in the spring, usually sometime in May, when spore horns are beginning to swell on the galls and are about  $\frac{1}{8}$  inch long. This spray prevents spore horn formation and consequent spread to the alternate hosts.

Since the presence of both hosts is required for the cedar rust fungi to complete their life cycle, the best control measure for rust galls on juniper is to remove susceptible crabs and hawthorns in the vicinity. This practice, unfortunately, is seldom feasible, particularly in nurseries and extensive landscape plantings.

The next best procedure is to plant juniper varieties resistant to the rust fungi. Particular attention should be given when selecting varieties of *Juniperus virginiana*, since 21 varieties or

forms have been found susceptible to cedar-apple or cedar-hawthorn rust or both, and 15 forms are reported resistant to one or both fungi. *Juniperus scopulorum* and all its forms and varieties are reported susceptible to cedar-apple rust and should be planted only if other juniper species are not available or not desirable for some reason. A list of resistant and susceptible juniper varieties is available from the Illinois Natural History Survey on request.

#### Spraying Is Practical

If neither removal of the alternate hosts nor use of resistant varieties is practical, susceptible junipers may be protected from rust infection by three sprays applied in July and August at 3-week intervals using 2 pounds of ferbam in 100 gallons of water.

Several fungi may cause needle blights of evergreens, especially if a plant is weakened by drought, winter injury, transplanting shock, a poorly drained site, or low nutrition. Most healthy evergreens, such as spruce, fir, and pine, can be protected from needle blights by applying several sprays in the spring using one of the organic mercury fungicides or a copper-containing fungicide such as Bordeaux mixture.

One of the needle blight fungi, *Scirrhia pini* (*Dothistroma pini*),

is of considerable importance, since infected trees often show extensive defoliation and die-back and occasionally die. This disease may affect several species of pine but is most severe on *Pinus nigra* (Austrian pine), *P. ponderosa* (Ponderosa pine), and *P. thunbergi* (Japanese black pine) in Illinois. Yellow to tan spots appear on 1- to 2- and 3-year-old needles in late fall or early spring. By April or early May in Illinois, fruiting bodies of the fungus appear on the spots. Often a band is formed around affected needles and the portion of the needle beyond the band dies. On severely diseased trees all but the current season's needles may defoliate, resulting in weakened trees which may succumb to winter injury or other causes. The disease is most severe on pines growing in sheltered locations, groves, or windbreaks. For this reason one of the recommended controls is to thin out groves and provide better air circulation which often reduces the severity of damage.

Although spraying of both diseased and healthy needles in the spring with a copper-containing fungicide such as Bordeaux mixture has been reported to give good results, *Scirrhia* or *Dothistroma* needle blight is difficult to control, and further work on the effectiveness of fungicide spray programs is needed. Con-



**Cedar-apple rust gall** on twig of red cedar before spore horn formation has occurred.



**Scirrhia or Dothistroma needle blight** on 1-year-old needles of Austrian pine.

siderable variation among individual Austrian pines in susceptibility to the disease has been observed in Illinois. Resistant varieties or clones may someday provide the best solution to control of this disease.

A large group of fungi may cause defoliation or needle cast on evergreens. Needle casts are not usually of enough consequence to warrant control measures, but under optimum conditions for disease development a fungus such as *Lophodermium pinastri* can cause considerable damage. Control measures are the same as for needle blights and consist of spraying in the spring with organic mercuries or copper-containing fungicides.

Needle rust of pine, usually found on *Pinus resinosa* (red pine), occurs commonly in the Midwest. White to orange pustules, fruiting bodies of the fungus *Coleosporium*, appear on infected needles in the spring and can result in stunting and defoliation in young seedlings. However, the disease is seldom of any importance on older plants, and therefore control measures are not often recommended. Control can be achieved by removing all goldenrod and asters in the area, which serve as alternate hosts for the rust fungus.

