

JANUARY, 1970

WEEDS TREES and TURF

100



Annual Turf Issue

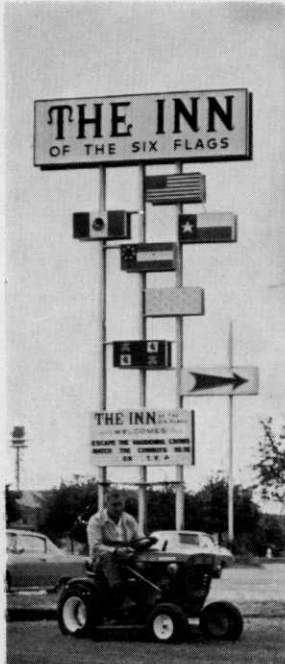


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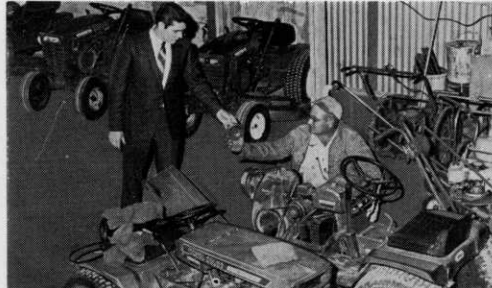
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Supervisor Fowler adds: "Out here garden tractors have to crawl like a snail one hour, run like a thoroughbred the next, and be able to take it hour after hour; the automatic shift on those Wheel Horses clinched it for us." If you have a lot of greenery to groom and keep green, write the pick of the pros: Wheel Horse Professional Services, 515 West Ireland, South Bend, Indiana 46614.



Landscape Supervisor Cotton Fowler near parking area of inn which has 308 rooms, five swimming pools, two golf courses.



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Fowler trims front lawn of Great Southwest golf club. Wheel Horse tractors "cut mowing time around trees and bushes in half", according to landscape supervisor.

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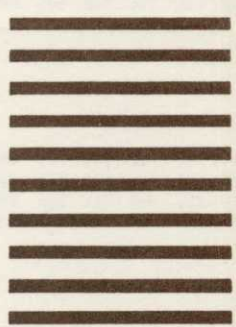
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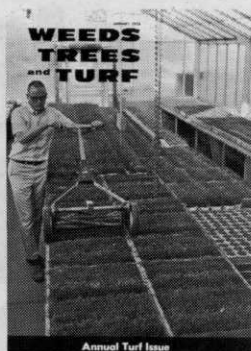
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The Cover

Growing grass can be confusing. It's pampered, fed and watered at great expense. Result: It grows fast, then needs to be mowed — at great expense. Now, many companies are looking for ways — at no small expense — to keep it from growing so fast. O. M. Scotts & Sons, Marysville, Ohio, devotes an entire greenhouse to growth retardant research. The cover suggests that in the greenhouse, at least, Scotts has the grass where it can be handled with a hand mower again, as Richard J. Schneider of Scotts research demonstrates. He's mowing boxes of turf varieties, each containing Windsor, tall fescue, Merion, bentgrass and Park bluegrass. So far, Scotts has found one regulator that gives good control up to six weeks.



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Gene Ingalsbe
Editor

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Editorial Director

A. J. Michel
Advertising Production

Hugh Chronister
President and Publisher

Dan M. Humphrey
Vice-President, Advertising

Roy Bever
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That Frightful Imaginary Danger



Senator Allen Ellender
Louisiana

"Whether danger actually exists is sometimes beside the point." Concerning pesticide pollution, "the face is *people think it does.*"

Sen. Allen Ellender of Louisiana made this ominous observation at the third annual meeting of the National Aerial Applicators Association. This is the problem the chemical industry must face up to and solve, he indicated.

At the same time in Washington, D.C., the noose was being yanked tight on DDT. And observed another speaker at the NAAA meeting bitterly, "The only thing DDT hasn't been blamed for is causing pregnancy."

What's additionally disturbing about the public attitude right now about pesticides, Ellender continued, is that the people who know least about the problem, or think they have no economic stake in its solution, shout the loudest.

Like all of us, they're concerned with safety and when they feel unsafe they want to do something about it. "Security is one of the foremost psychological needs of mankind," he explained. "What's important is that some danger is real and some danger is imagined. Sometimes imagined dangers can be more serious, for men are moved

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as much by myth as they are by logical reasoning.”

Awareness of a problem often breeds emotionalism, he said. The public has become acutely aware of pollution (of all kinds), said Ellender, principally for two reasons: (1) development of machines capable of measuring substances considered pollutive at minimum levels previously unheard of; and (2) dramatization by news media, particularly television, of incidents in which facts were occasionally exaggerated and sometimes downright erroneous.

Ellender cited a recent example in his own state that produced calls to his office. The news report was about a huge fish kill in Terrebone Bay, presumably from pesticides. In truth, a fishing boat had run aground and to lighten its load in order to float, the crew had dumped the day's catch of fish—already dead—overboard.

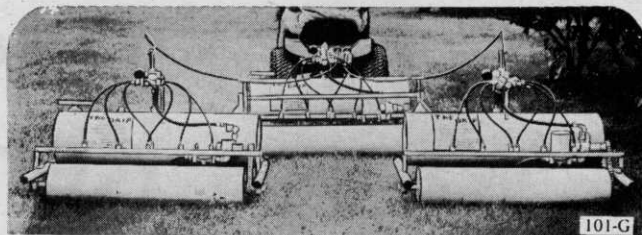
But as is true in so many cases, the Senator stated, “the damage was already done.”

“It is the responsibility of reasonable men to keep things in perspective,” said Ellender.

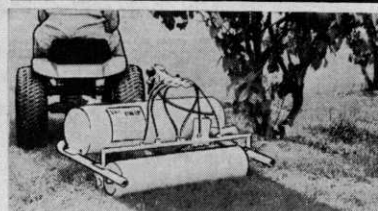
“Make no mistake about it,” he cautioned, “I am not saying that danger from the widespread use of persistent agricultural chemicals is non-existent. What I am saying is that the worst teeth of this dragon can be pulled by training and by the use of wise methods of applications.”

Ellender commended NAAA for choosing safety as its theme. He said he was particularly encouraged by the concern for additional pesticide safety on the part of industry and associations such as NAAA.

“While government can lead the way, as it must do on occasion,” he added, “in the final analysis real progress depends upon the wholehearted cooperation of those who produce, develop and find use of our natural wealth and resources.”



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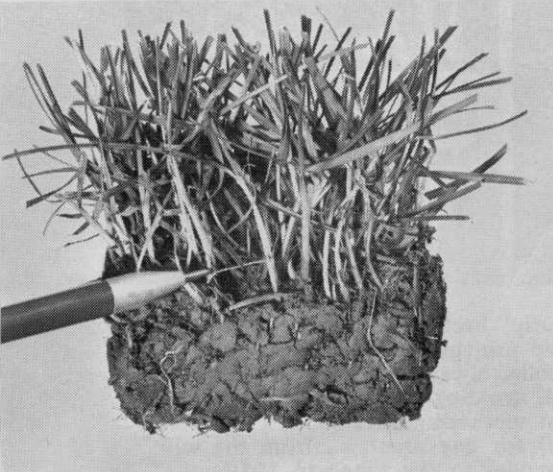
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Kentucky Bluegrass:



One of the elite, dense varieties of Kentucky Bluegrass is Fylking. It's shown above mowed at 1½ inches. Note very little thatch where pencil points, an advantage with species spreading by rhizome rather than by stolons. This grass is three years from seed. (Lawn Institute photo)

By DR. ROBERT W. SCHERY,
Director of the Lawn Institute
Marysville, Ohio

IT HAS BEEN several years since Kentucky bluegrass, *Poa pratensis*, was reviewed in Weeds, Trees and Turf as the first grass in a series of turfgrass portraits. An updating is timely for this turf issue.

Kentucky bluegrass not only remains the prime favorite for lawn seeding and sod from border state latitudes northward, but interest in it has intensified both domestically and in Europe. Skillful breeding has given a host of new cultivars, some already available commercially, others still in the testing and developmental stages. Many new, elite varieties for specialized use have now joined traditional, carefree types (which have also been perfected as varieties, viz. Arboretum, Kenblue, Park, etc.). An exciting decade lies ahead for Kentucky bluegrass enthusiasts.

A Bit of History

Bluegrass appears to have received first recorded mention by the Greeks, in southeastern Europe before Christian times. Perhaps primitive "diploid" forms could still be found in the mountains there (as is the case with many cultivated plants)? Records from the Middle Ages show the plant (not to be named *Poa pratensis* until 1753) widespread throughout Europe, undoubtedly in many of its present polyploid forms. Most likely it spread to the New World with early European colonization, the seed probably a chance component of shipboard hay and cattle bedding. Before the American Revolution it was reliably identified on the North American east coast, and especially in the St. Lawrence valley.

Evidence suggests that the French missionaries carried *Poa pratensis* to the Great Lakes country, and so far south as the Ohio River valley, before 1700. It grew superlatively on the phosphatic soils of north central Kentucky, where it supported in the Lexington area the first "civilization" of the white man west of the mountains. Called "June grass" and many other common names during its early years in North America, Kentucky bluegrass became identified with the state of Kentucky sometime between about 1830 and 1850. Gradually "Kentucky bluegrass"

came to be accepted for the species, and the name has stuck ever since.

Today Kentucky bluegrass is still recognized as an excellent pasture species, but even more as the premier species for lawn, recreational, roadside, and industrial turfs, even so far south as the mountains of Arizona and Alabama-Georgia. In Europe, too, it is gaining favor for fine turf, even though the milder, rainier climate there and the custom of close-mowing has tended to favor other species. In North America more bluegrass plants grow on more high priced land than is likely the case with any agricultural crop from corn on down.

Bluegrass Traits

Kentucky bluegrass is noteworthy not only for its graceful foliage that mows exceedingly well, but for its ability to spread by underground stems called rhizomes. By this means a single bluegrass plant can eventually colonize many square feet of ground, and of course this constitutes a built-in system for thickening up turf that has thinned for any reason.

Kentucky bluegrass can withstand drought, cold and abuse well, reviving even after seeming to have been completely wiped out. Although it prefers fertile, friable soils, it is a reasonably tolerant species that requires little pampering. Many of the traditional varieties get along quite well with no attention other than mowing, if planted to reasonably good soil. Bluegrass withstands moderate shade well, and the usual pesticides. Some of the newer selections such as Fylking and Pennstar can be mowed so low as ½ inch (traditional varieties are best mowed 1½ inches or taller). The foliage texture is first-rate, its color deep and not at all garish.

Growth Pattern

Kentucky bluegrass responds excellently to coolish weather—temperatures such as are normal in northerly states during September and October. Judging from performance in the deserts of southern California, bluegrass can withstand fairly high daytime temperatures, too, if the nights cool down (as they do from ra-

Turfgrass Par Excellence

diation in the clear atmosphere of the desert). Kept for long periods at temperatures much above 80° F, most Kentucky bluegrass cultivars exhaust accumulated food reserves, thus weakening the plant. But between freezing and about 80° F bluegrass is strongly accumulative; it builds up carbohydrates quite markedly in autumn. Reserves are drawn down in spring in order to foster the exuberant flush of new growth occurring then.

Bluegrass begins to green as soon as the weather warms in spring. During hot, dry weather of summer, growth slows and a degree of dormancy often sets in (which can be counteracted to a great degree by irrigation and fertilization). With onset of cooler weather in early autumn growth is rampant again, but in response to declining day lengths it is of a short, consolidative nature, with many stocky, tight tillers.

Maintenance

Both high-maintenance and low-maintenance groups of bluegrass varieties now seem shaping up. Most of the new selections have followed Merion's lead, and are bred for select, high-quality turf that is fertilized regularly and watered during drought. Fylking, Merion, Pennstar and most of the new hybrids profit from at least 4 pounds of elemental nitrogen (N) annually per thousand square feet (M), and are sometimes provided as much as 12. In cool weather bluegrass can withstand heavy feedings, but ordinarily it is well not to apply more than 1 lb. N/M at a time, and only about a half pound in warm weather.

As noted, mowing of the traditional varieties should be relatively tall, but newer varieties have been selected for low growth and withstand quite low clipping. With any turfgrass it is best not to scalp the lawn by mowing short suddenly; never remove more than half to one-third of the green leaf at a single mowing.

Although bluegrass is tolerant of a wide range of soils and pH, it performs best on well-drained land that is not compacted. Fertilization should match the soil.

Irrigation is increasingly practiced

on fine turf, with both favorable and unfavorable effects. Judicious watering keeps a bluegrass lawn green when it might turn brown from drought, but in hot weather it may confer greater benefit to certain weeds than to the bluegrass (especially if excessively done). When bluegrass sod is not let dry out almost to the wilting point occasionally, such difficult weeds as annual bluegrass, crabgrass and nutsedge often become troublesome.

Fortunately, bluegrass is very tolerant of conventional lawn herbicides applied at recommended rate.

Propagation

Tenacity of bluegrass, and its ability to spread by rhizomes, permits it propagation by plugs (biscuits of sod), or as sod itself. But seeding is simpler, more economical.

Nearly 40 million pounds of Kentucky bluegrass is marketed annually, each pound of which contains about two million seeds, potentially 80 trillion plants.

Sophisticated turfmen and many sod growers plant but a single type of bluegrass. However, experience has shown that blending several bluegrasses, or bluegrass varieties with fine fescues, creates a more widely adapted turf less likely to suffer serious decimation.

Kentucky bluegrass is highly apomictic, meaning that the seed mostly comes true to the parent type and is not affected by sexual crossing.

Bluegrass Varieties

The list of bluegrass varieties is increasing almost daily; it is difficult to keep track of the names alone, much less have experience with the cultivars over a range of conditions.

Table I lists those varieties which are commercially procurable as this is written, or promised soon: they are categorized as elite, especially attractive varieties for highly maintained lawns; as self-reliant varieties for less-tended turf and acreage sowings; and as an "intermediate" group which doesn't fit neatly into either category.

Kenblue is especially interesting as an "old-fashioned," genetically

mixed line tracing back to the first bluegrass in Kentucky mentioned in the section on history. Of course any of these bluegrasses can provide a first-rate turf if given suitable growing conditions. By-and-large those in the elite category should be more closely mowed, more heavily fertilized, and be provided supplementary attentions such as occasional removal of thatch; the self-reliant types should be mowed tall, and though responding well to fertilization survive without much (and may actually resent feeding in hot weather).

Table II lists some of the additional bluegrass varieties under test, not all of which will necessarily reach the market-place. A number of these are of European origin. Still others under test privately have not received a varietal name, and are known only by code number.

If one were to hazard a guess, many of the favorite bluegrasses for the 1970s will arise from this pool of coded selections.

Table I. Proved Kentucky bluegrass varieties, commercially available or pending.

ELITE CULTIVARS for well-tended lawns: Fylking, Merion, Pennstar, Warren vegetative selections.

SELF-RELIANT TYPES for acreage and turf receiving only moderate attention: Arboretum, Delta, Kenblue, Natural common, Park.

INTERMEDIATE VARIETIES: Cougar, Newport, Prato, Primo, Sodco, Windsor.

Table II. Examples of less familiar Kentucky bluegrass cultivars not included in Table I, and varieties under test but not yet available.

Adorno, Arista, Atlas, Baron, *Belturf, Campus, Captan, Delft, Fjord, Fusa, *Geary, Golf, Nike, *Nudwarf, *Nugget, *Palouse, *Silverblue, Skandia, Sydspout, Southport, *Troy, Zwartberg, diverse selections known by code designations only.

* signifies domestic selections.

A Big Turf Show And What Goes On

FOR A THREE-YEAR-OLD, it's making some pretty bold claims to bigness.

But then the Ohio Turfgrass Conference as supporting evidence offers its attendance of 1,050, raising the question: Is there another similar gathering any larger?

The latest measurement of the Ohio group's growth came Dec. 1-3 in Cleveland. Twenty-two papers were presented; 71 companies occupied 130 booths set up in the main ballroom and an adjacent room half as large in the Sheraton-Cleveland Hotel.

Sponsors were four-fold: The Ohio Cooperative Extension Service, Ohio State University, Ohio Agricultural Research and Development Center, and the Ohio Turfgrass Foundation.

Subject matter for the three days was categorized under five headings: Turf varieties and mixtures;

turfgrass diseases; soil factors; weed control; and grounds beautification. A report on the weed control section will be carried in the February special issue on weed control. A capsule of other information presented follows:

Turf varieties and mixtures

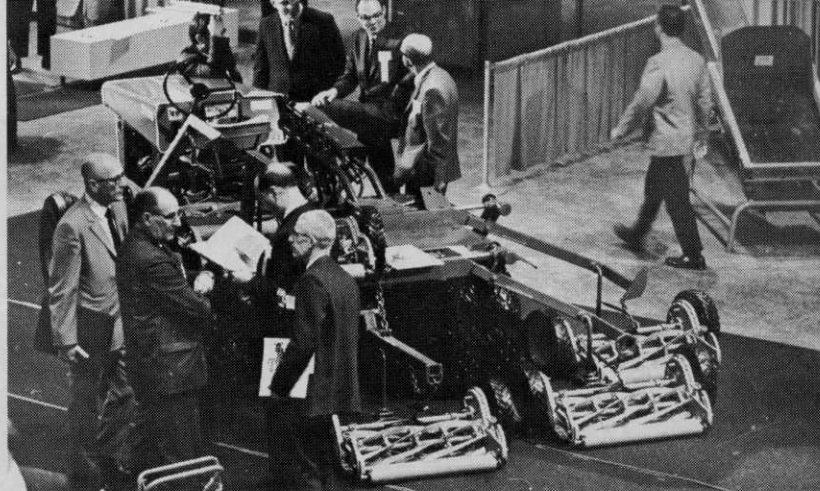
"Temporary grass mixtures are, for the most part, not desirable and used only when quick cover is necessary," stated agronomist Merle H. Niehaus from the Wooster research and development center. On the other hand, he added, "Permanent mixtures can be used to increase turf tolerance to certain pests and particularly to increase shade tolerance."

