

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



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.

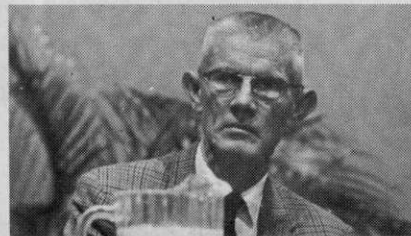
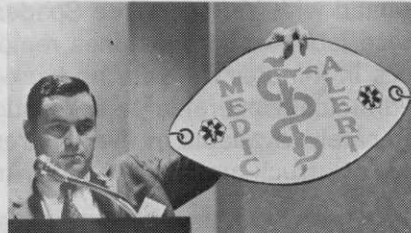
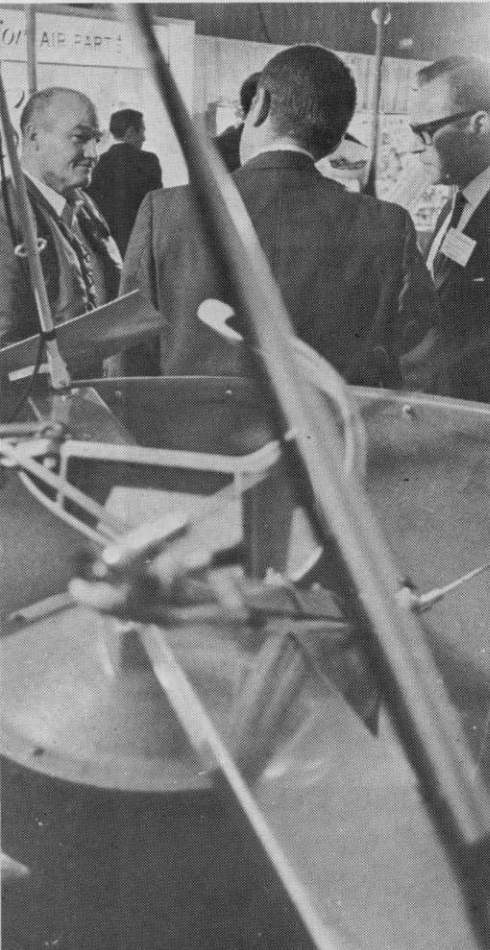
Applicators over-regulated? “You ain’t seen nothin’ yet,” exclaimed Dr. Clifford C. Roan of the University of Arizona. But he chided the collective authors of pesticide labeling laws for lack of common sense. “We wouldn’t have such a container disposal problem if manufacturers were permitted to market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



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.

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.

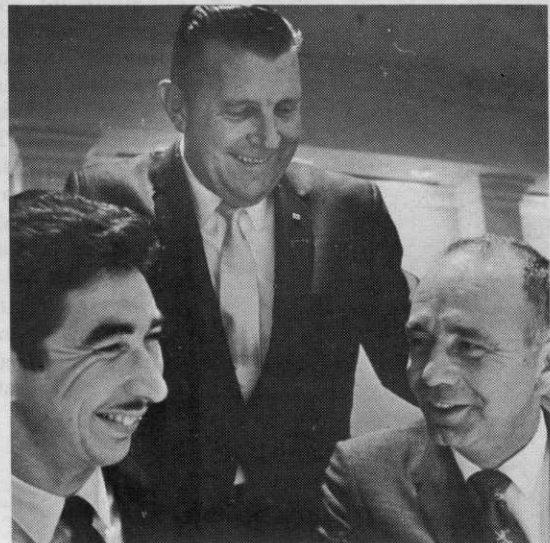
He admitted his staff, who came up with the projection, had exercised "vivid imagination." Nevertheless, some way is needed to dramatize the value of pesticides, he said.

