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The 10 to 20 h.p. tractor pulled ahead of the 30 to 50 h.p. tractor in 1979. Of all the types of equipment surveyed, irrigation equipment was the most evenly purchased type of equipment throughout the year. In the first three quarters of 1979, Weeds Trees & Turf readers purchased nearly $60 million in pumps, pipe, controls, and heads.

Seed was one item that consistently showed very high percentage of purchase every month of the year. Seed buyers outnumbered sod buyers by two to one in winter and stayed ahead throughout the busy season. Trees and ornamentals also exceeded sod. Nevertheless, sod was purchased by nearly two thirds of landscape contractors in the second and third quarters for more than $88 million in the first nine months of 1979.
Q: I have recently been using urea to melt ice and snow on walkways. Is urea, or certain forms of it, harmful to cement? For grit, I also add pelleted gypsum. Would this damage the concrete?

A: I contacted the Portland Cement Association in Skokie, IL, and was told that urea is not known to cause surface scaling or spalling on concrete when subjected to freezing temperatures and is approved by their association for deicing.

Gypsum (calcium sulfate), however, should be avoided since sulfate waters penetrate into the concrete and are chemically aggressive at any temperature.

Q: I own a small lawn company and have been told by the local fire warden that fertilizers are considered hazardous because they are explosive. Is he right?

A: Ammonium nitrate (NH₄NO₃) is explosive when mixed with organic compounds such as diesel fuel. According to the Farm Chemicals Handbook, ammonium nitrate "should not be stored with combustible materials nor mixed with organics and superphosphate unless the free acid has been neutralized first." However, this certainly does not apply to all fertilizers. Many, in fact, can be used as fire retardants.

Ask your fertilizer distributor for a Material Safety Data Sheet for each of the fertilizers in your program.

Q: Why do road salts cause plant injury? Aren't fertilizers salts?

A: The injury is primarily one of excess concentration. All salts, fertilizers included, will interfere with water absorption when salt concentration in the soil solution is greater than the salt concentration within the root cells. The resultant injury is known as "burn" or "physiological drought." In addition, sodium (a component of the common salt, sodium chloride NaCl) is toxic to plants in relatively low concentrations and breaks down the open structure of soils contributing to compaction.

Q: What fertilizers do you recommend for pines, spruce, hemlock, and other evergreens in the Pennsylvania area?

A: In general, we have obtained good results with the same 3:1:1 ratio recommended for hardwoods at rates varying from 75 to 200 lbs. nitrogen per acre. However, specific nutrient deficiencies do occur in certain soil types and locations, and identical treatments with the same plant species in different locations have not always given the same response. Have your soil analyzed at your state soil testing lab and follow recommendations.

Q: When is the best time of the season to apply pre-emergent crabgrass and broadleaf control? What about last year’s crabgrass on the lawn for the upcoming spring?

A: Pre-emergent crabgrass herbicides control the germinating seedling only and, therefore, must be applied before germination which occurs after the soil temperature stabilizes above 55 degrees F. In most areas this corresponds fairly well with medium bloom drop of forsythia, a spring flowering shrub.

Crabgrass is an annual which dies in the fall. Infested areas are prime targets for next year, however, because of the crop of seeds produced and the fact that the desirable turfgrasses will have been crowded out by the past year's crabgrass, allowing plenty of light for germination of the crabgrass seed.

Broadleaf weeds are best controlled when they are actively growing which, for most weeds, is in the spring and fall. Ideal weather for maximum control would be warm, humid, sunny days when rain does not occur for 24 hours following applications.

Q: Can dormant oil be applied in the fall? We have a problem in applying at the proper time in the spring because of bad weather.

A: This subject was discussed at the recent meeting of the Entomological Society of America where the general feeling was that satisfactory control could be obtained by a fall application of dormant oil spray.

During the interval from dormant to delayed dormant stage of bud development, the weight of some scales increases between four and eight times, and the level of control is reduced.

On the other hand, mites become more susceptible to the dormant oil spray as bud break approaches and the eggs are about to hatch.

More research on this subject is planned for the near future and, hopefully, the overall effectiveness of fall applications will be answered.

Q: Are there any good herbicides other than 2,4-D or those that contain 2,4-D for broadleaf weed control in lawns?

A: We have found that any that are as effective on a wide spectrum of weeds.

A free problem solving service to Weeds Trees & Turf subscribers. Send your question to Dr. Funk by using the postpaid editor card in this issue. Think ahead where possible since it takes about two months to receive, answer and publish.
hydrostatic drive which protects the engine from shock loads at the rotor. A remote control panel mounts on the prime mover and provides the operator with convenient controls for starting, speed selection, rotor disengaging, and stopping.