Fast-growing short-lived species,



You're looking at a portion of the banquet crowd and about a third of the exhibit area of the Ohio Turfgrass Conference and Show. The event is becoming one of the largest in the country on vegetation management.





On the Exhibit Floor



rather than acting as a "nurse crop" for slower-growing, long-lived species, can actually suppress the growth of the latter desired species, he said.

A desirable permanent mixture is bluegrass and red fescue. Bluegrass will dominate the sunny portion of the area; the red fescue, the shady portion. In Wooster tests, this mixture produced a complete sod more rapidly than either alone, he reported.

For hard-use areas, such as playgrounds on athletic fields, Niehaus advised pure tall fescue over bluegrass/tall fescue. In high levels of management, the bluegrass will dominate, he said.

Short-term data indicate that bluegrass and new turf-type perennial ryegrass look promising as a mixture to provide quick cover and a high degree of tolerance to many turf diseases.

Dr. C. R. Funk reported these conclusions from Rutgers research of bluegrass blends under various management conditions:

1. Observed performance of a blend has never significantly exceeded the performance of the best component variety.

2. Blending of varieties with contrasting leaf widths has produced attractive turf.

3. Newport has proved to be a poor competitor in mixtures with Merion, Pennstar and Fylking.

4. Merion has been too competitive, in relation to other available varieties to make it an ideal component of a permanent blend. At the end of three years, Merion comprised more than 94% of the turf in all mixtures seeded to either 25% or 50% Merion.

5. Blends of resistant and susceptible varieties showed considerably less damage from leaf spot than the average performance of the components grown separately.

6. Stripe smut did not influence competitive ability until it became severe.

"Data suggests that the best multipurpose bluegrass varieties," Funk concluded, "will be blends of compatible, low-growing, disease-resistant bluegrasses tailored to complement each other. Outstanding single-component varieties will continue to be used for special purposes."

All the while that one of the most enviable records in college football was being built, research was going on under the trampling feet of Ohio State University football players and their usually vanquished opponents. Among those watching the turf, perhaps as much

as they watched the players, was Dr. Robert W. Miller. He reported on findings of research that began with the renovation of the Ohio State field at Columbus in 1961.

A 90% tall fescue/10% Kentucky bluegrass was seeded in April of 1962. During the first playing season, tall fescue dominated, he said. Then the fescue dwindled to 25% in the 1963 season and disappeared entirely by the 1964 season.

Research was begun to find out what happened to the fescue. Merion, Delta and Newport bluegrass were mixed with fescue. Factors of fertility, seeding rate, mowing height, water and no water were evaluated.

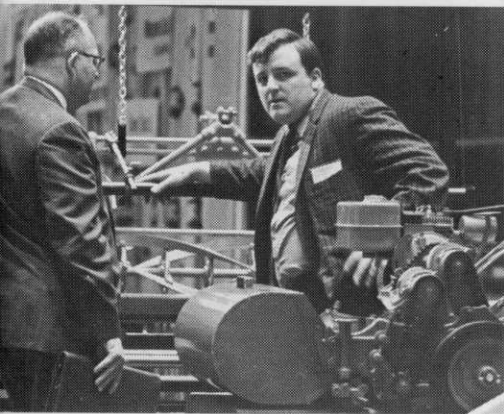
Dr. Miller reported these conclusions:

1. A turfgrass mixture of tall fescue and Kentucky bluegrass will gradually change to bluegrass when highly managed in a climate similar to that of central Ohio.

2. The increasing dominance of bluegrass results in part from differential winter injury to the two species.

3. To maintain a minimum shift to bluegrass, use no more than 3 lbs. of nitrogen per 1,000 sq. ft. per year and mow at a two-inch height.

While perhaps more than half of the golf courses in the northern part



The specialist must be keenly aware of three factors when attempting to identify disease: appearance of individual plants; weather conditions at the time and prior to appearance of the disease; and management practices.

Application of fungicides can be done several ways, but R. R. Muse of Ohio State's Wooster research center said spraying is preferred "simply because it provides a more efficient and better distribution."

Muse stated that complete and uniform coverage of fungicide — that is, wet leaves, crown, and thatch area — can be achieved with 5 to 10 gallons of spray per 1,000 sq. ft.

"In some cases, five gallons are satisfactory against diseases such as powdery mildew and rust, "which attack mainly the grass blades" he said. "Other diseases, such as Sclerotinia dollar spot, Rhizoctonia brown-patch, Pythium light, and Helminthosporium melting-out, in which the organisms attack the crown and roots, require 10 or more gallons."

Plant pathologist Noel Jackson of the University of Rhode Island doubted the development of a fungicide that would be a universal panacea for all turf ills.

Laboratory success for a fungicide doesn't always follow with field success because conditions vary so greatly, said Jackson. And methods of testing and evaluation vary from research center to center.

To improve fungicide research and evaluation, Jackson reported that the turfgrass committee of the American Phytopathological Society recommended recently the establishment of nationwide test standards. The standards would cover all aspects of field experimentation, growth chamber and greenhouse studies; The committee charged with recommending standards would also offer suggestions on how to develop a centralized, interstate cooperative facility for obtaining and compiling meaningful data.

A carefully planned fungicide program may be important, but may not be needed, suggested Lowell E. Moser of Ohio State.

"By carefully planning and modifying a turfgrass site, selecting disease resistant varieties, keeping a balanced fertilizer program, irrigating as infrequently as possible and preferably in the morning, mowing with sharp mowers, and keeping thatch under control, one could expect less disease."

Intelligent management won't eliminate disease on fine quality turf, he added, but where medium

quality turf is sufficient it often is enough to avoid a severe disease problem.

Soil Temperature Effects on Plants

Soil temperature and air temperature characteristics aren't always parallel, disclosed James M. Latham, Jr. agronomist for the Milwaukee Sewerage Commission.

The turf manager needs to pay more attention to temperature below the surface, Latham indicated, if he is to establish and maintain healthy turf.

It is well known that soil temperature directly affects germination, growth, and bacterial activity, therefore it is important for the turf man to know whether a soil tends to be cooler or warmer.

Latham listed these factors as indicators of warmer soil: dark color and dry, south slope, well-drained, uncompacted, bare, and in equatorial latitude. Cooler soil factors, he said, are light color, north slope, poorly drained, compacted, forested or cropped and polar latitude.

(Continued on Page 14)

of the country have bluegrass fairways and tees, James L. Holmes, Agri-Systems of Texas, Inc., Bryan, sees a trend to bentgrass.

Fairway irrigation and player demand for short height of cut are the reasons, he said. "If a blend or mixture is all that is required, simply use seaside," he advised.

"Great variation in type is perhaps the most favorable trait of seaside. Where this grass has been regularly and constantly seeded or overseeded, certain types develop under given environmental conditions."

Penncross is finding favor as a green and tee turf, simply because it is easier and cheaper to establish by seeding, claimed Holmes. "It is tremendously easier in reestablishing a uniform turf in a deadened area."

Turfgrass Disease

Of greatest importance is the discovery of turfgrass diseases at the earliest stage, stressed Clinton F. Hodges of Iowa State University. Once large areas have been lost, identification of the specific disease is extremely difficult.

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Presidents, Man-of-the-Year . . . And the Whole Gang



Newly elected president of the Ohio Turfgrass Foundation, Richard Craig, left, is offered best wishes by Robert Reiman, outgoing president (upper left picture) Charles Tadge, right, receives OTF's "Man-of-the-Year" award from Harry Shrode, awards committee chairman. The leadership that produced the big show and will plan the one next year at Cincinnati

is, from the left: Robert Miller, executive secretary; Richard Craig, president; Tom Evans, first vice-president; Robert O'Brien (front), second vice-president; Robert Reiman, outgoing president; Gene Probasco, treasurer; Paul Morgan, director; Fred K. Buscher, director; Bill King, director; Harry Shrode, director; Paul Mechling, director.

(Continued from Page 11).

Temperature variation diminishes as soil depth increases, Latham pointed out. The depth where no change occurs is called the neutral layer. The neutral layer for daily temperature change is five inches deep; for annual variation, 40 feet. At 30 feet, he said, the seasons are reversed.

Dr. Paul R. Henderlong at Ohio State illustrated how temperature affected seed germination (percentages recorded 10 days after seeding) with this chart:

Species	90°-80°	75°-65°	60°-50°
Pelo ryegrass	65%	92%	62%
Pennlawn fescue	42	86	40
Penncross bent	50	58	46
Highland bent	53	43	45
K-31 fescue	36	55	58
Park bluegrass	32	45	20
Merion bluegrass	—	5	—

The optimum air temperature range for bluegrass and fescue growth has been reported to be about 75 to 85 degrees, Henderlong said. Yet the optimum soil or root temperature range is 60-70 degrees. Optimum soil temperature for root development of bentgrasses and ryegrasses is about 85-65 degrees. Growth rate for grasses in general indicates an optimum temperature somewhat higher than that for root growth.

Soil and air temperatures have profound influence on fertilization, stated R. E. Blaser, agronomist from Virginia Polytechnic Institute.

"The 14 mineral nutrients needed by turfgrasses do not diffuse into root tissue by themselves," he said. Temperature influences availability of nutrients in soils through chemical and physical effects on soil materials and through growth stimulation or retardation of microbes and turf plants.

Phosphorus availability is lowest when temperature is low. Too much nitrogen when soil temperature is favorable for growing can overstimulate above ground leaf growth at the expense of root health. With high nitrogen content in the leaf and reduced energy reserves in the roots, disease can be just around the corner, he warned.

Experienced turfmen know when it's "dollar spot weather" or "brown patch weather," claimed plant pathologist Dr. Robert E. Partyka. It's an indication, he said, that soil and air temperature is quite important in the development of turfgrass disease. As a rule of thumb, he listed these air temperature brackets "right" for producing the following diseases:

Show Mold, *Fusarium nivale*, 32-

45 degrees; Brown Patch, *Rhizoctonia solani*, 64-73 degrees for mycelial growth (But at 80-85 and a relative humidity of 100%, the fungus can completely blight a large area within six to eight hours. A rapid temperature drop to the 64-66 degree level favors sclerotial formation. In some cases, sclerotia may form within an hour.); *Helminthosporium sorokinianum*, leaf spotting at 68 degrees, leaf spotting with some blighting at 75-85 degrees, and severe blighting with no leaf spotting at 95 degrees; Dollar Spot, peak activity at 70-80 degrees;

Copper spot, *Gloeocercospora sorghi*, fungus begins to grow when soil temperature reaches minimum of 62 degrees for seven days (air temperature may be in the 68-75 range); Anthracnose, *Colletotrichum graminicola*, 80-85 degrees; Pythium blight, *Pythium aphanidermatum* and *P. utimum*, most favorable at 85-95 degrees; Powdery mildew, *Erysiphe graminis*, 65 degrees; Fusarium blight, *Fusarium roseum* and *F. tricinctum*, 77-95 degrees; rusts, *Puccinia graminis*, 70-75 degrees, once fungus has invaded the tissue, 85-95 degrees favors growth; stripe smut, *Ustilago striiformis*, 50-60 degrees; and soil-borne nematodes generally grow best at 65-75 degrees,

temperatures that also favor good turf growth.

Grounds Beautification

Industry might warm up its welcome from a community by leading with its plan for landscaping.

Some people don't want industry because of its lack of emphasis on grounds beautification, said Jack Sybrant of Duncan Landscaping, Youngstown, Ohio.

"Many times we're called in too late," he added. "with the only solution of the beautification problem being to screen the business from the public."

Where we can landscape, he continued, "we try to soften the structural lines to make the structure look comfortable with its surroundings."

The same idea is applicable to home beautification, observed James Caldwell, horticulturist at Ohio State.

But first, he said, you have to get their attention focused on beautification. Then give them the right information; sell them the right plantings; talk about year-around effort; don't over-clutter.

Frank Dobie of the Sharon Golf Club at Sharon Center, Ohio, observed that a "well-planned beautification program can be a good public relations program with members."

Edward Friedhoff described the tree-planting and grounds beautification at the Cemetery of Spring Grove at Cincinnati. Year-around appeal is important, with the whole idea being to please the living who come there, he said.

Dave Willits, in reporting about his landscaping efforts around Columbus Public Schools, offered graphic illustrations of what happens when maintenance isn't considered in landscape plantings. In a relatively short time, a complicated, though attractive, planting can become an eyesore if the time and labor isn't available to maintain it.

Election and Awards

Richard Craig, superintendent of the Camango Country Club at Cincinnati, was elected president of the Ohio Turfgrass Foundation. Elected to serve with him were: First vice-president — Tom Evans, Velsicol Corporation; Second vice-president — Robert O'Brien, Century Toro Dist., Inc., Toledo; Treasurer — Gene Probasco, Lakeshore Equipment and

Supply Company, Bloomington; and directors — William King, Princeton Board of Education, Cincinnati; and Paul Mechling, Sylvania Country Club, Toledo.

Charles Tadge, superintendent of the Mayfield Country Club of South Euclid, was named Man-of-the-Year. Other awards included: Outstanding Service — Dr. Richard R. Davis of the Ohio Agricultural Research and Development Center at Wooster; Membership — Ronald Smith, grounds superintendent at Bowling Green State University; Past Presi-

dent — Robert Reiman, sales service and traffic manager of the Ohio Lime Company at Woodville.

The Ohio Turfgrass Foundation presented a check for \$2,400 to Ohio State University for scholarships awarded to six students. They are Randy Rausch, Brian Thrasher, Jerry Jackson, Gary Chamberlain, Richard Boehm and Thomas George Vandendenden.

Chamberlain, Vandendenden, and Thomas Urbansky receive scholarships from the Golf Course Superintendents Association of America.



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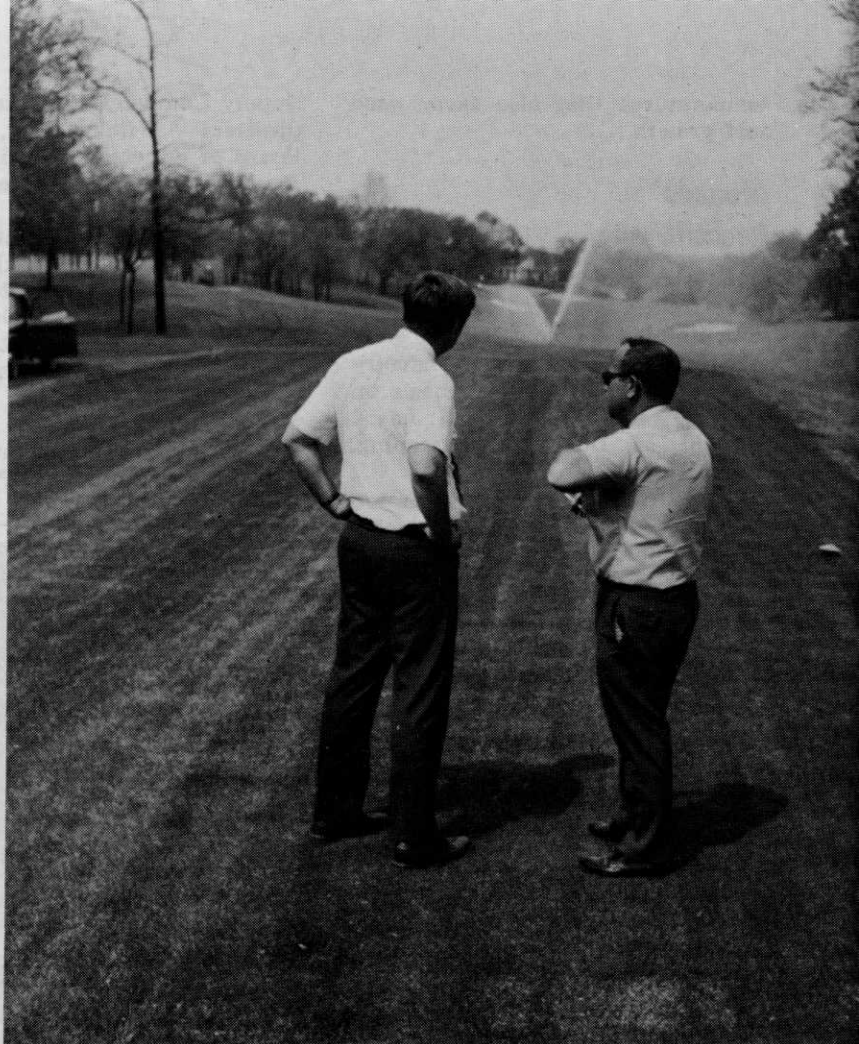


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For More Details Circle (104) on Reply Card

The best in golfing played this course in 1969. It's the NCR course at Dayton, Ohio, site of the PGA tournament. Naturally, it had to be in superb shape, and the man responsible is Jack Hart. Hart (right) is visiting with Roger Gilmore of Diamond Shamrock Chemical Co. Hart watches over 54 holes, and that's why two-way radio communications between the maintenance building and key vehicles is vital.