The fungus *Botrytis cinerea* may cause a mold or blight on foliage and succulent stems of

evergreens under conditions of high humidity. Seedlings and cuttings in the greenhouse are often attacked by this fungus, but *Botrytis* mold on plants in the field is rare and usually occurs only during periods of extremely wet weather. Control has been achieved through the use of copper fungicides, but a new fungicide, Botran, may prove to be much more effective. Weekly spraying of foliage with Botran as soon as *Botrytis* blight appears should give satisfactory control.

#### Mildew Fungi Are Regular

Mildew fungi appear frequently on the foliage of evergreens, particularly on the broad-leaved plants such as Euonymus and holly. Disease severity, which varies from year to year, depends on weather conditions. In addition to an unattractive appearance, mildew can cause leaf curling, defoliation, and general weakening of infected tissues, resulting in increased dieback due to severe weather conditions. Control measures consist of spraying at 10-day intervals with Karathane, sulfur, or cycloheximide (Acti-dione PM), beginning when mildew first appears on the foliage.

Organisms causing twig and stem diseases on evergreens are often found on plants low in vigor or weakened in some way. Many disease organisms found

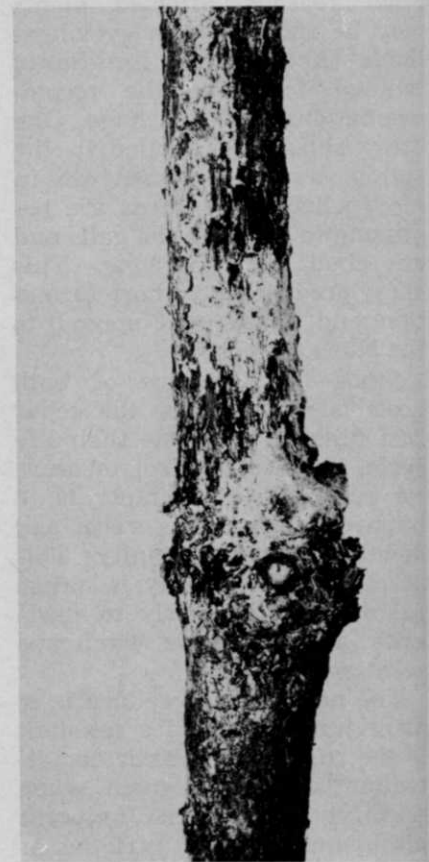
on stems, such as the canker fungi, are wound-invading parasites which enter the plant through a break or wound and, if the tissues are weakened, cause a localized infection. If stems become girdled by canker or other stem disease organisms, extensive dieback can occur.