Other features include adjustable skids, tree pushers, and a 60-inch wide rotor assembly. The skids permit cutting from ground level to 5 inches high and the tree pushers protect the operator and direct trees into the cutting path. The rotor assembly consists of 20 19-inch-diameter discs and 38 heat-treated, alloy steel cutters which are double-edged, freeswinging, and easily reversed or replaced.

The machine measures 7 inches long by 78 inches wide by 53 inches high. It attaches to front-end loaders and other equipment which can handle 6,000 pounds. A GM 4-53N, 4-cylinder, 117-horsepower diesel engine drives it. (Circle 214 on free information card).

Other manufacturers of right-of-way brush cutters are Bombardier Ltd. (215), FMC, Agricultural Machinery Div. (216), National Hydro-Ax, Inc. (217), NFI, Inc. (218), Pettibone Corp., Ala. Div. (219), Rhino by Athens & Servis, Austin Prod. (220), and Washington Industrial Resources (221).

Miscellaneous

To top trees, cut fence rows, and reach limbs that are too distant for most equipment, a ZZZ-CUT works well. It cuts and removes limbs with a boom-mounted cutter head that is hydraulically controlled from inside the cab.

The cab of this trimmer, made by Products for Energy Inc., is completely enclosed so an operator can work in rain, cold, or heat. It drives over ditches, up hills, and through mud to get to any site. No-spin axles add traction to the four-wheel drive.

The ZZZ-CUT can travel 40 to 45 mph on the open road and does not have to be hauled to a different work location. (Circle 222 on free information card).

Excel Industries, Inc. makes a Hustler 402 mower that cuts 72 inches out front and works on sloping terrain while the operator remains comfortably upright. The self-leveling cab maintains level operator station and engine platform even on slopes to 27 degrees. Weight distribution stays balanced on high and low drive wheels.

The four-wheel drive mower crawls in and out of ditches, climbs banks, and turns on slopes. Dual hydrosstats operate the drive wheels independently and twin hand levers steer at a touch to control both direction and speed. With its low center of gravity, the mower climbs and turns a full circle while it continues to cut grass and weeds.

Continues on page 56
**Workhorses** from page 55

A choice of mowing decks includes the heavy-duty 72-inch rotary and a 60-inch flail mower, both with rear discharge that is effective for places where debris is concealed by heavy grass and weeds. (Circle 223 on free information card).

After all the cutting is done, a log fork from Tube-Lok Products may be used to carry out loads. Every log fork is box-welded for increased carrying strength to handle large single or multiple-log loads in one pass. The manufacturer claims that carrying capacity meets or exceeds the actual lifting capacity of all lift vehicles.

Log forks are constructed of high-strength alloy steel, with extra large heat-treated pins and hardened steel bushings. Wear bars are hard faced to extend tine life. The spacing of fork cross-members gives the operator good visibility for productivity and safety. (Circle 224 on free information card).

**Alternatives** from page 47

over weeds. If a few weeds do appear, removal by hand can help keep the problem from becoming serious by preventing spread of weed seed.

These basic principles of good management to reduce weed encroachment are not new, but need to be re-emphasized. Too much dependence has been placed on using herbicides to cover up what may be the result of bad management. When a chemical such as silvex is lost, we can be faced with a weed problem which may only be solved by complete renovation of the area.

Also, a weed problem which is solved temporarily by herbicides is certain to return if bad management continues. Good management will certainly not eliminate the need for herbicide applications, but it will greatly reduce the seriousness of weed problems that could eventually occur.

Reprinted from *The Agronomist, University of Maryland, College Park*
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ENKAMAT WILL HELP KEEP THE ORANGE BOWL GREEN.

And the stadiums of Purdue and New Mexico State, the playing fields of Lovett, T.C. Roberson High and Coral Gables Park, Fore Lakes Golf Club, Wellington’s landing strip and more.

Dr. William H. Daniel of Purdue University, turf grass specialist and developer of the PAT (Prescription Athletic Turf) system, said after extensive greenhouse testing and outdoor field observation of Enkamat: "I think Enkamat is resilient and durable, and will substantially increase sod stability."

Enkamat, a 3-dimensional webbing made of nylon monofilament fused at the intersections, is being installed on major playing fields and parks across the country. As such, it will help scarred turfgrass heal itself, reduce compaction and wear and promote a strong root system. Enkamat should also provide a resilient but firm footing so players' injuries may be greatly reduced.