Golf's Best Played NCR Course That Boasts Turf Management by Ear

JACK HART says he "plays everything by ear" in his job as golf course superintendent at the NCR Country Club, Dayton, Ohio. Over the years, the sensitivity in that "ear" has paid off for him.

Especially last year.

This was the year Jack's course was not only played over by the nation's top professional golfers, but was seen in glorious living color by millions of avid golfing enthusiasts via TV. It was the year Jack's turf took on the 51st annual PGA Tournament, and Jack wasn't taking any chances that his turf would be anything less than perfect.

To accomplish this, Jack relied heavily on his years of experience to tell him what needed to be done and when, to keep his turf as healthy, good-looking and playable as possible. And the consistently high turf quality of the NCR course was certainly a factor in choosing

it as the site for the 1969 PGA Tournament.

Has a Feeling for Trouble

Take control of turf fungi, for example. "As a rule, I'll wait until I see some appear," Hart says, "after awhile you can nearly feel when they're going to hit. Like brown patch—I can see that grass standing up a certain way and I just know we're going to start getting some brown patch."

"I really can't go by any rigid program, because nature doesn't follow a rigid program," Hart explains. "I play everything by ear, hour by hour."

But Hart's explanation of his intuitive grasp of the situation also brings out what is possibly an equally important part of his success as a course superintendent — management. Hart knows how to manage his resources, and he knows which resources he can count on to solve

the problems which crop up.

"The first thing I've got to have, with the three courses that I'm responsible for," (He handles 36 holes at the NCR course and another 18-hole private course adjacent to it) "is to have men I can count on. And



Sometimes, laments Hart, "It seems we have more different plants, more grasses, more insects, more diseases, more everything" . . .

I'm fortunate in that respect," Hart says. "I've got one top assistant, Clyde White, and an excellent foreman on each course, all connected by two-way radio."

Weed Control Constantly

Next, he depends on high quality "tools of the trade," and knowing how to use them. "Weed control is a constant job, and we're always looking for better ways of handling it," Jack says. "We were using silvex for clover and broadleaf control," he says, "until we started using Dacamine a few years ago. We've had wonderful results with Dacamine, in that it gets the weeds beautifully and doesn't injure the grass at all—no leaf burn or anything."

"It seems to be a completely different formulation than any of the phenoxy herbicides we've used," he adds. "I've found it to be completely non-volatile—we haven't burned an oak since we've started spraying with Dacamine."

Clippings Say When on Fertilizer

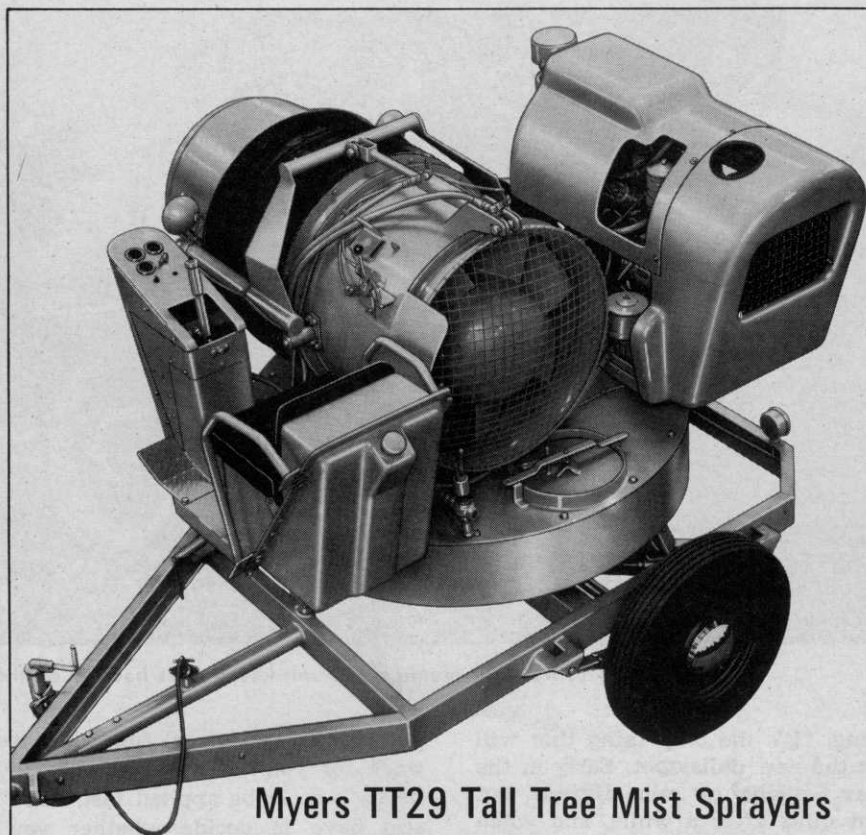
Fertilization isn't a "by guess or by gosh" proposition with Hart, either, but again he doesn't follow any rigid pattern. "It just depends on when the turf needs it," he explains. "I judge the grass by its clippings, not by its color, and fertilize on that basis. Color isn't really that important—it's how the course plays that counts. I'll bet the turf could be purple and nobody'd mind if it played well."

In general, though, Hart starts with an application of 12-4-8 or 10-3-7 in the spring and "touches up" later with a light shot of 10-3-7 or liquid urea.

When it comes to the fungus control, Hart has discovered a new friend, Daconil 2787 fungicide, to supplement the Dyrene he had been



But Hart has found a big help in weed control is Dacamine herbicide. Here, he examines some knocked-out dandelions along the edge of a fairway.



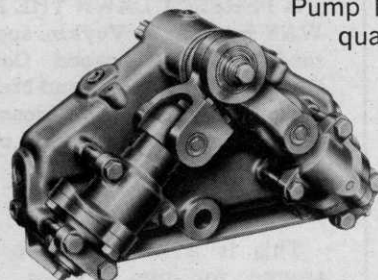
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This high-volume spray unit keeps trees healthy on the NCR course.

using. "It's the only thing that will get the new dollarspot. Early in the year I might use some Dyrene, but that quits after a while, and when the going gets tough I go to Daconil 2787 fungicide."

"Application," Hart says, "is im-

portant in getting a fungicide to work for you." First of all, he believes it must be applied fast. "You also have to decide whether you want to spray on top or get to the bottom—different diseases should be attacked in different places," he says. "Some diseases work on top of the grass—like leaf spot and smut, and some work near the bottom. Right now we're driving the spray down into the grass to clean out brown patch and pythium."

Another Secret's in Watering

What else does it take to make a PGA-quality course? "Well, if you want to call it a 'secret' of success," Hart laughs, "I guess you'd have to call good watering practices another of my 'secrets.'" There is more damage done to good turf due to over-watering, especially in hot

weather, than by lack of water."

Hart makes sure none of his turf gets watered by sprinkler in hot weather—it is always done by hand. "And," he says, "we do every bit of our fairway watering at night."

"In fact," he adds, "we don't do anything in the heat of the day—at 87 or 88 degrees everything stops, because we don't want to make the turf susceptible to bruising. More good grass is hurt by bruise than people realize. In addition," he says, "a rundown condition is the cause of much disease, like pythium."

Jack keeps precise records on his practices on all three courses. It helps him build the store of "intuition" he uses constantly in his work. And it's that big "intuition" that helped make the PGA Tournament one where a golfer's only reason for a missed putt was the golfer himself, not the turf.

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RAPID-GRO

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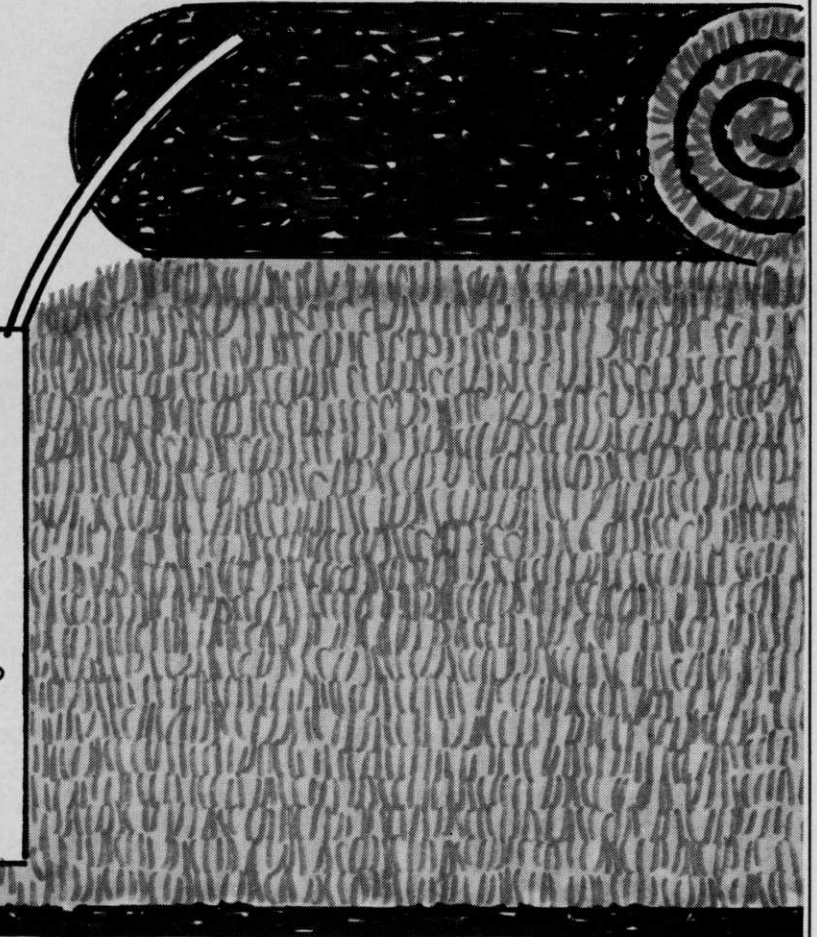
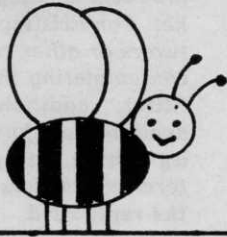
BOOK REVIEW

A PERFECT LAWN THE EASY WAY by Paul N. Voykin, superintendent of Briarwood Country Club, Deerfield, Ill., Rand McNally & Co., P.O. Box 7600, Chicago, Ill. 60680. Hard cover, \$3.95; paperback, \$1.95.

This is a nice book to have around for two reasons. First, you'll enjoy reading it. Voykin is a good story teller and is able to see the humor in embarrassing or frustrating situations; to make the complex seem simple. Voykin

presents a month-by-month approach to lawn care. "Take it easy," he repeatedly advises. Secondly, the book is good to have around to loan to the customer, club member, or friend who's about ready to cement over his yard—or do something drastic. Voykin's title indicates he can write authoritatively—to include tips on how to try to convince your neighbor that his flowers are suffering from a "rare Moroccan disease epidemic" rather than drift from your weed-killer spraying! Have fun.

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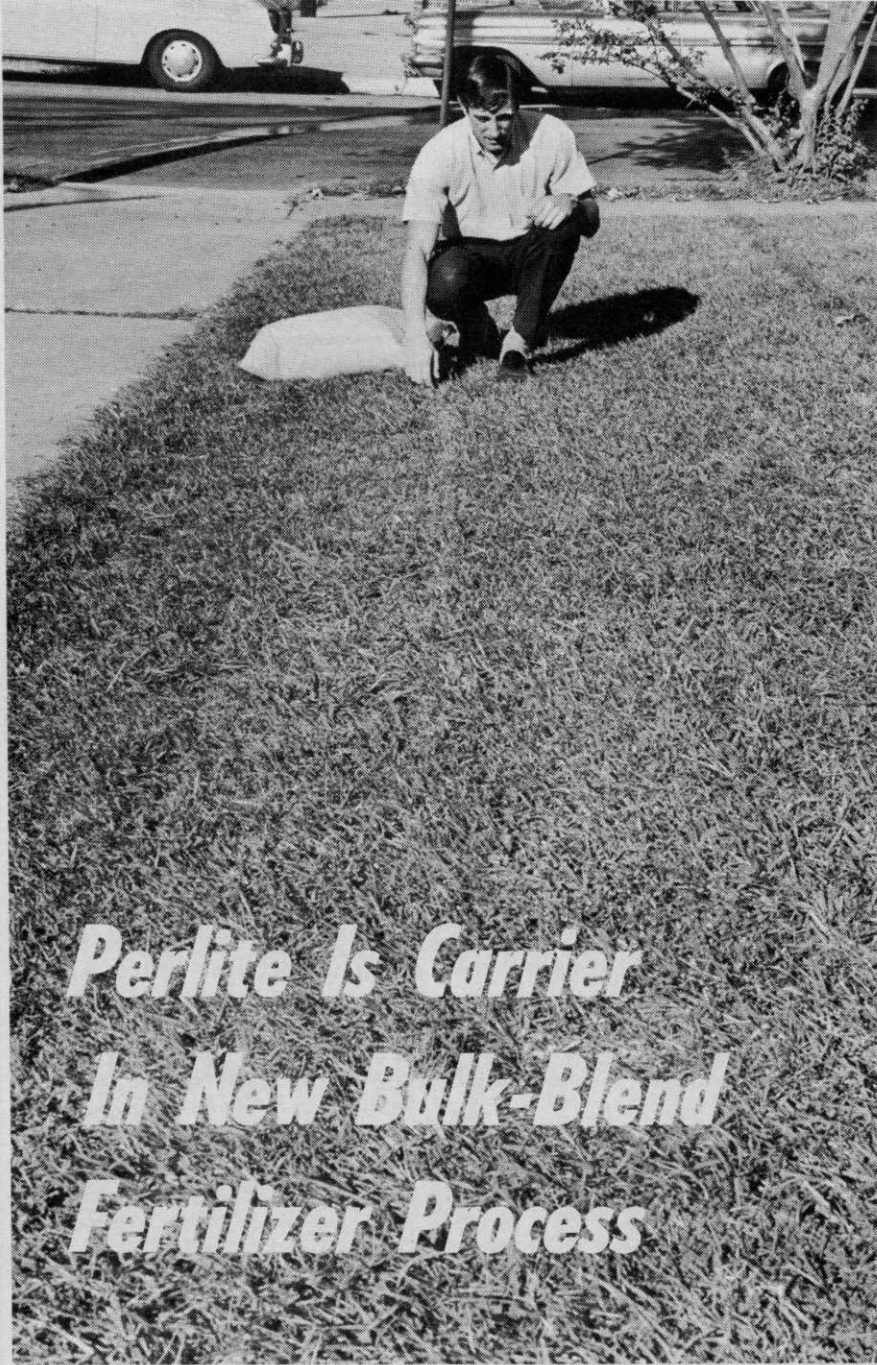
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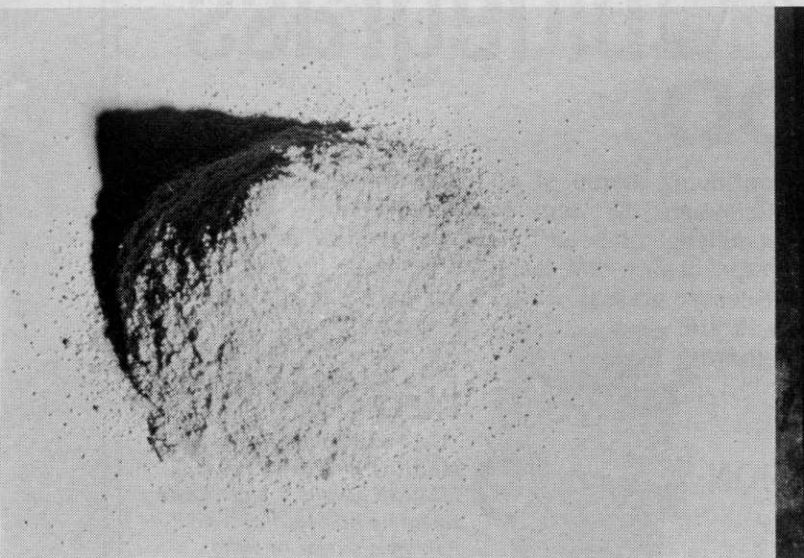
Perlite Is Carrier In New Bulk-Blend Fertilizer Process

Georgia Institute of Technology, working with the Perlite Institute, Inc., has developed an economic process for manufacturing a lightweight fertilizer containing perlite by the wet granulation process. The technique shows advantages in the production of bulk-blended lawn and garden fertilizers. A brief report follows to give you some background for evaluating the resulting products as they come on the market. For existing fertilizer manufacturers or other readers that might be contemplating the production of fertilizer, additional information is available on formulations, uniformity testing, and production data. Interested readers may circle 711 on the reply card.