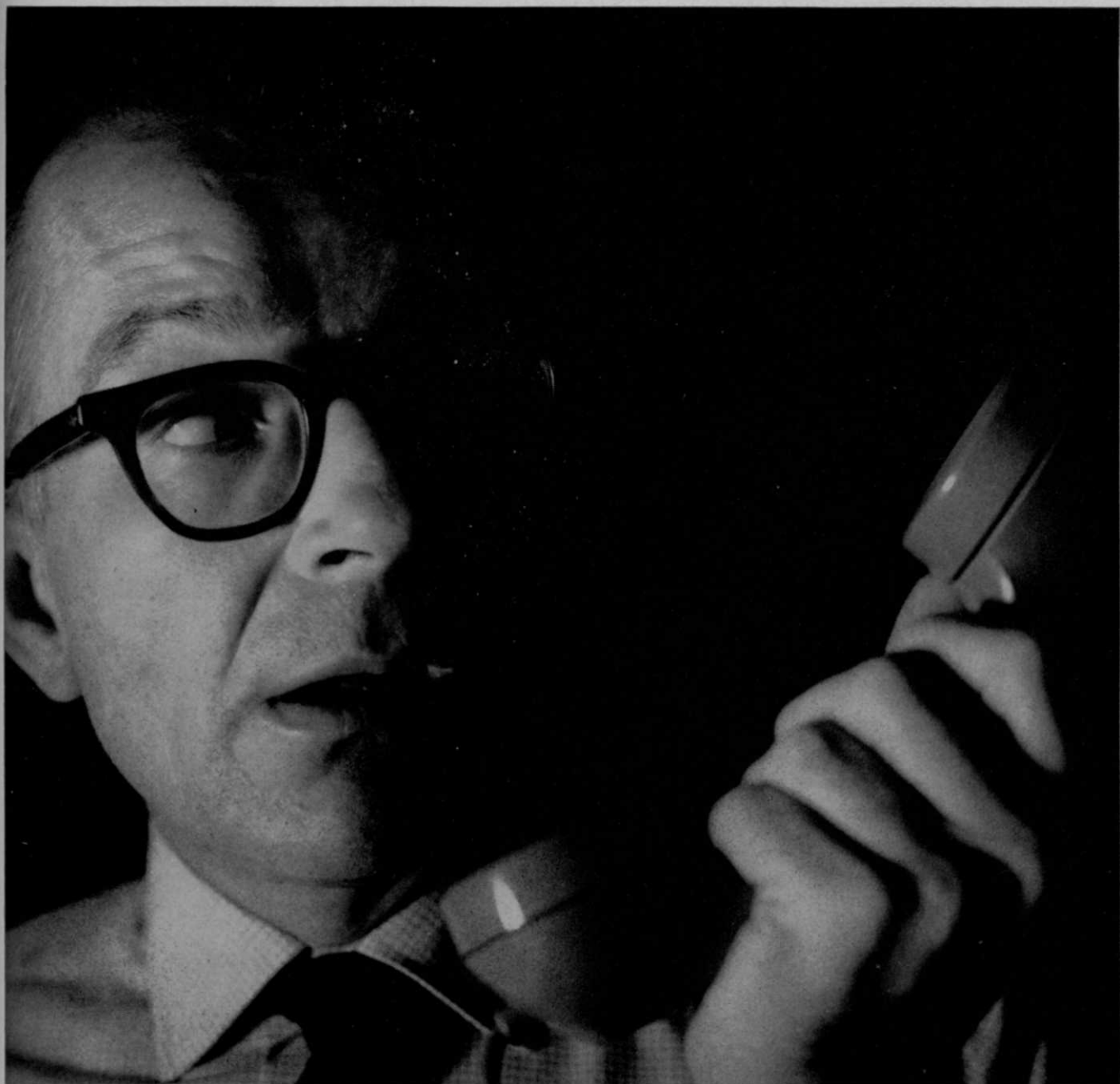
Stem infections by disease organisms often result in the formation of dead, sunken areas, called cankers, around the point of invasion, which is usually a wound of some type. In the more destructive canker diseases, the cankers continue to enlarge until girdling of the stem occurs.

A common example is *Cytospora* canker of spruce. Early symptoms appear as browning and defoliation of needles on affected branches. In most cases girdling cankers form, accompanied by the exudation of pitch, and branches die, beginning with those nearest the ground and progressing slowly upward. Control may be achieved by pruning out cankered branches and by maintaining plants in a vigorous growing condition by proper pruning, watering, and fertilization.

(Continued on page 30)