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

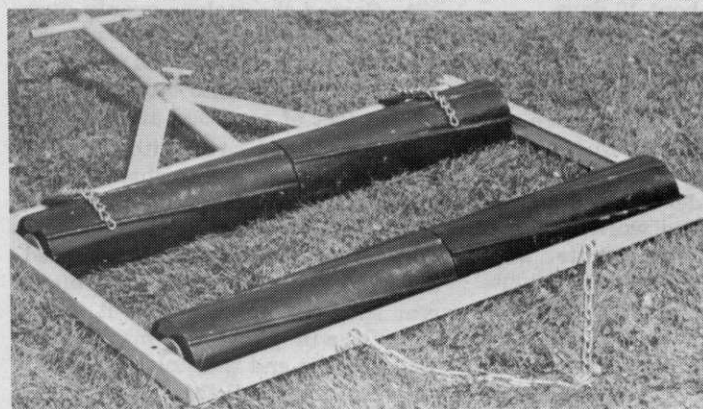
invites your participation

If you are a Sod Grower you should be
a member of ASPA.

Keep in touch with progress.

Allied Industries are welcome.

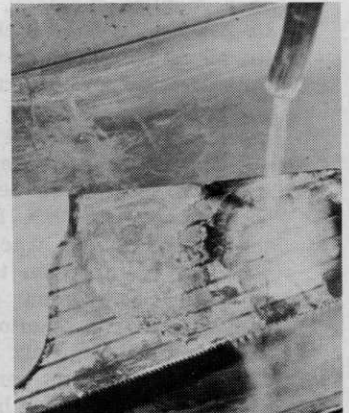
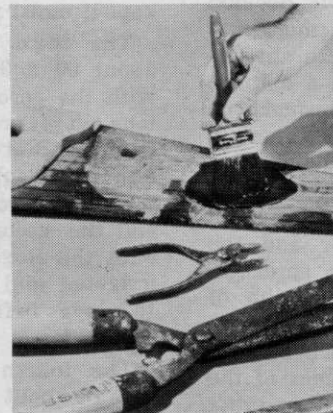
For More Details Circle (105) on Reply Card



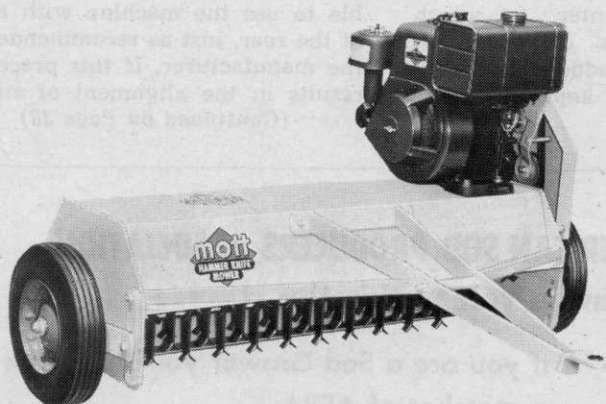
Swenson Spreader and Manufacturing Co., Lindenwood, Ill., announces a new concept in rollers. The roller is propelled by friction from the elevated rear wheels of any standard garden tractor. It utilizes the weight of the tractor and driver for compaction. Split rollers provide easy steering and maneuverability, 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.



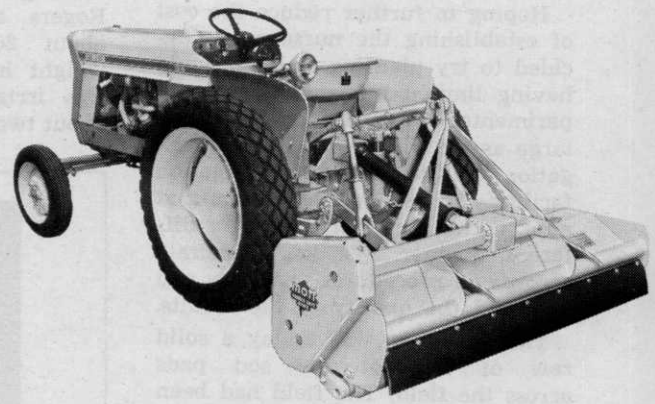
Ditch Witch, a division of Charles Machine Works, Inc., Perry, Okla., offers a new trencher, the 37 hp R-40. The second largest model, the R-40 is powered by an air-cooled Wisconsin engine. Maximum trenching depth is six feet; maximum width, 12 inches. Attachments include a front-mounted backhoe, vibratory 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.