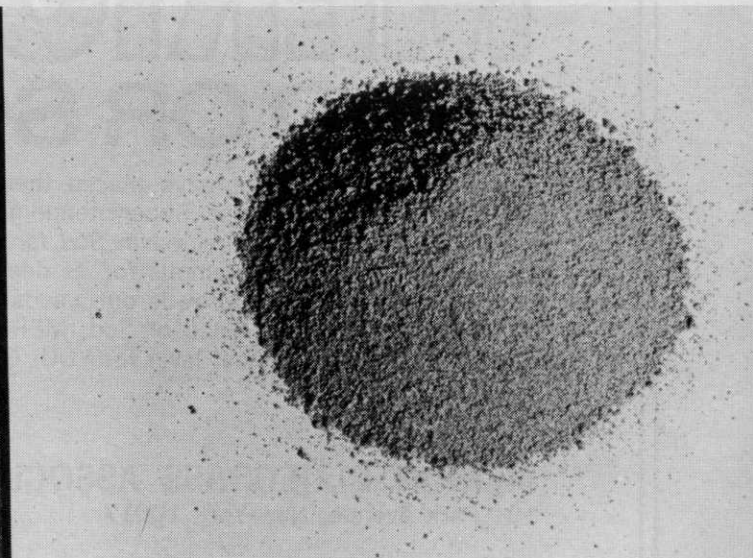
FIELD TESTS on a new perlite-containing, bulk-blended lawn and garden fertilizer developed at the Georgia Institute of Technology, under the auspices of the Perlite Institute, indicate that the addition of the expanded perlite provides low production cost, better application characteristics and performance equal to lightweight fertilizers produced by conventional wet granulation processes.

The specific advantages claimed for the new fertilizer blends include:

1. Ease of application—no caking as a result of storage, dustiness during application.
2. Lower bulk density (packed); 24-28 pcf compared to 30-40 pcf.
3. Better appearance; light and uniform in color. The light color makes it possible to see on application thereby preventing overlapping



Proof of a fertilizer process is in the results. At Georgia Tech, a lawn treated with the bulk-blended perlite-containing fertilizer equaled or bettered the performance of con-



ventional fertilizers of the same analysis. Fertilizer bulk-blended with perlite, left, has 50% more volume for the same weight as conventional bulk-blended fertilizer.

USDA Bans DDT in Four Categories

DDT registration is now cancelled in four general categories of use described as "non-essential" and "not in the public interest."

These categories are:

1. All uses on shade trees, including elm trees for control of the elm bark beetle which transmits Dutch Elm Disease.
2. All uses on tobacco.
3. All uses in or around the home except limited areas for control of disease vectors as determined by public health officials.
4. All uses in aquatic environments, marshes, wetlands, and adjacent areas, except those which are essential for the control of disease vectors as deter-

mined by public health officials.

The cancellation of federal registration took effect Dec. 25, or 30 days from the announcement by the pesticide regulation division of USDA's Agricultural Research Service.

Manufacturers, formulators and distributors were directed that "such uses are no longer considered to be in compliance with the provisions of the (Federal Insecticide, Fungicide, and Rodenticide) Act." The directive said withdrawal or relabeling is not considered necessary for products already in channels of trade.

ARS officials say the announcement was an indication that ARS planned to ban all "nonessential" uses of DDT. Exceptions, a USDA release stated, will be made only

where DDT is needed "for prevention or control of human disease and other essential uses for which no alternative pest control means are available."

Action on the cancellation of nonessential uses is expected to be completed by the end of next year, the release continued.

Persons desiring to submit written data, views, or arguments regarding the proposed cancellation, USDA said, should file them with the Directors, Pesticides Regulation Division, Agricultural Research Service, U.S. Department of Agriculture, Washington, D.C. 20250. All submissions must be made no later than 90 days after publication in the Federal Register. (That makes the deadline Feb. 25, 1970.)

or skipping. The color, however, quickly disappears into the lawn on watering, or as a result of dew or rain.

4. Can be manufactured in low-cost, bulk-blending plants with substantial manufacturing cost savings over conventional processes. This can, in turn, lead to possible freight savings due to ease of manufacture near point of sale.

5. Formulation can be quickly changed in the manufacturing process to obtain various grades of fertilizer.

Results of the Tests

After development, Georgia Tech field-tested a 20-10-5 formulation of the new fertilizer in which the nitrogen was all in a water soluble form. The tests were conducted in the Southeastern part of the United States. The 20-10-5 formulation was chosen because it was considered typical of lawn and garden requirements. The field tests revealed that the new fertilizer flows well from cyclone or roll type spreaders, providing even distribution. They also found that it does not cake in the spreader and is not prone to blow in a light breeze.

Most important, tests showed that the new fertilizer does not burn at 2 pounds of nitrogen per 1000 sq. ft. (normal application for grass is 1 to 2 pounds of nitrogen per 1000 sq. ft.), and that the grass treated was deep green in seven days—was still

green after 4 weeks.

While applying the fertilizer in a cyclone-type spreader, it was noted that on occasion it tended to bridge in the spreader. This minor problem was overcome by hitting the spreader with the hand, or by bending or extending the existing scraper wire.

Storage Tests

In order to determine shelf life and other marketing factors, the bagged product from the production test run was stored in an Atlanta warehouse 12 bags high for six months. After six months, bags were taken from the bottom of the pile and dropped from waist-high two times, once on each flat side. The bags were then cut open for examination. No evidence of caking.

Bags stored in the laboratory at Georgia Tech show no caking after a year.

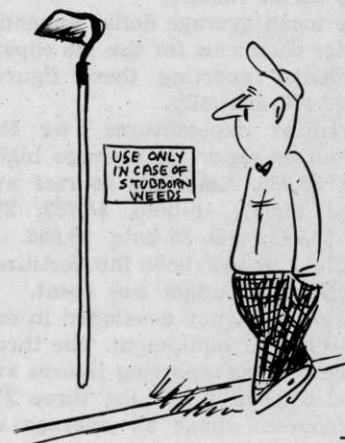
Manufacturing

Feasibility of commercial production was proved in a fertilizer bulk-blending plant utilizing a "one-ton" rotary mixer. This is a 56-in. long by 66-in. diameter rotary horizontal mixer rotating at 13 rpm. The unit was driven by a 10-hp motor. There were lifting flights inside the mixer. The water-spray pipe was inserted horizontally into the center of the mixer and rotated so that it discharged at a 45-degree angle downward onto the bed of material. Wa-

ter was supplied from an air pressure tank and was discharged into the mixer through a Spray Systems Company (Chicago) ¼-in. BSS8 Whirljet nozzle. It was found that this method worked well, achieved a satisfactory blend and resulted in no production problems.

The selection of raw materials for this new fertilizer blend is important, particularly with regard to particle size but also, of course, as to chemical makeup of the particulate matter.

Raw materials required for a 2,000-lb. batch are: 478 lbs. diammonium phosphate fines, wet process, 18-46-0; 720 lbs. white fine crystalline urea, 45%N; 164 lbs. solution grade potash, 62% K₂O; 14 lbs. 200-mesh bentonite; 524 lbs. expanded perlite; and 100 lbs. water.



WTT Surveys Costs Of Golf Course Upkeep

It's an immensely expensive task to provide the entertainment of golfing — which probably comes as a surprise to nearly everyone but those involved with course maintenance.

Questions of how expensive and what constitutes the expense were answered this summer in a golf industry survey conducted by this magazine. A computer random sampling of the more than 6,000 golf course readers of WEEDS TREES and TURF provided the inside look on golf course maintenance costs.

Eighteen-hole courses constituted nearly two-thirds of the courses reporting. Their maintenance budgets average \$65,123. The nine-hole courses averaged \$27,550. Three 27-hole courses averaged \$111,666 and three 36-hole courses, \$143,666.

As could be expected, labor accounted for more than half (56.8%) of the budget. About 11% went for equipment, 7% for fertilizer, and 4.4% for chemicals.

A significant cost break is evident between the nine- and 18-hole courses, apparently reflecting more professional management and upkeep for the latter. Fertilizer, chemical, labor and equipment expenditures for 18-hole courses were three and four times greater than for the nine-hole courses.

A considerable difference in total maintenance budget was discovered for 18-hole courses. Budgets varied from \$25,000 to more than \$100,000 (See Table I).

Average expenditures for chemicals were \$703 for nine holes; \$3,009 for 18 holes; \$5,600 for 27 holes; and \$5,166 for 36 holes.

The mean average dollar expenditure for chemicals for the 128 superintendents reporting these figures was \$2,470 annually.

Fertilizer expenditures for the 128 courses reporting average higher, at \$3,986. Nine-hole courses averaged \$1,097; 18-hole, \$4,753; 27-hole, \$8,983; and 36-hole, \$8,666.

Table 2 shows how the fertilizer and chemical budget was spent.

An inconsistency developed in expenditures for equipment. The three 36-hole courses reporting figures averaged \$13,666, while the three 27-hole courses spent an average of

\$20,750. Averages dropped considerably for 18 holes — \$6,862 — and for nine holes — \$2,232.

Average dollar expenditure for new and replacement equipment for the 124 superintendents reporting figures was \$6,286.

Equipment inventory for the average course looks like this: one aerator, one earth auger, one dozer, two granular chemical applicators, one liquid chemical applicator, two turf combs, one disk cultivator, one field drill, one fumigant applicator, one grader, one turf blower, one leveler, one backpack mistblower, one truck-mounted mist blower, 13 mowers (one flail, three gang, six reel, two rotary and one sickle bar), one dethatcher, one soil proportioning system, one chain saw, one soil shredder, one sod cutter, two seeders, two sod pluggers, 11 sprayers (one boom, one bifluid two cart or wheel-barrow type, one compressed air, three hose end, two

knapsack, and one mobile turf), three tractors, 16 electric carts, eight gasoline carts and one vertical turf slitter.

Private courses accounted for 41.3% of the total; public, 34%; and semi-private, 24.7%. Nearly a third of the courses were on acreages between 101 and 150 acres. Better than 20% were between 50 and 100 acres; another 20% between 151 and 200 acres.

The average labor expenditure of \$32,236 went for five year-around employees and six part-time employees. Only 16% of the courses reported that uniforms are required for employees, but in 96% of these instances the club paid for them.

Watering systems look like this: Greens — 70% are hose and/or quick coupler, 6% sod cup, and 24% automatic; tees — 82.5% are hose and/or quick coupler, and 17.5% automatic; fairways — 82.2% hose and/or quick coupler and 17.8% automatic.

Irrigation water came primarily from wells, lakes, or city supply sources. Nearly 32% of the superintendents reported they tested water before using it on the courses. Water pressure for most courses was from 70 to 150 lbs./sq. in.

TABLE I. GOLF COURSE BUDGETS

Budget	Number Reporting					Percent**
	9 holes	18 holes	27 holes	36 holes	Other*	
Less than \$10,000	6					4.4%
\$10,000-\$24,900	7					5.2%
\$25,000-\$34,900	16	14				22.5%
\$35,000-\$49,900	7	8				11.0%
\$50,000-\$74,900	3	25				20.9%
\$75,000-\$99,900	1	21	1		1	18.0%
\$100,000 or more		19	2	3		18.0%
Total	40	87	3	3	1	100.0%

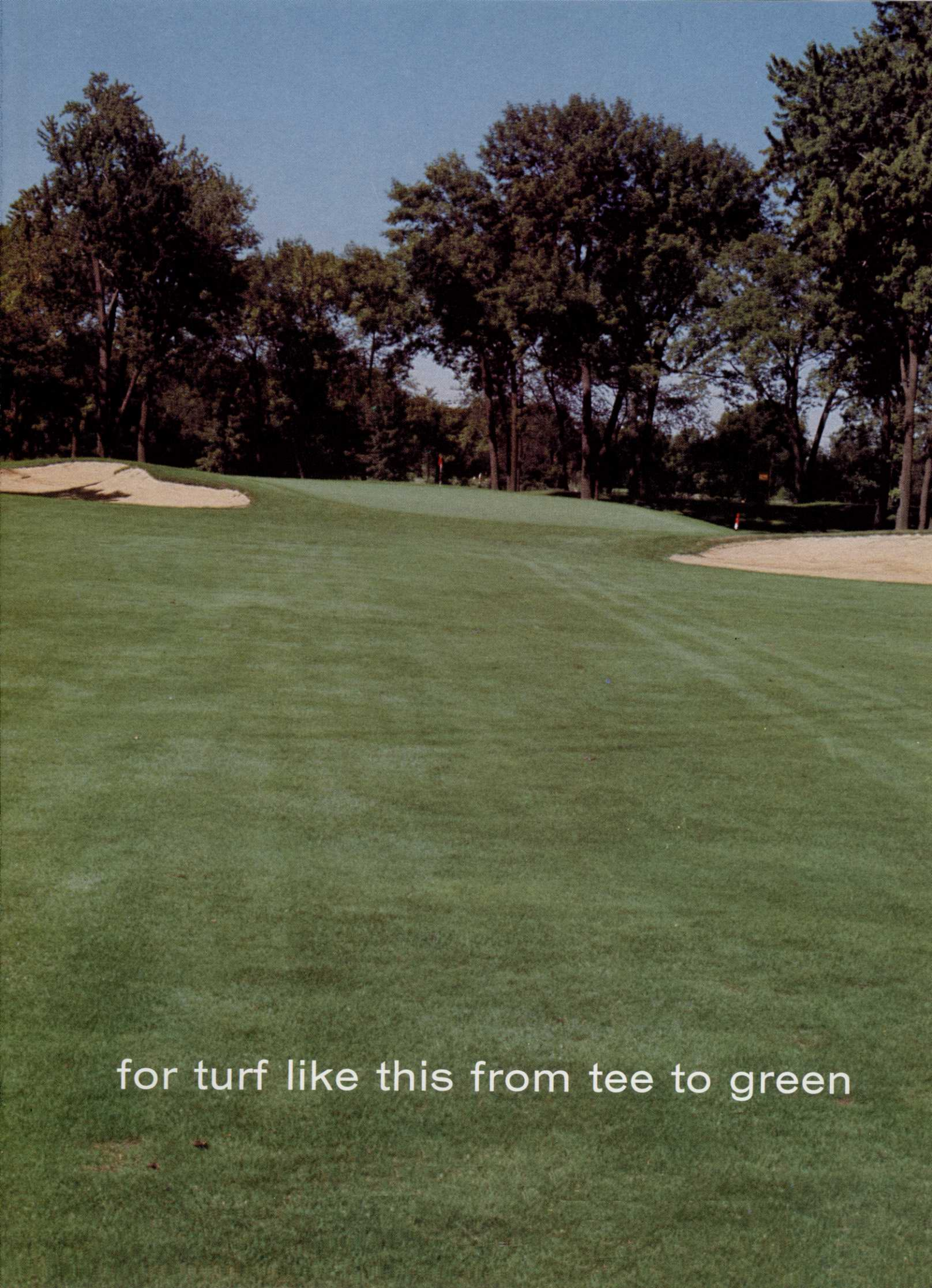
* A 27 hole course plus seven practice holes.

**Based on average budgets of courses in each budget category as reported by 134 respondents answering the question.

TABLE II. FERTILIZER AND CHEMICAL 1969 EXPENDITURES

	Number Users Reporting	Total 1969 Expenditures	Average Per User Reporting
Fertilizer	111	\$322,914	\$2909
Broad-leaf weedkillers (Post-emergence)	95	35,064	369
Post-emergence crabgrass/poa herbicides	47	13,806	298
Pre-emergence crabgrass/poa herbicides	47	23,478	500
Fungicides	97	111,940	1154
Growth retardants	13	2,675	206
Insecticides	82	24,710	301
Soil amendments	34	13,855	408
Wetting agents	41	11,611	283
Turf dyes/colorants	18	1,580	88
Soil fumigants	14	4,705	336
Peat moss	24	7,865	328

* Based on the number of respondents who answered each segment of this question; a total of 150 golf course superintendents returned questionnaires.



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fairway spray program

The same antibiotic fungicide proven for years on golf greens *at hundreds* of courses now provides a program for economical treatment of fairways.

NOTE: The cover photo, the untreated fairway at left and the closeups below were all taken the same day in August, 1968, at courses less than 40 miles apart. All are unretouched. Below left is bluegrass; right is bent grass.



why a fairway **disease control** program?

1. Golf course superintendents set increasingly demanding standards for themselves to provide superbly conditioned courses regardless of weather and other obstacles.
2. Demand by golfers for high-quality turf at all times. They want the good lie for fairway woods and iron shots.
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Acti-dione Ferrated is a formulation of the antibiotic Acti-dione and Ferrous Sulfate designed for the control of specific turfgrass diseases. Acti-dione RZ is a broad spectrum turf fungicide formulation containing the antibiotic Acti-dione in combination with PCNB. Both products are used in a preventive and eradivative treatment program for:

Kentucky Bluegrass—leafspot, going-out, and melting out
Merior Bluegrass—rust, fading-out and powdery mildew
Bentgrass—dollarspot, melting-out and fading out.



how to use **Acti-dione**® in a fairway spray program

Acti-dione may be applied as a spray with a conventional boom sprayer or with a broadcast boom jet spray nozzle. The Acti-dione spray should be allowed to dry in the grass—do not water in.

Your fungicide program should begin in the spring as soon as possible after the first mowing. Succeeding applications should be made as often as necessary throughout the growing season. Usually an interval of 21-30 days between applications will maintain satisfactory control. The recommended rate of Acti-dione Ferrated for fairway disease control is one package per acre; the recommended rate of Acti-dione RZ is 1.5 pound per acre.

Prepare a fresh solution each day spraying is done; use at least 30 to 40 gallons of water per acre. For severe disease infestations, increase dosage rate of Acti-dione Ferrated to two packages per acre. If you are using Acti-dione RZ, one package of Acti-dione Ferrated per acre may be added as a tank mixture to increase effectiveness.

When mixing Acti-dione for fairway spraying:

1. Fill the spray tank $\frac{1}{2}$ full with clean water
2. Start agitator and add the recommended amount of Acti-dione for the number of acres you plan to spray
3. Add remaining water while agitator is running

For sprayer calibration, request our Acti-dione sprayer calibration guide.