**Cytospora canker** on Colorado blue spruce showing typical exudation of pitch.





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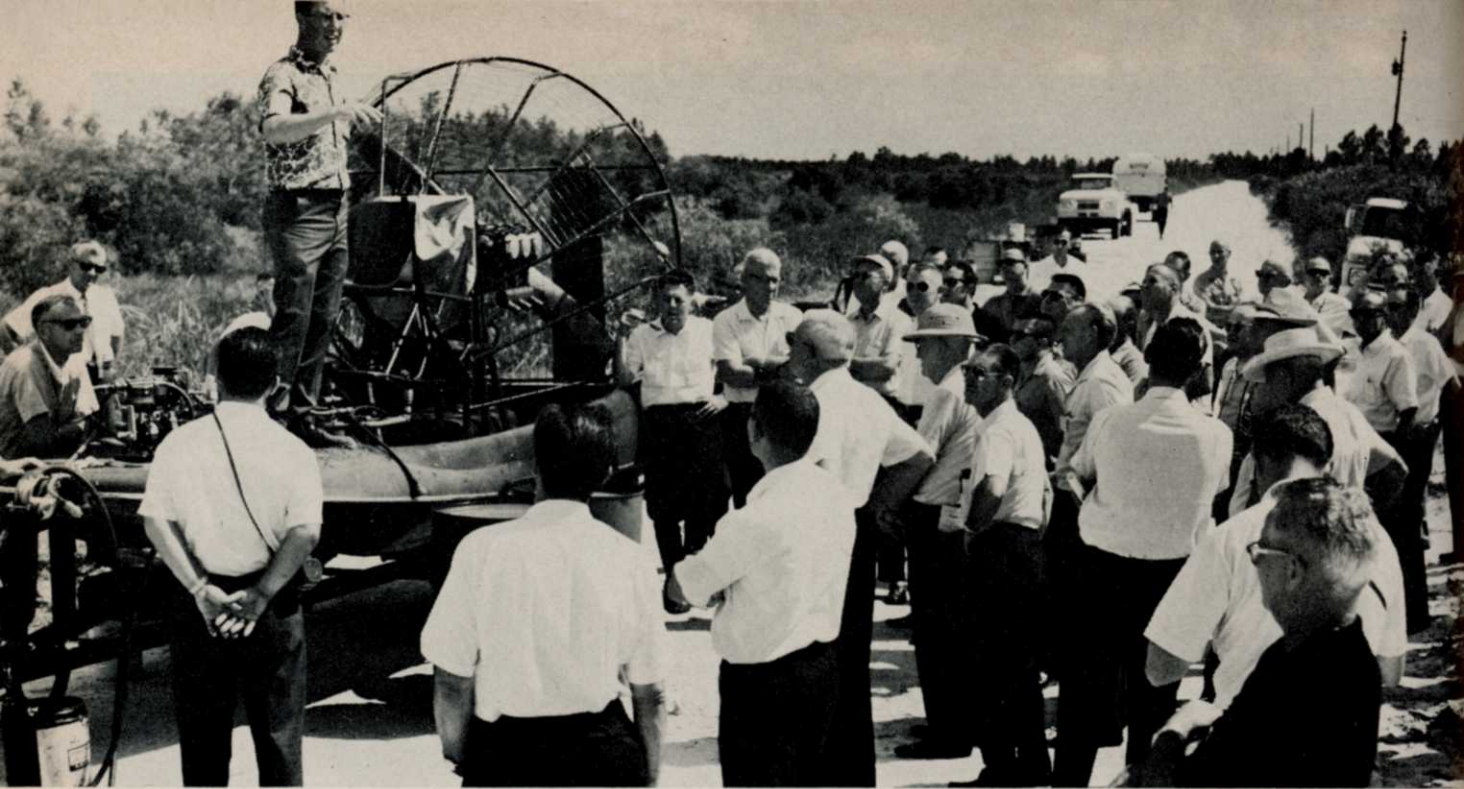
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**Dr. Lyle W. Weldon, atop air boat,** research agronomist at Agricultural Research Service, USDA, Ft. Lauderdale, Fla., gets Society field

demonstration underway. Some 150 members of the Society registered for the 1967 annual meeting.

# Aquatic Vegetation Control

*a major segment  
of the industry*

**Earl Ogle, Hercules, Inc.,** Wilmington, Del., demonstrated Hercules equipment for testing consistency of invert spray materials during field demonstration at Society's 7th annual meeting.