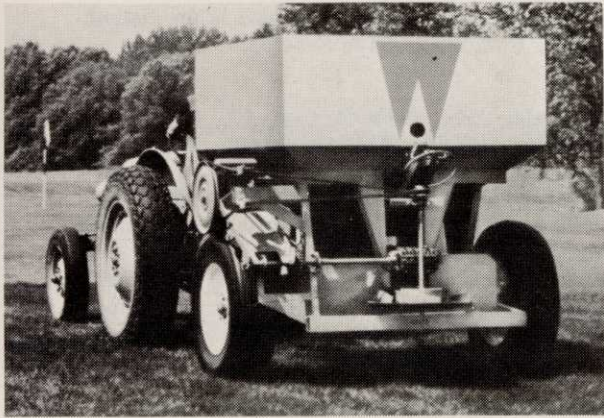
Ace Chemical Co., Chicago, Ill., announces a rust remover that is applied with a brush and washed off with water. The company claims that no scraping, wirebrushing or sandblasting is necessary. Rust-Removo, containing a blend of mineral acids, solvents and wetting agents, is a jelly that sticks to anything—even 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.



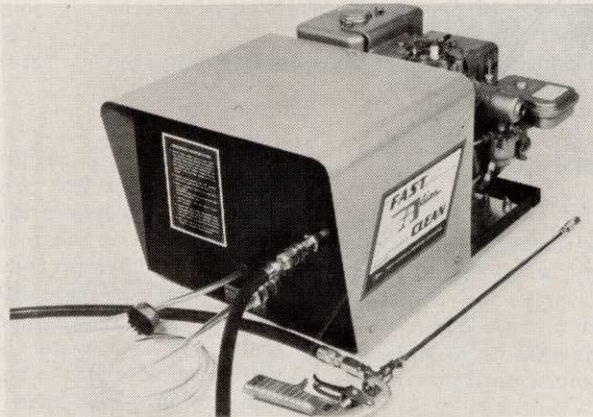
West Point Products of Hahn, Inc., Evansville, Ind., offers a new Big Boy 3-4000 spreader designed to reduce the cost of fertilizing large turfgrass areas. It features a 60 cu. ft. hopper capable of holding more than two tons of granular fertilizer. Distribution swath is 50 feet. Moving at 10 hp, the 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.



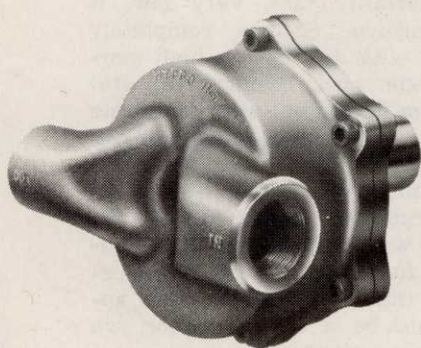
Allis-Chalmers makes this HB-212 hydrostatic drive lawn and garden tractor equipped with the 26-bu. capacity vacuum collector. Tractor attachments can be raised or lowered from the operator's seat, either manually or with an optional hydraulic control. The 12 hp unit has a controlled traction differential;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



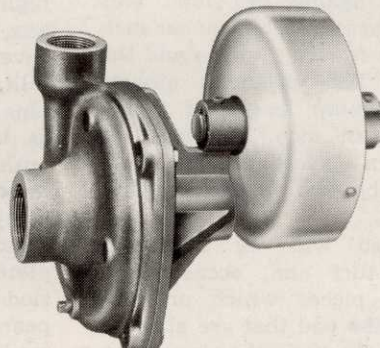
Solo Motors of Newport News, Va., reports effective use of its Model 410 Knapsack Mistblower to combat insect and bacteria problems on golf green and fairway. Scattering leaves is another practical use of the 25-lb. unit which boasts a spray of 50 feet. A 3 hp engine powers unit, handy also for nursery 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**