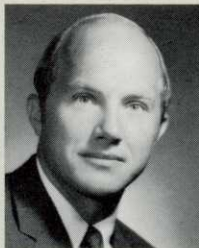
When it comes to turf problems—



STANLEY CAPLAN has a B.S. in agriculture from Delaware Valley College of Science and Agriculture in Doylestown, Pennsylvania. Stan has had several years of experience as a manager and buyer of nursery and garden supplies for a large company in California prior to joining TUCO in 1965.



HENRY LYON graduated from Cornell University with a major in ornamental horticulture. He has a broad agricultural background which includes wholesale sales and garden store management. Henry has been with TUCO since 1964.



ROBERT SCOBEE was raised on a golf course (his father is a superintendent). Bob graduated from Purdue University with a degree in agronomy. Former secretary of the Indiana Golf Course Superintendents Association, Bob is a member of the Golf Course Superintendents Association of America. Bob has been with TUCO since 1965.



**THESE MEN
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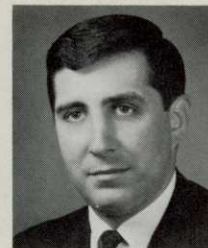
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CARMEN BOONE is a native of Arkansas and studied at Arkansas A & M College. He has a broad agricultural background and has had experience in the agricultural equipment field. Carmen joined TUCO in 1968.



CARL MARTIN is a graduate of Texas A & M University with a degree in entomology. Carl is exceptionally well versed in the field of Entomology. He is a member of the Entomological Society of America and has been with TUCO since 1964.



ROBERT LIPPMAN is an honor graduate of Pennsylvania State University's turf management course. While attending college, Bob was awarded a scholarship and certificate of merit from the Golf Course Superintendents Association of America and has had actual field experience as a golf course superintendent. He is a member of the Metropolitan Golf Course Superintendents Association and the Hudson Valley Golf Course Superintendents Association in New York state. Bob joined TUCO in 1967.



How to Control the Cooley Spruce Gall Aphid

By J. L. SAUNDERS, entomologist
Washington State University
Puyallup, Wash.

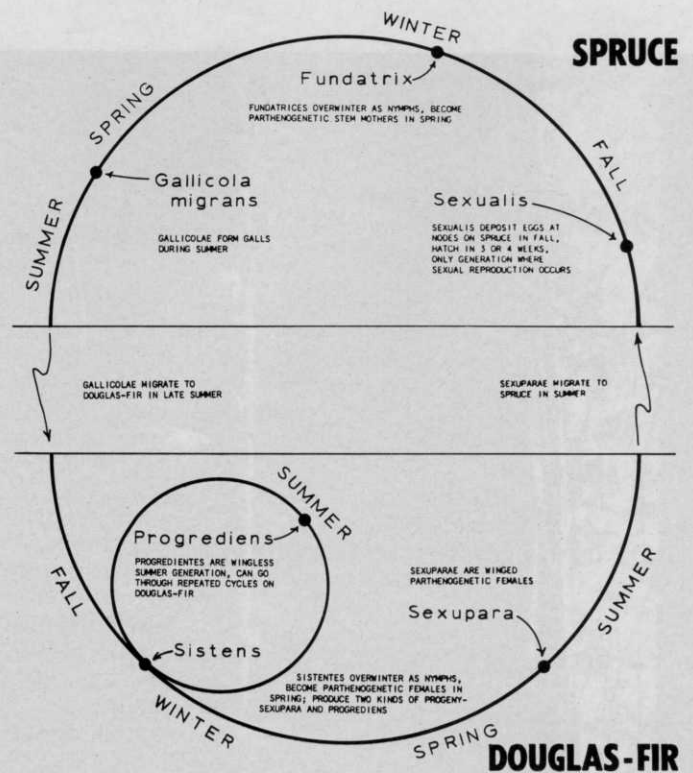
THE COOLEY spruce gall aphid, *Adelges cooleyi*, is both literally and figuratively a "wooly" problem on Douglas-fir and a "galling" problem on spruces as it is a challenge to people involved in pest control.

Most broadspectrum insecticides presently used for general pest management do not adequately control adelgids. Poor control is usually related to incorrect timing or treatment inadequacies that yield marginal control and thereby perpetuate the problem year after year. Increases in infestations have been noted where an insecticide is used that is selective for parasites and predators but does not kill the pest.

There are several reasons why the adelgids (more commonly known as "woolly aphids," "gall aphids," or "*Chermes*") present such a perplexing problem and nearly all of these reasons involve a lack of understanding the pest. The adelgids are not true aphids and are not killed by some of our accepted aphicides. Their biology is among the most complex of all insects and at least a rudimentary knowledge of the various forms and life cycles is needed to formulate a control program.

The Cooley spruce gall aphid has at least five different morphological forms and requires two years and two host plants for these forms to complete their cycle. In addition to this "normal" cycle, there is a special form on spruce and another on Douglas-fir that, under some conditions, can live indefinitely on one host by producing progeny identical to the parent and thereby perpetuating its own kind. By piecing together bits of information from various sources and from our own knowledge, the life cycle may be presented generally as shown above.

Fortunately, it is not necessary for us to understand all of the intricacies of this cycle. With either host it is only necessary that we time spray applications to coincide with, or be just prior to, bud break. Properly timed applications kill the



young nymphs when they are unprotected.

Attack on Douglas-fir is restricted to the needles and is usually most severe when the trees are young, i.e. in the "thicket" stage such as occurs in Christmas tree plantations. Severe damage occurs in the early spring when young nymphs attack and distort the newly elongating needles. Damage to spruce is most noticeable as cone-shaped galls formed by swelling of stems and needle bases. These galls are manifestations of host response to pest feeding. Nymphs are enclosed in chambers inside the galls and there is no known practical way of controlling the pest in this stage.

During 1967 and 1968, sprays, soil granules and bark paints of several pesticides were tested for Cooley spruce gall aphid control on Douglas-fir in western Washington. Thiodan (endosulfan) gave excellent control and is presently being recommended to Christmas tree growers, nurserymen and other professional people

involved in pest management. Baygon also effectively controlled the pest both as a spray and a bark paint, but this product is not yet registered for use on ornamentals and Christmas trees. Several systemic insecticides were applied as bark paints to the basal portion of trunks. Baygon and Meta-Systox-R (oxydemetonmethyl) both gave good control when applied at one gram actual toxicant per inch diameter at the tree base. It should be noted that Meta-Systox-R spray at the same rate of actual toxicant per tree did not give significant control. If only a few trees are to be treated or if spraying is undesirable, apply or if spraying is undesirable, bark paint might well be justified.

General coverage sprays with 0.5 lbs. actual Thiodan per 100 gal. water applied in the spring controls the young nymphs and is presently the most practical approach under most conditions. The trees should be sprayed to runoff and care taken to obtain complete coverage.

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Huge Park Protects

Land of the

By Grover Brinkman
Okawville, Ill.

WITH A FEW strokes of an executive pen, recently, a very impressive segment of the American landscape was saved for posterity.

Signed into law were bills creating the following: A two-unit, 58,000-acre national park in the towering coastal redwoods area of northern California;

A 1.2 million-acre park, wilderness and recreation area in the North Cascades of Washington, the heartstone of which would be the 504,000-acre North Cascades National Park;

A National Scenic Trails system; and

A National Wild and Scenic Rivers System.

Approval of this package of "preserve America" bills was greeted as a great achievement by conservationists and naturalists all over America, interested first in saving our redwoods forests from commercial exploitation by lumber companies.

Creating a Redwoods National Park has been proposed in one form or another for more than a century, but was never brought into full focus. Now it is a reality in the year 1969.

Quoting former President Johnson: "The park created by the bill will stand for all time as a monument to the wisdom of our generation. In preserving the redwoods, we have rescued a magnificent and meaningful treasure from the chain saw."

The 58,000-acre National Redwood Park contains some of the largest and oldest redwoods in the northern California coastal range. For 50 years, the Save-the-Redwoods League has attempted to get this legislation passed.

The core of the authorized Redwoods National Park consists of three state parks, Jedediah Smith, Del Norte Coast and Prairie Creek, all near the coast in northern California.

Gratifying additions of virgin forest, notably on Lost Man Creek, Little Lost Man and to a lesser extent on Mill Creek have been made. The area of "The Tall Trees," and a scenic corridor along the Pacific Ocean have been assured of preservation as well.

Some of the federal acquisitions

Tree Giants

consist of cut-over lands on which in the centuries ahead second-growth forests will ultimately mature. This is important for watershed protection.

There is much yet to be done, according to the conservationists. But what is now under federal and state protection is an impressive nucleus for the ultimate ideal Redwoods National Park of wide domain. Although many of the big trees are already gone, this will stop the lumberman from cutting on land now protected by the government.

The Sequoias (or Redwoods) known the world over for their size and beauty, grow only in California and the southwest corner of Oregon. Yet the paleobotanist tells us that at one time they were widespread in the northern hemisphere including eastern Oregon, Yellowstone Park, some of the Rocky Mountain region in Canada, England and western Europe.

The giant Sequoia is known for its extremely large diameter, and its great age, probably 3,500 years for the very large trees. It overtops the pines, firs and cedars with which it grows. Some of these trees are 300 feet tall.

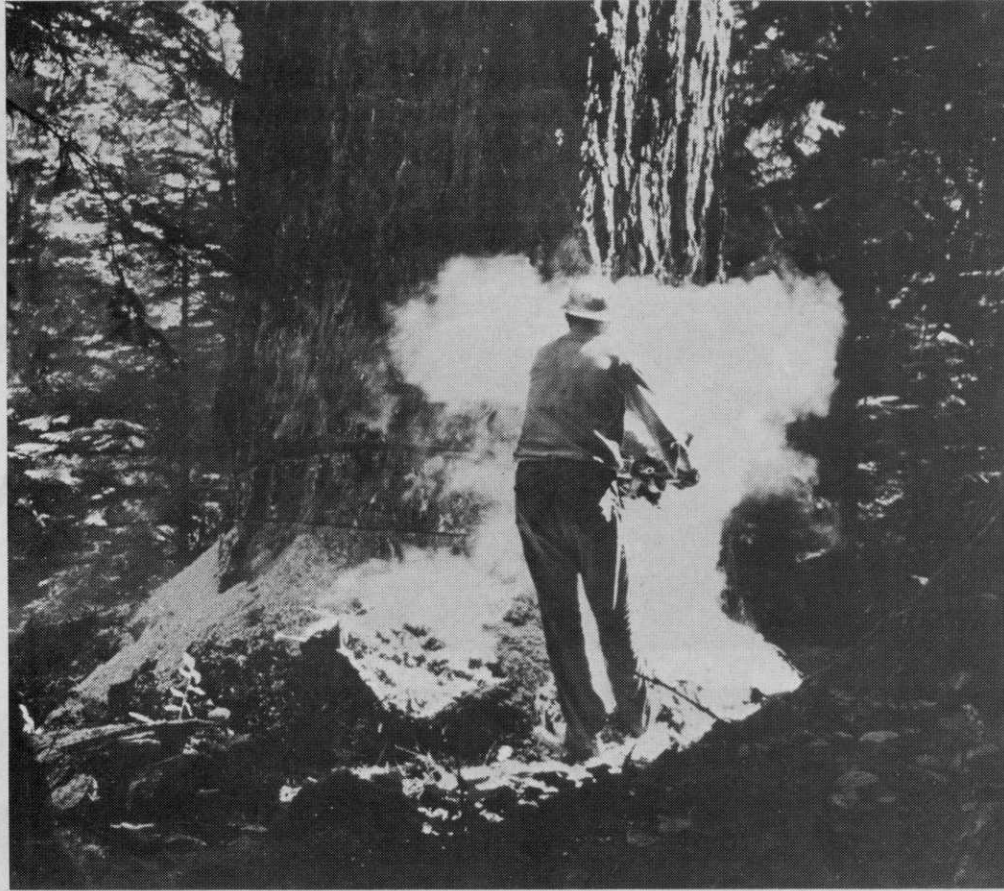
The coastal redwoods average smaller in diameter but exceed the Sequoia in height. The National Geographic Society has measured a redwood 367.8 feet tall, and since then even a taller tree has been found.

The giant Sequoias are largely in public ownership, protected in three natural parks, a state park, and in the national forests. Now the move is on to stop further waste of the redwoods remained. Some conservatively owned tracts.

Several years ago an estimate was made that 300,000 acres of virgin Redwoods remained. Some conservationists today believe the figure has dwindled to the 200,000-acre mark.

Fog is necessary for the growth of the redwoods, scientists say. Oldest tree checked in the coastal area of California by ring count is about 2,200 years old. To cut a giant of this size and age means it will take another two thousand years to reproduce it in like size.

That is the challenging thought that prompted Senate Bill 2515, preserving many of these old trees.



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Fifty companies exhibited for the third annual National Aerial Applicators Conference, Dec. 7-10 in New Orleans. Upper left, perhaps the best pulling power was the wives of Aeromotive International representatives, Sarah Hooker, left, and Linda Steele. Linda's husband, Bill, left and behind the women, is talking with Tom C. Ewing of Valley Flying Service in Mississippi. Upper right, Don Chase of Villisca, Ia., looks over the award-winning booth of Dusters & Sprayers Supply, Inc., Chickasha, Okla. The noon luncheon shows most of the more than 600 attending. Lower right, Tom Campbell, left, Dow Chemical, explains the new particulating agent Norbak (it cuts down on spray drift), to Richard Green of Buckingham, Ia. In the background is Jim Welton, also of Dow.

SOME 600 aerial applicators were grounded, but active, in New Orleans four days in December. Their out-of-cockpit mission was to consider together how they might achieve greater "Safety in the Seventies."

Safety is to be pursued at the broadest level of its definition, indicated William Marsh, president of the National Aerial Applicators Association, as he opened the group's third annual conference.

Our aim should be, he said, "to pay more attention to the health and welfare of the general public." This increased effort is desired, "even though there is less contamination of food than 30 years ago."

Aerial applicators already are among the most restricted businesses in the country, said Marsh, coming under—by one count—17 departments and agencies of government. What the housewife must understand, he said, "is that additional

Aerial Applicators See Increased Safety Indispensable in 70s

restriction on applicators and needed chemicals "could produce a food shortage **now**, not in 10 years."

Flying safety came under review as the systematic development of the conference theme unfolded. Accident records have been good, reported Dale Steward, program chairman, but "the record could be a lot better. Between 1952 and 1968, a total of 5,640 accidents occurred causing 717 fatalities."

What's significant in pointing us in the right direction toward improving the record, he said, is that "76% of the accidents were caused by pilot error and 87% were because of human error."

Failure to maintain flying speed was the greatest cause of accidents, and most often the mishaps came at the procedure turn-around, he said.

"Our experience has been that most of the accidents occur when you get behind schedule for one reason or another during the rush of the season," said Huard Norton, Federal Aviation Administration official out of New Orleans. "Slow down; keep your cool," he advised.

Inadequate pre-flight training, pilot mental attitude, careless handling of pesticides, and improper maintenance also were cited by Norton and other members of the NAAA Safety Advisory Committee as leading causes of accidents.

Panelists George C. Hay of FAA out of Washington, D.C., said that operations procedure help is on the way. An operations manual for aerial applicators, on which nine different government agencies have been working, will be ready by April of 1970.

"In no way is this manual to be considered a directive," stressed Hay. "Rather, we hope it will be a helpful guide."

Disposal of empty pesticide containers needs more careful attention, suggested Dr. J. Blair Bailey of the University of California. A proposal is in the works in his state, he said, to establish disposal points and to classify them in three categories. Class I sites would be for containers that held pesticides either very difficult or impossible to de-contaminate. The sites would be located away from any surface or underground waters. Class II sites would be manned by personnel to help clean containers, to include assistance in chemical de-contamination. Bailey said research is under way in a number of states on high-temperature incinerators. The Class III sites would be for containers most easily cleaned up.

As burdened as he is with things

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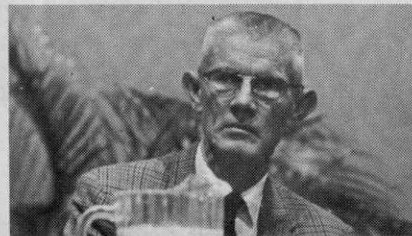
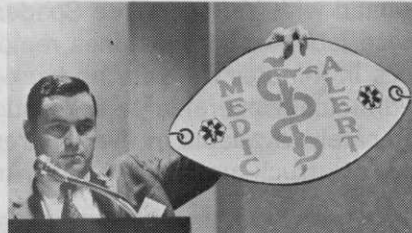
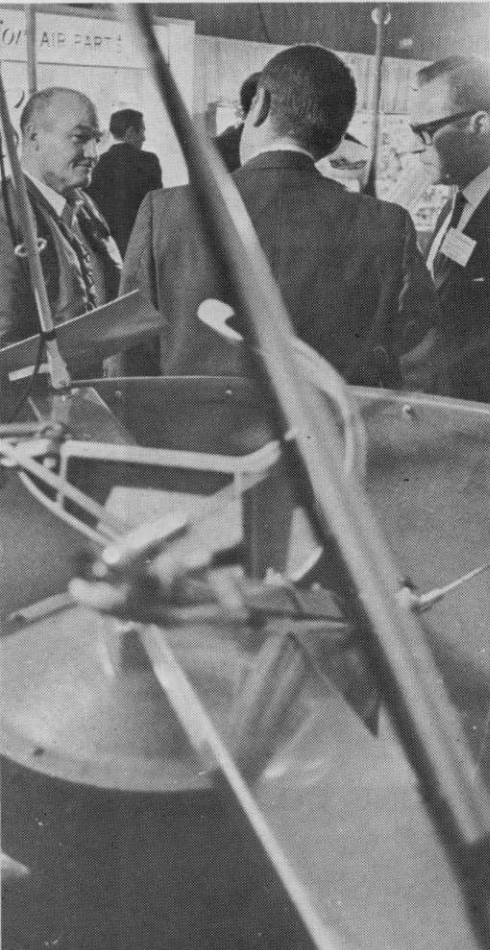
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Melvin Bridgewater of Continental Motors Corp., talks engines with K. Anker, Decca, Houston, Tex. Below, is William Marsch, Litchfield Park, Ariz., outgoing president.