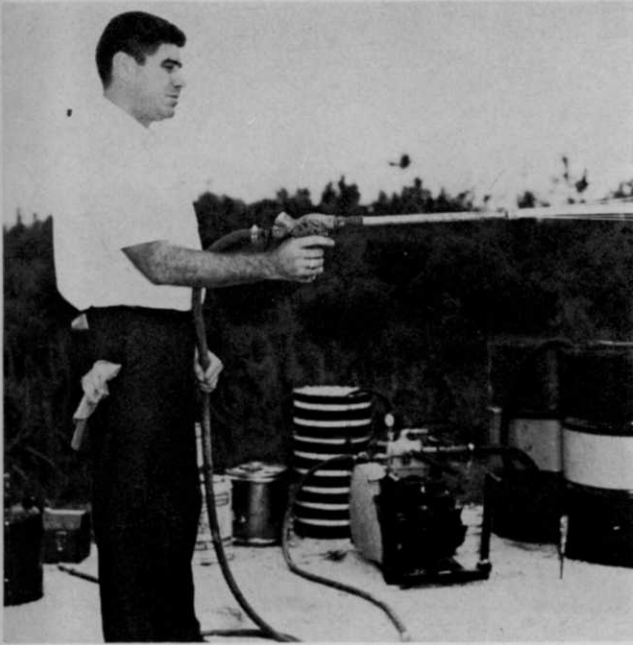
*A WTT staff report on the 7th annual meeting of The Hyacinth Control Society, an organization dedicated to control of all noxious aquatic weeds. Members pool their experience and research in an exchange of information, aimed particularly at the applicator level.*



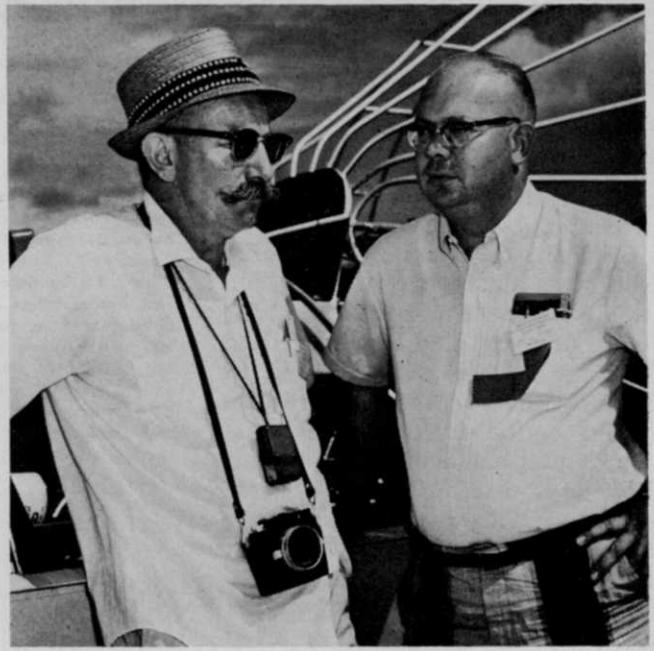
Aquatic weed control promises to become more complex. Problem areas increase as greater segments of the nation's population seek out and use inland water, whether lakes, canals or regular streams. Homebuilding and commercial use of inland water causes a buildup of pollution which in effect fertilizes bodies of water to the extent that they become natural incubators for weed growth. The usual result is that aquatic weeds limit

recreational, commercial, and public use of both natural and artificial water areas.

A good example of how quick noxious aquatic weeds can become a problem is found in the Panama Canal. Problems there began only about 10 years ago at a time when only hyacinths and some aquatic grasses were evident. These did not become alarming until about 5 years ago when many areas suddenly became choked with Elodea and



**Stull Chemical Company's Bifluid System** as an aquatic weed control technique is being demonstrated at field session of Society meeting by Bob Burgdorff, sales representative of Stull, Houston, Tex. On the program Burgdorff related Stull's pioneer work with this new concept of vegetation control.