Enkamat will also hold turf together so damage from tearing and divots is minimized. And because Enkamat is an open webbing, it will maintain grass on high-traffic areas without the constant need for aeration. It has been tested and used successfully on playing fields in Europe for 10 years.

It was to prevent tearing and compaction on heavily trafficked areas that Dale Sandin, Grounds and Turf Manager of the Orange Bowl, had Enkamat webbing installed. Now, 6 months later, he's pleased with how the turf is holding up.

Other success stories keep coming in. Purdue, of course,
had over 22,000 square feet of Enkamat installed along with its PAT system and they’re “tickled pink” by the results. T.C. Roberson High and the Lovett School, Atlanta, GA, installed Enkamat because it increases playing time on their fields so they can schedule more events. New Mexico State University installed 22,500 square feet of Enkamat to restore the field and reduce their maintenance hours at Aggie Stadium.

Both the soccer field and playground of Coral Gables Park had Enkamat installed and they report greener-looking grass. The Mel Reese Golf Club, Miami, FL, installed Enkamat on its tees, Fore Lakes Golf Club put 10,000 square feet of it on their driving range, and Biltmore Forest Country Club, Asheville, NC, installed Enkamat on the golf cart path. The Wellington landing strip in West Palm Beach, FL, and the David B. Oliver High School, Pittsburgh, PA, are both in the process of installing Enkamat. As time passes, there will be a lot more success stories.

Life, and your turf, will have fewer problems if you install Enkamat. For more information, contact Turfibre Products, 1934 N.E. 151 Street, North Miami, Florida 33162, (305) 947-4649, Tom Mascaro, Manager.
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News from page 50

SOIL EROSION

Builder receives laboratory contract

Geupel DeMars, Inc., Indianapolis, IN, has been awarded a contract for construction of the U.S. Department of Agriculture's National Soil Erosion Laboratory. The Laboratory will be on land made available to the U.S. government by Purdue University in West Lafayette, IN.

The $3,930,000 contract, which provides for construction of a one-story building and basement, was awarded by the department's Science and Education Administration (SEA). Plans call for the addition of a second floor as funds and authorization become available.

With about 21,000 square feet of usable floor space, the one-story laboratory is designed for multidisciplinary studies by about eight SEA Agricultural Research scientists and 10 support staff. The second floor could provide enough space for an additional seven scientists and 12 support staff. There also will be accommodations for cooperative studies with Purdue researchers and graduate students.

PESTS

U.S., Canada seek spruce budworm cure

The Canada/United States Spruce Budworm Program (East) is accepting proposals for research contributing to the protection of eastern spruce-fir forests from damage by the eastern spruce budworm (Choristoneura fumiferana). Limited funds for grants have been provided for 1980, 1981, and 1982.

CANUSA is an international research and development program sponsored by the USDA Forest Service and the Canadian Forestry Service to promote the development of integrated management techniques for minimizing the impact of spruce budworm infestations. For more information, contact: Melvin E. McKnight, Program Leader, Spruce Budworm Research and Development Program, USDA Forest Service, Rosslyn Plaza E, 1627 No. Kent Street, Rosslyn, VA 22209 or Daniel M. Schmitt, Program Manager (East), Canada/United States Spruce Budworms Program, USDA Forest Service, 370 Reed Road, Broomall, PA 19008.

SEEDS

Punch planting helps establish seeds

In experiments to establish grass from seed under drying conditions in the Southern Great Plains, punch planting produced a satisfactory number of seedlings when there were very few from conventional planting.

Plant punching, a method of placing seeds in small diameter holes punched in the soil and left open to the atmosphere, made no difference where water was adequate. Optimum depth of punch planting was related to seed size and seedling vigor. Small diameter holes (3/8 inch) produced best plant emergence, because the bottom of small holes dried slower than the bottom of large holes.

The tests, conducted by scientists with the USDA-SEA-Agricultural Experiment Station, offer a possible solution to the problem of seeding failures in the Plains area. The conventional planting practice for perennial grasses is to place grass seed about 1/2-inch deep in the soil, but that soil layer often dries quickly and prevents plant establishment.

TURF

Turfgrass group honors Cornell prof

The New York State Turfgrass Association has honored professor emeritus John F. Cornman of the N.Y. State College of Agriculture and Life Sciences at Cornell University.

Cornman, a specialist in turfgrass management and an authority in this field, received the Association's Citation of Merit given annually during its turfgrass conference.

In another event at the college, A. Martin Petrovic has been appointed assistant professor of turfgrass science in the department of floriculture and ornamental horticulture.

Petrovic recently completed his doctoral degree in the department of crops and soil sciences at Michigan State University. His research is in the areas of turfgrass management and soil physics.