Alfred Hodder displays the emblem of the organization he talked about, Medic-Alert, Inc. In the picture below him is Dale W. Steward, program chairman and winner of the outstanding service award. At left, is the booth of Transland Aircraft, Inc. and you're looking across the top of a Sling King, used for seeding and fertilizing, suspended from a helicopter.

to think about, the pilot must assume some responsibility for assuring that workers in the field are not sprayed, the panel agreed. Perhaps, one panelist suggested, it would be a good idea for customers to understand—or have to agree through terms of the contract—that if pilot had to return to base because of workers in the field, they would be charged for the trip.

Extensive record-keeping might prove advantageous, particularly if trouble developed, it was suggested. Bailey reported that California applicators report monthly on their operations—where, what, how much, why, and what were weather conditions. This policy, he said, perhaps should be considered nationally.

Applicators over-regulated? "You ain't seen nothin' yet," exclaimed Dr. Clifford C. Roan of the University of Arizona. But he chided the collective authors of pesticide labeling laws for lack of common sense. "We wouldn't have such a container disposal problem if manufacturers were permitted to market pesticides in bulk."

The constant aerial applicator bugaboo of spray drift can be measured and can be reduced, reported Barry Byrd of Dow Chemical Company. He explained the technique Dow used to determine the effectiveness its registered plastic particulating agent, Norbak. (It looks like liquid corn starch). Among findings, it was learned that drift damage varies from ground-level to 10, 20, 30 and 40 feet above ground.

For the first time in history, man has an edge over insects, observed Ray Morgan of Thompson-Hayward Chemical Co. This achievement has come with the development of pesticides and the numerous methods to apply them. Aerial application has played a significant part. In the past year, he reported, using some 6,000 aircraft and logging more than a million hours in the air, aerial applicators treated 80 million acres. Safe operating practices had to be followed to achieve this mark, he said, and they'll be vital in improving this performance.

Concerning pesticide container disposal, Morgan said applicators can solve drum de-contaminating by relying on drum reconditioning firms with burning equipment.

"Safety is not luck; you have to work at it," reminded Huard Norton. In a discussion of safety in flight technique, Norton talked about an FAA program that will begin on a nationwide basis in July designed to make aircraft owners more cognizant of safety. "Gold-coated" FAA

men will be visiting you to give helpful suggestions rather than citing you for violations, he said.

"We have found that in only 9% of general aviation accidents was an FAA law broken."

To reduce the chance of aircraft accidents, Norton suggested:

- provide written operating instructions for all pilots;
- keep aircraft airworthy;
- don't push too hard in the peak of season ("Panic programs can bring accidents.")
- develop among employees an attitude of safety.

A panel of aircraft manufacturers' representatives discussed what improvements "are just around the corner" or are in the near future that would contribute to safer operations. Among predictions:

- continuing advances in metallurgy that will reduce engine wear;
- stronger "cages" for the pilot;
- quicker acceleration to improve the aircraft responsiveness;
- lower-drag dispersing equipment;
- fire retardant coverings for fuel tanks;
- better low-speed stability;
- better cockpit visibility, with filtered air at the least and at the most an air-conditioning system.

Pilots had some suggestions for improvements also. In view of the trend toward more fuel-injection engines, they asked for easier starting. And what about bug and spray deflectors? How about better seats to ease the back problems? Why not add compartments for radios that would reduce contamination and get them out of the way?

Discussions of pilot health closed out the conference, beginning with a report by Alfred Hodder on the nationwide Medic-Alert Program. Medic-Alert keeps a central bank of information on people with hidden diseases and serious allergies. The M-A idea is to "alert" doctors to any unusual health characteristic of an individual in situations where

the patient is unable to communicate the information orally. A typical device is a bracelet that is inscribed with the vital information.

Whether a person wishes to go to the extent of taking advantage of the Medic-Alert program, it is a good idea, suggested Hodder, to carry critical medical information in your billfold as near as possible to your drivers license. It is most likely to be seen in this location, he explained.

Dr. Clifford C. Roan appeared on the program for the second time to relate the research going on in Arizona concerning the effect of pesticides on human health. He is directing one of 15 such community studies under way in the nation.

Dr. Roan and a number of others associated with the project took doses of DDT for 180 days and are compiling data to determine if ill effects develop.

Dr. Roan said that data on more people are needed for the findings to be statistically significant. Research on 84 persons so far indicates that aerial applicators checked showed a build-up of DDT five times greater than the general public. All pesticides considered, aerial applicators registered an index anywhere from 100 to 1,000 higher than the general public.

Whereas Dr. Roan's study is concerned with the long-term effects of pesticides accrued in small amounts, Dr. Paul Smith of FFA discussed his experiences of dealing with the short-term effects of pesticides coming in large doses.

"Make no mistake about it," he warned, get enough parathion and it will kill you."

What's of vital importance, he said, is that "some physician in your area should be made aware of what you are doing and asked to be prepared for an emergency."

Keynoters for two luncheons were Sen. Allen Ellender of Louisiana (see editorial on page 4 for comments) and Dr. John A. King, man-

ager of agricultural research for American Cyanamid Co.

Projecting as did Rachel Carson when she predicted a "silent spring when no birds sing," Dr. King said that unwarranted and wholesale restrictions of pesticides could result in "silent cities."

Farmers no longer would be able to produce food for themselves and 45 other persons, he explained. To produce enough food, great numbers in cities would have to return to the land.

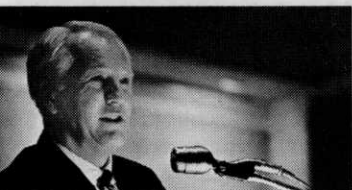
He admitted his staff, who came up with the projection, had exercised "vivid imagination." Nevertheless, some way is needed to dramatize the value of pesticides, he said.

Public attention should be directed from attacks on pesticides to the attack waged by insects and disease. The public needs to know that despite all our efforts, "crop and animal loss attributable to disease, pests and insects amounts to one-fourth of our total yearly production."

Ray Thornton, Cane-Air, Inc., Belle Rose, La., was elected president for the coming year. Elected to serve with him were: Dick Carroll, Crop Care, Alido, Ill., vice-president; Jack Garriott, Garriott Aviation, Bakersfield, Calif., secretary; and Terry Pfeil, Sky Farmer Sprayers, Inc., Waseca, Minn., treasurer.

N-Triple-A's top award, "Agrinaut of the Year," went to Robert A. Phillips, Phillips Aero Ag Co., Ceres, Calif.

Among other awards: Presidential citation—Carl Heimer and Farrell Higbee (NAA executive director); outstanding service—Dale Steward and Bob Ueding; related industries award—Conrad Barlow of Transland Aircraft Company; best exhibit—Dusters and Sprayers Supply, Inc. Plaques for outgoing officers went to President William Marsh, Vice-President L. H. Mills, Secretary Walter Ball, and Treasurer Charles Stone.



John F. Neace, left, Bell Helicopter, performed as the "unofficial" toastmaster for the banquet; George Haddaway, editor of Flight magazine, was the official one. New officers, right, for NAAA are Terry Pfeil, left, Waseca, Minn., treasurer; Ray Thornton, Belle Rose, La., president; and Dick Carroll, Alido, Ill., vice-president. Jack Garriott, elected secretary, was not present.





By WILLIAM M. LATTA, Vice-President
Princeton Turf of Kansas City
Latta-Scholes, Inc.

I'll Tell You How We Started A Zoysia Nursery

OUR ZOYSIA NURSERY project began in April, 1965, with 15 acres of Meyers Z-52 zoysia. My personal problem then was being a turf nursery manager with little knowledge of grass in general, and none at all about zoysia.

Our company had within its ranks, men who possessed a large volume of knowledge regarding the establishment of cool climate grass nurseries. However all of our farms, with the exception of the Kansas City farm, were located in cool climate grass areas and no one in the organization had personal experience with zoysia.

I contacted a number of people who had established small zoysia nurseries or who had manufactured equipment for establishing vegetatively reproduced plants. But I was unable to find anyone who could, or would, put down in black and white the best procedure to establish zoysia. The most concrete information was to cut the grass into plugs, make a hole in the ground and place the plug in the hole, water frequently for a week or so, and let nature take its course.

A few mathematical calculations made it obvious that the number of plugs required would be quite large. This eliminated cutting plugs by

hand. We had decided to establish our nursery from certified Meyers Z-52 zoysia. Not having a certification program for zoysia in Missouri or surrounding states, we were faced with the problem of either having certified sod shipped in and cut into plugs after arriving, or cut into plugs and shipped to us as such. In discussing this problem with southern growers, we decided the practical way was to ship the grass as sod and cut it into plugs.

Several hurried telephone conferences with the company engineer in New Jersey produced some drawings for a machine that sounded practical to cut the plugs. In about three weeks' time, he manufactured and delivered the machine, which has since been patented. The machine is capable of cutting several thousand plugs per hour from sod pads.

A number of spade-type, foot-operated pluggers were purchased and the next problem became one of manpower and time. Making holes for the plugs by hand was about as impractical as attempting to cut that large a number of plugs by hand.

We decided that we would till a seed bed and try pushing the plugs down into the soft dirt. This procedure was much faster than attempting to make holes. We hired

a number of high school boys and had them place the plugs green side up, about six inches apart on a fresh, deeply rototilled seed bed. The plugs were then rolled with a heavy turf roller which pressed them into the seed bed. They were watered and kept moist for a period of about two weeks.

Mischief Spawns an Idea

One day it was necessary to take the foreman off of the plugging operation and use him in another area. This left the school boys unsupervised for a period of time, and when I checked on them, they had neglected their work and were throwing plugs at each other. While standing there viewing the situation in disgust, I discovered that nearly every plug thrown landed right side up on the ground.

Being familiar with the operation of a manure spreader, we decided to see if it would kick plugs into the air and space them with any degree of accuracy. We ran a manure spreader load of plugs through the machine and went out to the field where we had just completed rototilling a large area seed bed. We soon discovered that by adjusting the speed of the tractor and the speed of the feed on the spreader, we could do a very good job of throwing the plugs into the air and placing them about six inches apart. This left about five per cent of the plugs wrong side up, which we didn't bother to take the time to turn over. We rolled them with a turf roller and kept them wet and they grew very well. Needless to say, this is the plugging procedure that we used from that time on.

Four Ways We Planted Stolons

Hoping to further reduce the cost of establishing the nursery, we decided to try planting stolons. Again having limited information, we experimented. We planted an area as large as we could with limited irrigation facilities. When the irrigation facilities were available from that area, we did another area in a different manner. We kept accurate records on procedures and costs and observed the quality of the results.

The first plan was to lay a solid row of one-foot-wide sod pads across the field. The field had been prepared with an aero blade to a fine seed bed condition. We ran the aero blade four times across the sod, chewing it into stolons of various sizes. These stolons were hand-raked to cover an area ten times as large as the sod used. The

entire area was then worked with a Rogers stolon planter, which tended to press the stolons into the ground and stand them on edge. This was accomplished by a series of blunt discs followed by a roller. The area was then kept moist for a period of about two weeks before receiving normal irrigation.

The next planting, an area of about 33 x 320 feet, was begun by first preparing the soil to a fine seed bed with the aero blade. The stolons were produced by running sod pads through a Fox chopper. They were spread on the seed bed with a manure spreader at the rate of about one square foot of sod to about 20 square feet of soil. The area was then worked with the aero blade, further chopping stolons and mixing them with the soil. We then went over the area twice with the Rogers stolon planter, irrigated and kept it moist for about 10 days.

The third planting, an area of about 60 x 320 feet, was prepared with the aero blade as before. Stolons were prepared and spread as before and at the rate of one square foot to 20 square feet of soil. This time, the aero blade was eliminated and the stolons were worked twice with the Rogers stolon planter and irrigated and kept moist for about 10 days before receiving normal irrigation.

The fourth planting covered an area of about the same size and was prepared with the aero blade with a tiller attachment. This time the sod pads were irrigated prior to lifting and were quite wet when they were cut with the Fox chopper. They were spread as before, at the rate of about one square foot of sod to 20 square feet of soil. The area was then gone over twice with the Rogers stolon planter, to which about 200 pounds of additional weight had been added. The area was irrigated and kept moist for about two weeks.

Six more areas, ten in all, were completed during the month of June, each with some variation from the other. After observing the results of that year's efforts, our conclusion is that the most economical method of rapidly establishing a zoysia nursery is by planting stolons rather than by plugging.

Our Present Technique

Following is the procedure we have followed in completing our zoysia nursery:

1. Aero blade the soil with a tiller attachment to the depth of about three or four inches until a fine seed bed is obtained.

2. Thoroughly wet the zoysia before the pads are run through the chopper to be made into stolons.

3. Complete the entire balance of the procedure as rapidly as possible so the stolons do not dry out.

4. Spread the stolons evenly over the soil with a manure spreader at the rate of about one square foot of zoysia, processed into stolons, to 10 square feet of seed bed area.

5. Process the area with the aero blade with a tiller attachment to a maximum depth of two inches. This depth mixes some of the stolons in with the dirt and re-levels the seed bed. The position of the aero blade rear shield is important. If it is too high, it will allow the machine to kick the dirt and the stolons into the air, resulting in all the stolons being left on top of the soil. If the shield is too low, the mixture of soil and stolons will be left in ridges. Proper adjustment will result in a smooth, evenly mixed discharge from the machine.

6. Go over the stolonized area two times with a Rogers stolon planter. It appears that it is desirable to use the machine with roller at the rear, just as recommended by the manufacturer. If this procedure results in the alignment of stolons

(Continued on Page 38)

AMERICAN SOD PRODUCERS ASSOCIATION

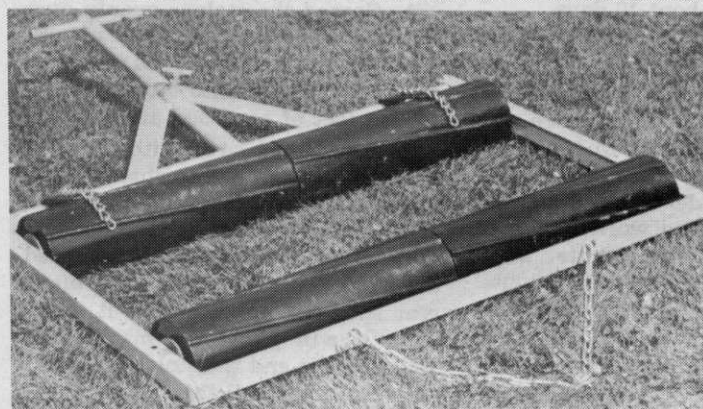
invites your participation

If you are a Sod Grower you should be
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Keep in touch with progress.

Allied Industries are welcome.

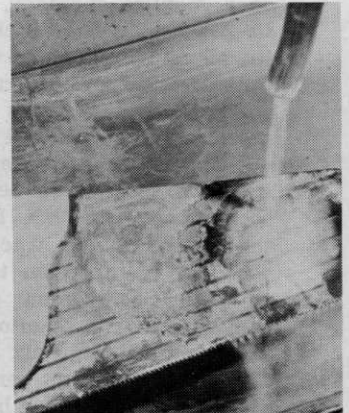
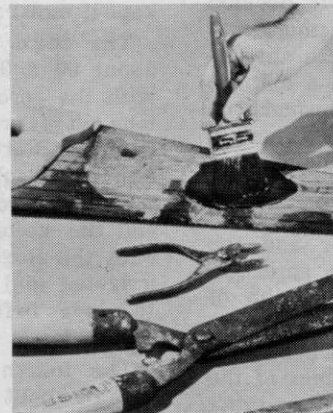
For More Details Circle (105) on Reply Card



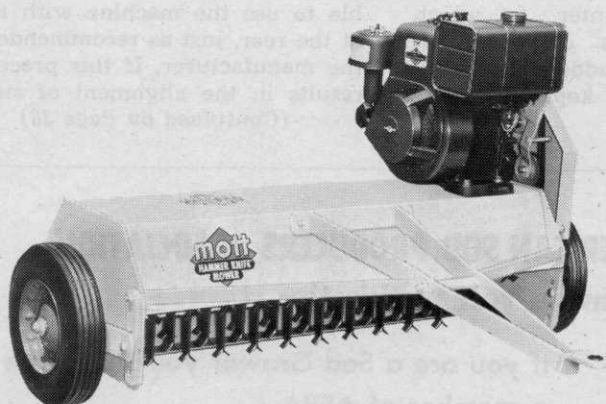
Swenson Spreader and Manufacturing Co., Lindenwood, Ill., announces a new concept in rollers. The roller is propelled by friction from the elevated rear wheels of any standard garden tractor. It utilizes the weight of the tractor and driver for compaction. Split rollers provide easy steering and maneuverability, forward or reverse. The roller is attached by driving the tractor onto the six-inch-high rollers and by making two simple attachments. For more details, circle (701) on the reply card.