**John Gallagher, left, and James D. Gorman** discuss aquatic weed problems during field demonstration of Hyacinth Control Society annual meeting. Gallagher is aquatic weed research specialist, Amchem Products, Inc., Ambler, Penna., and Gorman, Society president, is director of the Hillsborough County mosquito control unit, Tampa, Fla.

other varieties of submersed weeds. Mechanical methods of clearing choked areas worked for a time but, according to Julian S. Hearne, chief of the Dredging Division of the Panama Canal Co., who reported at the recent annual meeting of the Hyacinth Control Society at Ft. Myers, Fla., the need to rely on chemicals was soon apparent. Copper sulfate experiments were started in 1964 and produced good results. It was used in crystal form so that it would settle to the bottom and attack the root system of the plants. Later, in May 1966, Elodea was almost completely cleared by use of copper sulfate. However, because of the expense involved on the massive expanse of the Canal, Hearne said that experiments were started with other chemicals to seek methods of reducing costs. Most of the areas tested were plagued with about 90% Elodea, 8% coontail, and 2% water hyacinth and marginal grasses.

Results varied with concentrations of chemicals used, Hearne reported, but were generally good. For example, Hydrothol 191 used in liquid form at concentrations of 1.5 to 3 ppmw showed a remarkable disintegra-

tion of vegetation, and within 3 weeks plots were virtually free of all vegetation. No fish kill was evident. By contrast, a similar concentration of Hydrothol 191 in granular form produced a very slow effect with areas adjacent to spots where the granules fell having a very healthy effect.

Copper sulfate plus Diquat at

concentrations of 1 to 2 ppmw of each give kills ranging from 80% to 100%. Diquat alone at 1 to 2 ppmw concentrations gave 80% to 85% kills after 3 weeks. Copper sulfate crystals at 5 to 20 ppmw concentrations produced 90% to 100% breakup and decomposition of Elodea with no new growth showing after 3 weeks. Karmek at a concentra-

**Zeb C. Grant, vice-president** of the Hyacinth Control Society and director of operations and maintenance of the Florida Flood Control District at West Palm Beach, Fla., left; Charles J. Fox, technical representative of Hercules, Charlotte, N. C., center; and William Dryden, commissioner of the Lee County Hyacinth Control District at Ft. Myers, Fla., and a past president of the Society as is Grant, discuss program just prior to opening session.



tion of 3 pounds per acre foot gave a 10% reduction in weeds after 3 weeks; at 15 pounds, a 35% reduction.

Problems in aquatic control were reviewed for the record 150 registrants at an annual Society meeting by President James D. Gorman, director of the Hillsborough County, Fla., mosquito control unit. Among the most far reaching, he said, was a ruling by the Florida State Board of Health that no pesticide formulations containing 2,4-D, dalapon or Diquat had been registered for use in sources of potable water supply. This problem is being studied by a number of federal, state, and private agencies to determine the information required for registration of 2,4-D formulations. A report is expected shortly. Gorman also said that a bill had been introduced into the US Senate to prohibit importation into the US of exotic aquatic plant species. The Society is on record, Gorman stated, in support of the bill. Gorman called on Society members to stimulate interest in aquatic weed control by commercial applicators. Government agencies cannot treat aquatic weed problems on private property and to date, too few commercial applicators are qualified to handle the

**Robert D. Blackburn, research botanist,** Agricultural Research Service, USDA, Ft. Lauderdale, Fla., demonstrates new development in pump equipment for air boat use, during Ft. Myers annual meeting. Blackburn was elected Society president for the coming year.



specific problems. He complimented the work of researchers on present aquatic problems within the scope of current financing, but called for more research on control programs by university staffs, in Florida and throughout the Southeastern US area. At the annual Society banquet, Gorman was presented a plaque for his service to the organization.