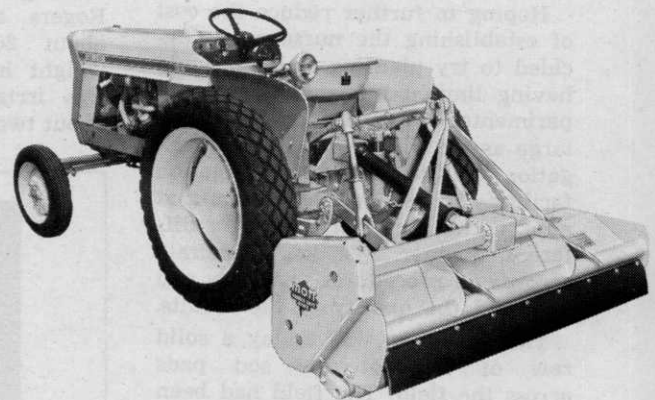
Ditch Witch, a division of Charles Machine Works, Inc., Perry, Okla., offers a new trencher, the 37 hp R-40. The second largest model, the R-40 is powered by an air-cooled Wisconsin engine. Maximum trenching depth is six feet; maximum width, 12 inches. Attachments include a front-mounted backhoe, vibratory plow, boring unit, and selective trenching attachments. The R-40 is a rubber-mounted, four-wheel-drive unit. For more details, circle (702) on the reply card.



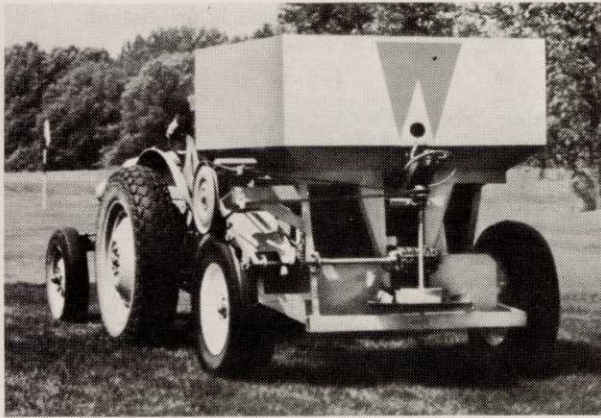
Ace Chemical Co., Chicago, Ill., announces a rust remover that is applied with a brush and washed off with water. The company claims that no scraping, wirebrushing or sandblasting is necessary. Rust-Removo, containing a blend of mineral acids, solvents and wetting agents, is a jelly that sticks to anything—even ceilings. To obtain quantity prices or a sample gallon (for \$14.95), circle (705) on reply card.



Mott Corporation, LaGrange, Ill., announces two additions to its line of hammer knife flail-type safety mowers. The Model T38 is designed to be pulled either singly or in gangs behind any pulling vehicle. Each unit cuts a 38-inch swath and is powered by a 7 hp Briggs & Stratton engine. Model CLB60 is designed for mounting the three-point hitch system of the new IH Cub Lo-Boy 154 tractor and is powered by it. The swath is 60 feet. Both fea-



ture the lightweight, free-swinging flails, with self-cleaning design and edgewise slicing action. They cut all growths from fine lawn grass to rough grasses and tall weeds; in all conditions—wet or dry, clean or trashy. The relatively low impact force action minimizes tendency for struck objects to be thrown. Deflecting action of cutter housing and shields provide additional safety. For details, circle (708) on reply card.



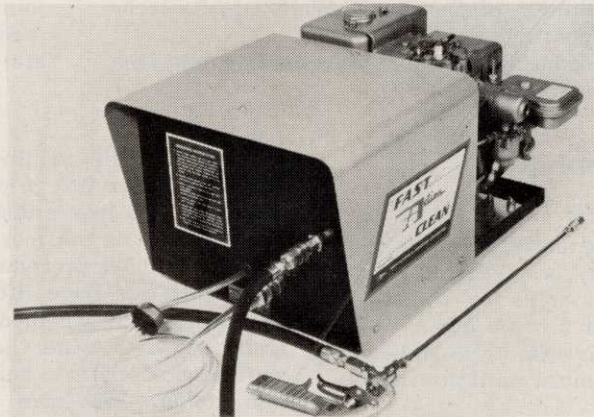
West Point Products of Hahn, Inc., Evansville, Ind., offers a new Big Boy 3-4000 spreader designed to reduce the cost of fertilizing large turfgrass areas. It features a 60 cu. ft. hopper capable of holding more than two tons of granular fertilizer. Distribution swath is 50 feet. Moving at 10 hp, the Big Boy covers a two- to three-acre area in about three to four minutes. Tow bar is one-man hook-up unit. For more details, circle (703) on reply card.



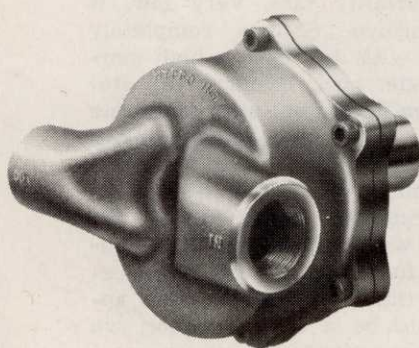
Allis-Chalmers makes this HB-212 hydrostatic drive lawn and garden tractor equipped with the 26-bu. capacity vacuum collector. Tractor attachments can be raised or lowered from the operator's seat, either manually or with an optional hydraulic control. The 12 hp unit has a controlled traction differential; 12-volt starter/generator electrical system; magneto ignition; key switch and pushbutton starting. For more details, circle (704) on the reply card.



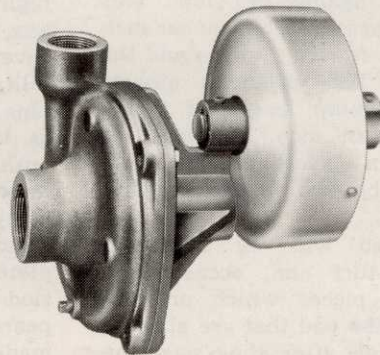
Solo Motors of Newport News, Va., reports effective use of its Model 410 Knapsack Mistblower to combat insect and bacteria problems on golf green and fairway. Scattering leaves is another practical use of the 25-lb. unit which boasts a spray of 50 feet. A 3 hp engine powers unit, handy also for nursery and home garden chores. For more details, circle (706) on reply card.



Action Manufacturing and Engineering Corp., Minneapolis, Minn., announces a gas-driven, remote-controlled, hi-pressure washer with chemical metering. Output: 500 psi at 3 gpm from any water source. Unit builds own pressure. Metered chemicals connected by plastic tube. Control handle connects with 5/16-inch, quick-coupling pressure hose in 25- or 35-ft lengths or multiples up to 105 feet. For details, circle (707) on reply card.



SERIES 8500 5-ROLLER PUMP



HYPRO SERIES 9100 PUMP



Billy Goat Industries, Kansas City, Mo., claims a 14% power increase plus a larger, heavier steel safety deflector as standard equipment on its industrial vacuums. Inset shows new engine and deflector. Gasoline, propane, or battery power source. For details, circle (710) on reply card.

Hypro, Inc., St. Paul, Minn., announces two new pumps, the Series 8500 PTO roller pump and the Series 9100 PTO centrifugal pump. Both mount directly to the PTO shaft and deliver 20 gpm at 540 rpm and 50 lbs. pressure. The Series 9100 has a top volume of 75 gpm at speeds of 600 rpm and 25 lbs. pressure. The Series 8500 has a top delivery of 23.8 gpm at 540 rpm and zero pressure. It is capable of pressure up to 100 lbs. Port sizes for both are: suction port 1 1/4 inches; discharge, one inch. For more details, circle (709) on the reply card.

New Products for the Turf Industry

Industry People On the Move



International Harvester Company has named John J. Dierbeck, Jr., as public relations manager for farm and industrial equipment.

* * *

Frank E. Gardner, retired horticulturist from USDA's field laboratory in Orlando, will head the Florida State Horticultural Society during 1970.

* * *

Chipman Division, the agricultural-chemical arm of Rhodia, Inc., announces that Dr. Elton L. Clark has been appointed assistant general manager. Clark came from W. R. Grace and Co., where he had directed the company's technical-sales effort in certain pesticides. His doctorate is in entomology from Cornell.

* * *

The Davey Tree Expert Company, Kent, Ohio, announces the addition of Charles F. Walton to its technical service department.

Walton is responsible for soils, transplanting, and tree

fertilization improvement studies. He also is an instructor at the Davey Institute of Tree Service.

* * *

DESA Industries, Inc., Park Forrest, Ill., has named Charles E. Brinly vice-president in charge of sales for its power products division.

Brinly formerly was division manager of chain saw products of Remington Arms Company, Inc.'s power tools department.

The power products division was formed as a result of DESA's recent acquisition of Remington's power tools department.

* * *

Toro Manufacturing Corporation, Minneapolis, Minn., has appointed Melvin D. Goetz manager of employee relations, Henry B. Tillotson as facilities planning director for its Canadian and European markets, and Roy W. Simpson as credit manager.

Goetz, formerly was manager of employment and director of labor relations for Continental Air Lines, Inc.

Tillotson had served as assistant director of manufacturing, manager of consumer products in manufacturing and engineering, and director of manufacturing since joining Toro in 1953.

Simpson served as Minnesota area manager for General Electric Credit Corporation prior to joining Toro.

Zoysia Nursery ...

(Continued from Page 35)

on the surface parallel to the disc grooves, it may be advisable to use the stolon planter in two directions at right angles to each other.

7. Irrigate as soon as possible and keep the area moist until new leaves appear.

Procedure to Prepare Stolons

The procedure that we used in preparing stolons is as follows:

Our observations indicate it is desirable to wet the sod pads thoroughly before chopping into stolons. We have accomplished this by two methods.

One, where sod pads have been previously cut, we have irrigated—

putting one-half to three-quarters inches of water just prior to lifting the pads. This leaves the pads quite wet, but this is the most desirable. Where the above procedure has been impossible, we have lifted the sod in sod pads and wet them thoroughly by use of a water hose as they were stacked, prior to being chopped into stolons. We have been using a Fox curved-knife chopper for cutting pads into stolons. A straight knife chopper will probably work just as well.

We found that a hammer mill reduces the zoysia into particles too small to use as stolons. The best stolons were produced by the Fox chopper when the bed knife was moved back against the stops. This left about three-quarters of an inch between the rotating knives and the bed knife. This produces stolons with a minimum length of three-quarters of an inch, and most of them are in excess of one inch. Many will be two to three inches long.

There also will be numerous chunks of turf and, occasionally, some large pieces which are the tag ends of the pad that are allowed to go through after they pass the hold-back roll on the feed table. This does not matter, as these can be spread with the stolons. Some will be reduced in size when the aero blade is used after the stolons are spread. These large chunks and pieces will remain on top of the ground, even after being worked

twice with the Rogers stolon planter and will reproduce just as plugs do. The most important fundamental is keeping the stolons from drying out at any time until they have established a new root system in the new nursery soil. Hot, dry soil will sometimes dry out the stolons after they are spread. This can cause severe injury before irrigation water can be applied. If this is the case, it is suggested that the nursery bed be irrigated the day before final preparation for stolonizing so that the soil is moist, but not wet, when the stolons are spread.

We have observed that stolons left lying on top of the ground, with no dirt cover, have an extremely high mortality rate. Very few, if any, survive. Stolons completely covered with dirt have a high mortality rate, also. Keeping the stolons from drying out until such time as they have attached themselves with new roots appears to be vitally important. We found a high mortality rate in areas where the ground was allowed to dry completely for even a very short period of time. Because moisture appeared to be a critical factor, we made every effort to have the process completed with irrigation water running in a maximum of three hours from the time the stolons were chopped. The areas that were planted in June of 1965 developed into completely mature sod and were harvested during the summer of 1967.



"I'll bet you that place even has a creaky lawn."



Robert F. Lederer, right, executive vice-president of the American Association of Nurserymen, receives the Key Award for outstanding leadership, from S. Rayburn, president of the American Society of Association Executives. The award is the highest ASAE can give one of its members. It's presented annually, and was announced this year at the November ASAE annual convention in Las Vegas.

Planting Machines

A number of machines for row planting sprigs have been on the market for some time. Most were designed for establishing bermudagrass in rows at least 12 inches apart. We have found much to be desired when it is necessary to place zoysia plants more than eight inches apart. This is due to the difference in our area between zoysia and bermudagrass in time required to complete ground coverage. The wider spacing of zoysia will cover, but the additional length of time required is not suitable from an economical standpoint.

Various other machines are on the market for planting strips or plugs. Machines that plant zoysia which has living roots imbedded in a strip or plug of soil are very desirable when a longer period of time (more than three or four hours) is necessary between planting and first and subsequent waterings. We are using machines of this nature with a high degree of success where frequent watering is a problem. The machines place the plugs on about eight-inch centers.

We have recently furnished zoysia stolons for fairways and tees at Tan-Tar-A Resort at the Lake of the Ozarks for its new exotic golf course. Here the stolons were planted in September of 1969 with a hydromulch unit where-in the stolons were mixed with cellulose wood fiber in water and spread as a slurry through a high pressure hydraulic system.

Early observations indicate that this procedure might produce maximum turf in a minimum of time, if adequate frequent watering and professional care are available. Complete evaluation of this method of planting zoysia stolons, both from a growth and economic standpoint will have to be made at a later date.

MSU Study Evaluates Protective Turf Covers

The problem of providing protection for intensely maintained turf areas, such as golf course greens, during winter has prompted James Beard, Michigan State University crop scientist, to study various materials that might serve as protective coverings.

He has conducted winter field ex-

periments and laboratory studies with 16 different types of coverings. By using a cold chamber and a wind tunnel he was able to create conditions identical to winter climates.

Three of the coverings that performed best were a viscose-rayon fiber cover, a viscose-rayon-polyester cover, and an excelsior blanket.

Other coverings which gave protection against water vapor loss and provided good spring green-up included a cloth-like material of woven plastic strips, a fluffy mat of fiberglass, and polyethylene sheets. These materials, however, did not give adequate protection against low temperature injury.

Beard also studied a plastic material sprayed directly on the grass. It is used on shrubbery to prevent water loss during transplanting but did not satisfactorily meet any of the desired protection standards.

According to Beard, "The findings of this study will mean a considerable cost saving to people in the turfgrass industry. The coverings will allow them to maintain high quality areas of turfgrass by reducing or eliminating spring rehabilitation practices."

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A soil fumigation system developed by Ferguson Fumigants, Inc., Hazelwood, Mo., promises to improve soil pest control. Ease of application is the chief advantage. The gelled methyl-bromide-ethylene dibromide formulation is applied

at the soil surface and dispersed by rotary tiller. No plastic tarpaulins are needed. The rig above is using the Cantrix non-returnable container applying fumigant just ahead of the tiller's blades.

New Gelled Soil Fumigant Dispersed by Rotary Tiller

A unique soil fumigant system developed by Ferguson Fumigants, Inc., Hazelwood, Mo., promises to improve soil pest control throughout the country. Chief advantage of the system is its ease of application. The gelled methyl bromide-ethylene dibromide formulation is applied at the soil surface and dispersed by rotary tiller. No plastic tarpaulins are needed.

Crucial to the success of the new system is a gellant and vaporization rate control material, FMC Corporation's AVIBEST-C, microcrystalline silicate.

J. Carl Dawson, president of Ferguson Fumigants, who invented the new rotary tiller fumigant system,

said recently that the system would have been ready earlier if a completely satisfactory gelling agent had been available.

"Some of our early gelling agents lacked stability," he said. "Another problem was caking and plugging in equipment lines. AVIBEST-C microcrystalline silicate turned out to be ideal in all respects for our system."

Basically the rotary system works like this: the gelled soil fumigant is packed in Cantrix 4.3 gallon cylindrical containers seven inches in diameter and 28 inches long. This is a non-returnable container with 85 p.s.i. working pressure. (Methyl bromide has always been shipped in heavy, returnable steel cylinders, which require handling cost and return freight.)

The Cantrix container is mounted on application equipment. Compressed air forces the expulsion of the fumigant through a tube. The fumigant moves to a ground wheel metering unit, and is then delivered to a point on the surface of the untilled soil directly in front of the tiller's rotating blades.

The tine or chisel method of applying soil fumigants, which has been used previously, injects fumigant about six or eight inches beneath the soil. This works satisfactorily in light, sandy soils but not in heavier soils, because uniform

permeation of heavy soil is not achieved. The advantage of the two gelled fumigants using AVIBEST-C is that one is suitable for this tine or chisel-lighter soil treatment, while the other is useful in the new rotary-heavy soil application.

Four primary pests are controlled by soil fumigation techniques — weeds and weed seeds; parasitic nematodes; soil-borne bacterial diseases, and soil-borne fungus plant diseases.

Dawson feels that the new gelled fumigant and the new method of application will cut the overall costs of fumigation. "More important, the utility of the new method for all soil types makes it a truly universal fumigant system."

In explaining the benefits of the new system, Dawson said that gelled methyl bromide formulations for soil fumigation evaporate at a slow, controlled rate, allowing longer, more uniform exposure of the soil-borne pests to the toxicant without the need of a polyethylene tarpaulin. The formulations may be tailored to the texture of the soil for maximum effective exposure.