Also receiving an award was William E. Wunderlich, chief of the US Army Corps of Engineers

aquatic growth control section at New Orleans, La. He received a lifetime membership to coincide with his retirement. On the formal program, Wunderlich discussed mechanical harvesters which have been used for a number of years to clear hyacinths from navigable channels. These harvesters, he said, are limited to waters deep enough to float them. Chemicals, he said, have ruled out all but about 3% of such work in his area. Attempts

*(Continued on page 38)*

**Charlie P. Johnson, left,** president of the Johnson Spray Company which bears his name, and Paul R. Cohee, technical sales representative of Hercules, Inc. Cohee was elected secretary-treasurer of the group for the new year.

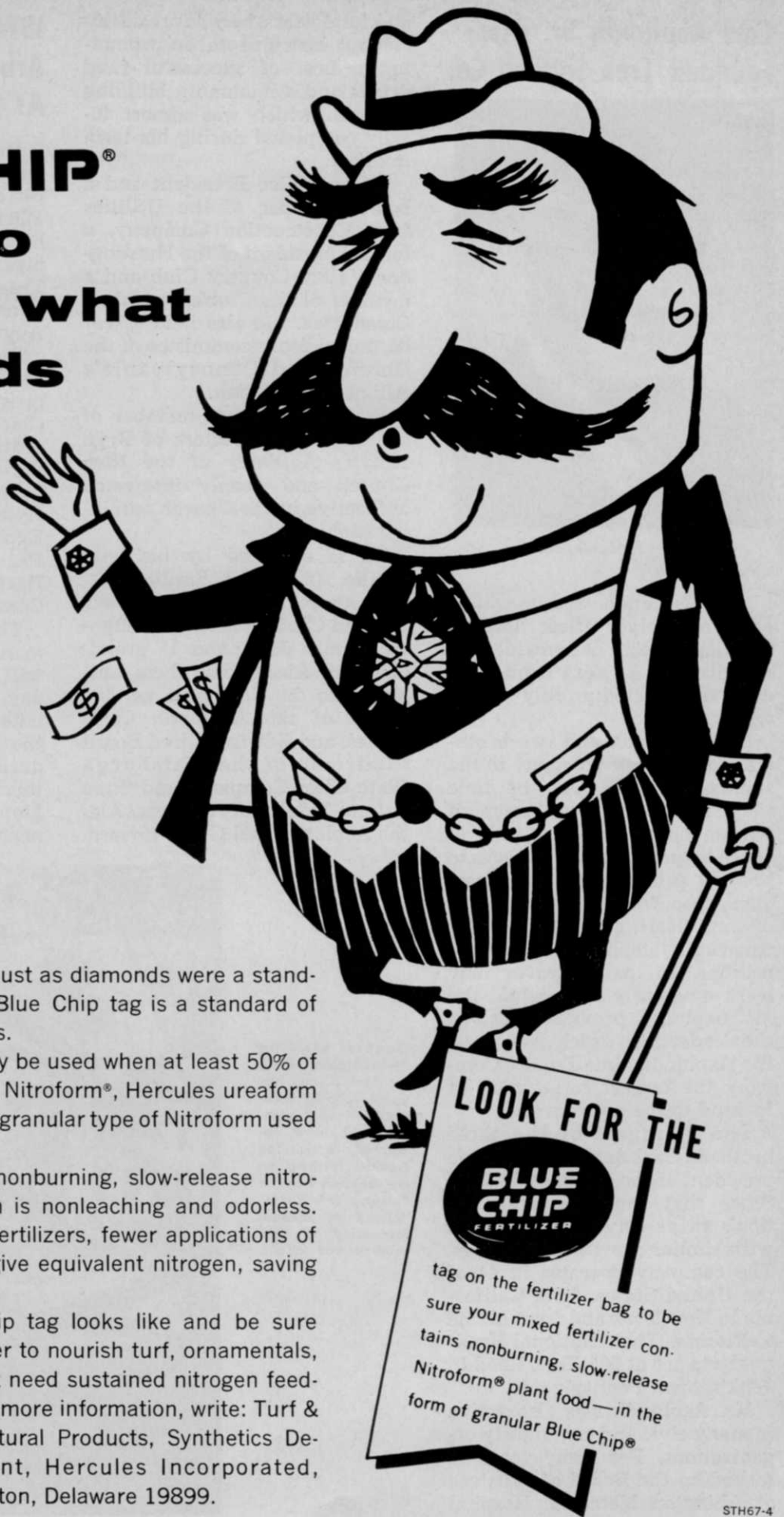


**Andy L. Price, aquatic biologist** of Pennsalt Chemicals Corp., Orlando, Fla., center, examines spray gun with group during field demonstration. Price discussed commercial aquatic weed control in southeastern U.S. on Society formal program.





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## Carl Asplundh Sr. Dies; Founded Tree Service Co.



Carl Asplundh, Sr.

Carl Asplundh, Sr., president, chief executive officer and co-founder of the nationwide Asplundh Tree Expert Company died unexpectedly July 2. He was 63.

Mr. Asplundh and two brothers created their company in the summer of 1928. At the time they had only two crews of workmen, two trucks and an office helper. Their intent was to provide professional line clearance, tree trimming and right-of-way clearing, exclusively for America's telephone and electric utilities. In that endeavor they were eminently successful, and Mr. Asplundh provided much of the leadership which has made the Asplundh Tree Expert Company the largest corporation of its kind in the entire world.

The youngest of the three brothers, Carl Asplundh, became president of the company in 1952. Since that time the organization's sales have quadrupled with similar growth in earnings. The company operates in 44 of the United States, from California to New York and from Maine to Florida. Their National Headquarters are at 505 York Road in Jenkintown, Pennsylvania.

Mr. Asplundh was also active in many civic and community organizations. For many years he served on the Board of Trustees at Abington Memorial Hospital

and for 4 years, he was president. He was instrumental in promoting a host of successful fund drives and a mammoth building program which was almost totally completed during his term in office.

He was Vice President and a board member of the Utilities Line Construction Company, a former president of the Huntingdon Valley Country Club and a member of the Club's Executive Committee. He also held a seat on the advisory committee of the University of Pennsylvania's Alumni Association.

He was a current member of the Board of Directors of Bryn Athyn's Academy of the New Church and deeply interested and active in the Church administration.

He is survived by his wife Emilie (formerly Emilie Kessel); three sons, Edward, Carl, Jr., and Christopher; one daughter, Emily Jane, and 11 grandchildren. Also two brothers, Lester, who is Chairman of the Board of the Asplundh Companies, and Edwin, retired Board Chairman of the Pittsburgh Plate Glass Company; and three sisters, Fidelia de Charms, Alethe Asplundh and Guida Bovard.

## ISTC and National Arborists To Meet At Philadelphia

Members of the shade tree industry will gather at Philadelphia late this month. The Marriott Motor Hotel will be headquarters for annual meetings of the International Shade Tree Conference and the National Arborist Association, both August 27-31.

Registration begins at 9:00 a.m. Sunday, Aug. 27. Arranging the program for the arborists is Clarke W. Davis, association executive secretary. For the ISTC, the program has been put together by General Chairman Hyland R. Johns, Asplundh Tree Expert Company, Jenkintown, Pa., and Co-chairman Ronald L. Harper of Philadelphia Electric Company.

The Honorable Orville Freeman, Secretary of Agriculture, will be in Philadelphia on Tuesday, August 29, to give the Keynote Address to the members of the ISTC. Freeman will speak during the convention's Keynote luncheon at noon at the Marriott Motor Hotel on City Avenue, near the Schuylkill Expressway,

Guests visiting Philadelphia, Pa., for the ISTC and National Arborist Association annual meetings will have opportunity to visit The Franklin Institute on the Benjamin Franklin Parkway. It is a wonderland of science, fascinating to both children and adults.