Rotary tillage incorporation of the fumigant assures homogeneous dispersion of the fumigant in the soil. This makes it no longer necessary for a period of time to elapse before the fumigant has completely penetrated the soil. The fumigant is mechanically dispersed and the organisms are immediately exposed to the fumigant. Accurate metering of the fumigant into the soil assures maximum benefit with greatest economy.

**February
Is the
Weed
Control
Issue**

Texas A&M Reports Research Progress on 'SAD'

Texas A&M University plant scientists have found disease resistance to the virus lawngrass killer, St. Augustine Decline (SAD), through a new technique of screening for resistance.

Fifteen resistant types have been discovered from a check of 185 St. Augustine-grass cultivars (varieties produced by breeding), clones (vegetative propagation), and seedlings.

Dr. R. W. Toler, A&M plant virologist, and Norman L. McCoy, assistant Extension plant pathologist, detected these disease-free kinds through a method they developed for rapid determination of resistance to the virus disease.

First, they grind diseased plant tissue by a special process and extract the virus in a buffered plant sap solution. The buffer acts as protection for the virus against destruction by enzymes present in plant tissues. The virus is then inoculated into healthy plants in the laboratory and the greenhouse.

After 21 days, they examine the inoculated plants for disease symptoms. Comparisons are made with control test plants given distilled water inoculations to determine

whether damage to the plant is caused by the disease or by inoculation technique.

Plants showing virus symptoms are discarded as being susceptible. Those apparently healthy or symptom-free plants undergo inoculation onto an indicator host, Proso millet, to determine if they are symptomless carriers or are truly resistant.

Toler and McCoy discovered that Proso millet is highly susceptible to the virus and develops diagnostically optimum symptoms in only six days. This speeds up reverification of disease resistance considerably. To eliminate the possibility of "escapes," resistant plants are re-inoculated at least three times. This is done to confirm non-appearance of symptoms as true resistance rather than from changes in environmental conditions, errors in inoculation or other interactions which may mask virus symptoms.

The 185 types checked for resistance by Toler and McCoy were obtained from the world collection of St. Augustine varieties at the University of Florida in Gainesville; Big B Ranch, a part of King Ranch, Inc., of Belle Glade, Fla.; Texas col-

lections from badly infested lawns; and Texas A&M's St. Augustine grass breeding program.

Additionally, the A&M researchers are further evaluating resistant St. Augustine strains found by two commercial lawngrass breeding companies. Commercial firms have joined the search for resistance since Toler and McCoy's screening technique has been shared with them and other public and private grass breeders.

"With discovery of a good nucleus of SAD resistant source material, our next step will be field testing," Toler said. "It will be a matter of determining if these sources will stand up and have desirable quality in actual lawn trials. Those that retain resistance, even though of poor quality, will serve as genetic sources for St. Augustine-grass breeding programs," he continued.

Texas A&M research on St. Augustine Decline, since its discovery in 1966, has received grants from King Ranch, Inc., of Kingsville, and from the Coastal Bend Lawn Improvement Association in Corpus Christi.

Insect Report

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



TURF INSECTS BILLBUGS

(*Sphenophorus* spp.)

MARYLAND: Seventy-five specimens of *S. sayi*, *S. parvulus* (bluegrass billbug), and *S. venatus vestitus* emerged from outerexposed rolls of two trays of Merion bluegrass sod. Each tray contained 55 rolls (500 square feet) of stacked commercially grown sod. Emergence occurred near Poolesville, Montgomery County, October, 1969, following exposure to surface irrigation and sunlight at temperatures in high 70's. Specimens were determined as follows: 7 *S. parvulus*, 12 *S. venatus vestitus*, and 56 *S. sayi*. This constitutes a new state record for *S. sayi* and new host records for *S. sayi* and *S. venatus vestitus*. A single specimen of *S. sayi* was taken in Montgomery County in 1965.

SOUTHERN CHINCH BUG (*Blissus insularis*)

TEXAS: Widespread and heavy on St. Augustine grass in Harris and Galveston Counties latter part of October. Damage extensive to lawns in cities.

INSECTS OF ORNAMENTALS A PYRAUSTID MOTH (*Undulambia polystichalis*)

FLORIDA: Larvae infested 80,000 leather hollyfern plants at Emporia, Volusia County, October 31.

TREE INSECTS EASTERN SPRUCE GALL APHID (*Adelges abietis*)

WEST VIRGINIA: Heavy on 50% of small spruce planting in Marion County.

SMALLER EUROPEAN ELM BARK BEETLE (*Scolytus multistriatus*)

ALABAMA: Dutch elm disease detected for first time in Colbert and Lauderdale Counties. NORTH CAROLINA: Dutch elm disease confirmed for first time in Mecklenburg County.

MOUNTAIN PINE BEETLE (*Dendroctonus ponderosae*)

CALIFORNIA: Aerial survey indicates about 5,000 dead trees on 10,000 acres of lodgepole pine at Lava Flow southeast of Hambone Butte, Siskiyou County, on Shasta National Forest.

A FALSE SPIDER MITE (*Pentamerismus erythreus*)

CALIFORNIA: Heavy on *Calocedrus decurrens* at Los Gatos, Santa Clara County.

WALKINGSTICK (*Diapheromera femorata*)

Severely defoliated red oak and locust on about 100,000 acres on Ouachita National Forest in eastern OKLAHOMA and western ARKANSAS.

Trimmings

NO SMALL DEGREE OF IRONY

is associated with the largest turf transplant in the San Francisco area. Candlestick Park, home of the San Francisco Giants, was stripped in December of its 125,000 sq. ft. of sod by Nunes Turfgrass Nursery of Patterson. The scalping was done to make way for the installation of artificial turf.

The natural grass, said a Nunes official, is valued at roughly \$25,000 and is being replaced with artificial grass costing more than \$1 million.

Seven men and newly developed Nunes harvesting equipment transplanted the turf to McLaren Park in just 16 hours.

* * *

ARTIFICIAL TURF has been considered also for the new sports stadium in Kansas City, Mo. William Latta, co-owner of Princeton Turf of Kansas City, has said that his firm could provide sod twice a year for just the interest that would be paid on the money borrowed to install the artificial grass.

* * *

BOY SCOUTS of Troop 13 in Kenilworth, Ill., have taken steps to offset the damage of Dutch Elm Disease, reports Scouting Magazine. The troop, as a community service project, established a 20x70 tree nursery to grow trees to replace those destroyed by DED. Scouts bought 87 trees, one to four feet tall. Species included green ash, white ash, river birch, white bark birch, ginko, Norway maple, American beech, red maple, crimson maple, honey locust, hackberry and pin oak.

* * *

DUTCH ELM DISEASE has invaded the grounds of Daniel Boone's home at Defiance, Mo., reports **FARMLAND**, a newspaper published by Farmland Industries, Kansas City, Mo. Some of the largest and oldest elms already have been removed. This is tragedy enough, but arborists fear the worst is yet to come. One of the trees "was already old when Daniel Boone first saw it," reported Mike Graznak. Boone decided to build his home near it and later conducted court beneath the tree to settle disputes between white men and Indians. It became known as "The Judgment Tree."

Arborists estimate the famous elm is more than 300 years old. They fear that with DED on the grounds that no matter what precautions they take the "Judgment Day" for the Judgment Tree may not be far off.

IH Sees More Lawn Tractors in 1970

More lawn and garden tractors will be in operation in 1970 than ever before, predicts International Harvester Co.

Power equipment enabling homeowners and gardeners to take care of larger areas in less time will be a principal reason. Another factor will be the variety of attachments available.

For example, says Max McCallister manager of IH industrial equipment sales, some 60 attachments are available for the IH Cub Cadet line of tractors. These are designed, he says, to expedite

such jobs as lawn mowing and maintenance, seeding, fertilizing, soil preparation, landscaping, earthmoving, sweeping of sidewalk, parking lot and lawns, hauling, gardening, and such winter chores as snow removal by plow or snow thrower.

Industry annual sales figures show the rapid upward trend. Unit volume of between 10,000 and 12,000 in 1956 jumped to 34,000 in 1961, to 114,000 in 1964, and to more than 250,000 in 1968. And McCallister believes the peak is yet to come.

Key Speakers Announced For Weed Science Society Montreal Meeting, Feb. 2-5

"Weed science and food—Canada, Britain and the U.S." will be highlighted in the 1970 annual meeting of the Weed Science Society of America at the Queen Elizabeth Hotel in Montreal, Feb. 2-5, announces Dr. Glenn C. Klingman, president of the society.

H. A. Olson, Canadian Minister of Agriculture, will be a featured luncheon speaker. Also participating in a general session will be Dr. J. C. Elliot, a weed scientist from Begbroke Hill, England; Dr. G. E. Jones, University of Guelph; Dr. E. G. Anderson, herbicide liaison officer from the Canadian Department of Agriculture; and Dr. B. B. Migicovsky, director general of the research branch, Canadian Department of Agriculture.

Leading authorities are expected to present more than 100 scientific papers at the meeting, dealing with various aspects of weed science and the control of vegetation. Registration will start Monday, Feb. 2, at noon. General session and sectional meetings will run all day Feb. 3 and 4 and the conference will end at noon Feb. 5.

Program chairman for the Montreal meeting is Dr. Loran L. Danielson, plant physiologist and leader in weed research in horticultural crops, U. S. Department of Agriculture, Beltsville, Md. Dr. Danielson is also president-elect of the Weed Science Society. Other officers are: vice-president, Dayton Klingman,

U. S. Department of Agriculture; secretary, Dr. Arnold Appleby, Oregon State College; and treasurer and business manager, Dr. Fred W. Slife of the University of Illinois.

Chairman of local arrangements for the meeting is Dr. John D. Bantden, Ontario Agricultural College.

New Chemical Increases Pesticide Residual Power

A chemical to give a number of pesticides increased residual power is being developed and marketed by Miller Chemical and Fertilizer Corporation of Hanover, Pa.

Miller's new proprietary chemical, Pinolene, is a film-forming agent designed for spray use with pesticides. The company says Pinolene retards natural degradation of pesticides by minimizing the effects of environmental degrading factors.

With the use of Pinolene, officials say a five- to seven-day pesticide can be made into a two- to four-week product, depending on the specific pesticide and the specific Pinolene formulation. Data is being developed with many pesticides under extensive test programs in the U.S. and abroad.

One formulation of Pinolene, named Vapor Gard, is used as an anti-transpirant. This material, the company says, has shown a high level of effectiveness in the areas of winter protection of evergreens in cold sections of the U.S. One fall application of Vapor Gard will protect evergreens from cold, drying winds for the entire winter.

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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" 10¢ per word, minimum \$3.00. All other classifications 20¢ 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. Bold-face rule box: \$25.00 per column inch.

USED EQUIPMENT

FOR SALE—Worthington 7 gang 3 blade blitzer mower, 30" blade capacity, 3:50 x 18" tires, excellent condition. \$950.00. West Salem Machinery Company, 7th & Murlark St., Salem, Oregon 97304.

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

FOR SALE: Vermeer model 10 stump cutter, very good condition, recently overhauled. Write to: Acme Tree Surgery, 203 Woodland Ave., Morton, Pennsylvania 19070.

WANTED TO BUY

JOHN BEAN hydraulic sprayer 35 to 70 gallon per minute pump. 400 to 600 gallon tank, late model, excellent shape. Write or call W. J. Smith, 2191 Pine River Rd., Midland, Michigan 48640. Phone: Midland, Michigan 631-0817.

HELP WANTED

SPRAYMEN needed, Portland, Oregon area. Must be able to obtain

license and move to area as near first of year as possible. Able to run route and to schedule customers and bid new jobs, to landscape, do weed control and pruning. (These are wishes not necessities). Will furnish schooling for business management if desired. All inquiries held in strictest confidence. Please send salary and qualifications to Box 47, Weeds Trees and Turf, 9800 Detroit Avenue, Cleveland, Ohio 44102.

TREEMAN Capable of operating developing small tree company. Must be able to price tree pruning and removals. Knowledge should include tree spraying and pruning. Opportunity for right man to earn excellent income, also fringe benefits. Send resume to: Bob Heavey, Heavey Landscape, 44 White Place, Brookline, Mass. 02146.

POSITIONS WANTED

WANTED supervisory positions in one of the following fields. Background in forestry - arboricultural, (utilities and private work). Nursery management: Landscaping, (utility, public, private work). Tree farming: specializing in large plant specimens 18 to 25 ft. Material. College background in above fields. Expectant salary range \$12,000 to \$15,000 annual. Age 40. Write Box 49, Weeds Trees and Turf, 9800 Detroit Avenue, Cleveland, Ohio 44102.

LANDSCAPE architect — Ambitious and talented. Extremely good future for right man. Firm doing landscape design, construction and maintenance. Now owned by large corporation that desires to expand nationally. Reply confidentially to Cut

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N'Care, Inc., Mr. E. Berthe, 2615 DeLeon St., Tampa, Fla. 33609. Phone 877-8261.

SALESMAN WANTED

CANADIAN Company requires sod salesman for Northeast United States and Canada. Must be capable of running entire sales program under professional management. Young, energetic man will best suit. Send complete resume to Box 48, Weeds Trees & Turf, 9800 Detroit Avenue, Cleveland, Ohio 44102.

FOR SALE

A FORT Lauderdale Lawn and Ornamental Pest Control Co. 700 yearly contracts. \$70,000 gross. \$20,000 plus net. Employees will stay. Write Mr. DuBois-Anaconda Realty Co., 1776 E. Sunrise, Fort Lauderdale, Fla. 33304.

Meeting Dates

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

22nd Annual Helicopter Association of America convention at the Stardust Hotel, Las Vegas, Nev., Jan. 11-14.

North Carolina State University Pesticide-Fertilizer School, Hotel Sir Walter, Raleigh, N.C., Jan. 12-13.

4th Annual Park Symposium, New Jersey Recreation and Park Association, Lewis M. Herrmann Labor Education Center, Rutgers University, New Brunswick, N.J. 10 a.m. Jan. 14.

22nd California Weed Conference at the Grand Hotel, Anaheim, Calif., Jan. 19, 20, 21.

Associated Landscape Contractors of America, Statler-Hilton, Orlando, Fla., Jan. 19-23.

Purdue University landscape maintenance workshop, University campus, West Lafayette, Ind., Jan. 20-21.

Southern Weed Science Society annual meeting, Sheraton-Biltmore Hotel, Atlanta, Ga., Jan. 20-22.

Ohio Chapter, International Shade Tree Conference, annual meeting, Hotel Sheraton-Columbus, Columbus, Jan. 25-26.

41st Ohio State University short course for arborists, turf management specialists, landscape contractors, garden center operators, and nurserymen, Hotel Sheraton-Columbus, Columbus, Jan. 25-29.

Annual Virginia Turfgrass Conference, Sheraton Motor Inn, Fredericksburg, Va., Jan. 27-28.

40th Annual Michigan Turfgrass Conference at the Kellogg Center of Michigan State University, East Lansing, Jan. 27-28.

Michigan Association of Landscape Architects annual meeting, Statler-Hilton Hotel, Detroit, Mich., Feb. 3.

Michigan Association of Nurserymen winter meeting, Statler-Hilton Hotel, Detroit, Mich., Feb. 3-5.

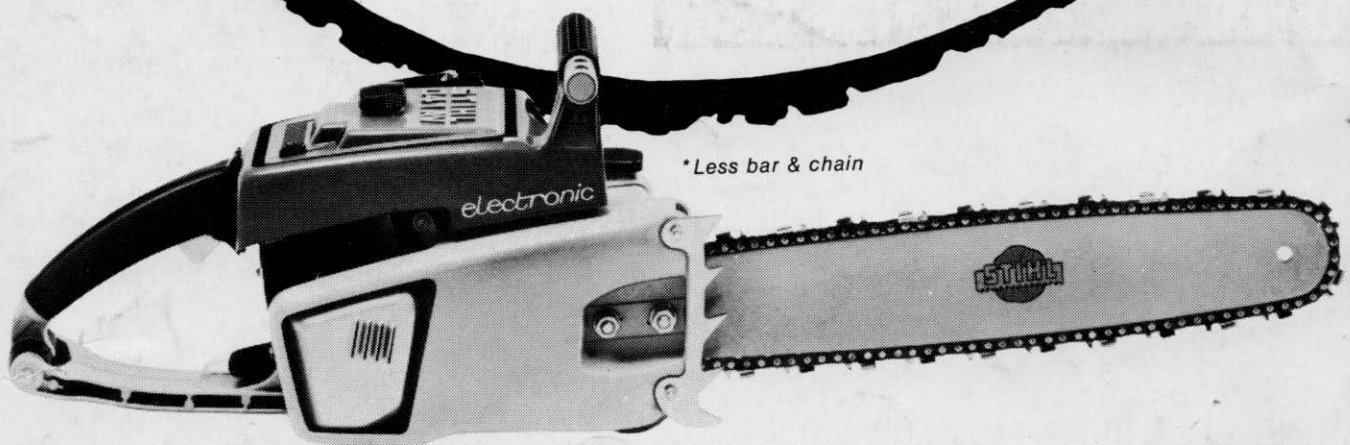
Weed Science Society of America annual meeting, Queen Elizabeth Hotel, Montreal, Quebec, Canada, Feb. 3-5.



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In keeping with our policy of offering the most advanced and most dependable in chain saws — we have incorporated solid state ignition into the STIHL 041 AV Electronic Saw. Other than eliminating the need for points and providing a molded circuit that is impervious to moisture, dirt, and temperature extremes — this model offers big horsepower output coupled with a light 12½* pound weight and the fabulous new vibration absorbing AV handle.

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