efficiency. If a forklift has a separate heat exchanger or oil cooler, they also must be kept clean, but not by means of a water hose. Steam cleaning or air-pressurized solvent will cut any oil film and clean away the dirt.

9. **Fuel choice and fuel storage are important** in forklift operation and maintenance. Even in view of current fuel costs, a few precautions can pay off in terms of decreased maintenance costs on your forklift. Keep your fuel storage tanks full, if at all possible. A full tank does not allow condensation — a cause of water contamination. Recognize that during fuel shortages, the available fuel may be less than premium quality, so use an inlet filter to prevent vehicle tank contamination. In addition, change fuel filters or drain the sediment bowl at more frequent intervals, particularly if you do get some low grade fuel. Because a given fuel supplier may be low on fuel, levels in storage tanks may be drawn down lower than usual. Therefore, any rust particles or any kind of contamination in the bottom of the tank, may be passed into the tank truck, bringing fuel out to the job site.

By changing engine fuel filters at more frequent intervals you save the heart of your diesel engine: the injection pump. It is worth the small additional expense to keep an adequate supply of fuel filters on hand especially in view of current service parts shortages.

10. **Engine radiators can't handle much exterior dirt.** If outside fins or tubes become coated with oil, dirt, or anything which reduces cooling efficiency, engine temperatures will go up, leading to reduction in power and possibly complete failure if not corrected. Steam clean the radiator, or blow off with pressurized air solvent if there is oil involved. Simple dirt can be cleaned with hot water on an air hose.

11. **Forklift masts need their own brand of care.** Lack of lubrication will reduce service life on rollers and rails. However, mast rails used in an abrasive environment should be kept clean and dry to prevent accelerated heat due to grit entering the rail lubricant.

Don't Neglect The Operators

Operators need to recognize several major differences between a forklift and other equipment that they may have been operating.

1. They may have a 1500 lb load 30 ft in the air. At this time, the forklift must not be driven. Sudden movements under these kind of conditions could cause undue stress or strain on the mast structure.

2. With a mast at full extension, a forklift is an unstable structure. Therefore, an operator must have his load properly centered on the forks so there will be no load shifting.

The operator of a forklift can prevent major breakdowns in three ways: 1. He avoids the need for unnecessary maintenance through proper operation. 2. He is the eyes and ears for those who perform maintenance or repairs he cannot do himself. 3. He can also do a few simple things on the spot such as checking lubricant and coolant levels, tightening loose bolts or hydraulic connections, etc.

The skilled operator notices and reports unusual operating conditions, such as changes in engine sounds, a jerky motion of the mast, the forklift may not advance or back up as easily as previously. These problems are often times not recognized by maintenance personnel.

In summary, forklifts should not be neglected. They're not an expendable device, but an important tool and it costs money to buy and maintain them. How much forklifts cost to operate is variable. However, these costs can be minimized in the hands of thoughtful owners, operators and knowledgeable service personnel.

A rough terrain forklift needs its own brand of tender loving care. Some of this care includes frequent cleaning and lubricating of the mast chain.

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Profitable Outlets For Wood Wastes

By DR. ROGER FUNK, Horticulturist, Davey Tree Expert Co., Kent, Ohio

BY FAILING to use wood residues, private industry is neglecting a valuable source of additional revenue.

The search for profitable outlets for sawdust, chips and similar wood wastes is often instigated by the need for reducing costs of disposal. Incinerators have been tried but the initial installation is expensive and incineration produces no useful product. Today, many municipalities and industries are utilizing chippers to reduce their waste wood to valuable chips which are selling for $15 to $40 per ton (depending on grade) throughout the United States.

Geographic separation of sources and markets and transportation problems arising from bulkiness severely limit profitable outlets for wood residues. Freight costs restrict the longest distance that low-grade material can be transported to about 100 to 200 miles. The feasibility of drying and compressing chips to economize on transportation and storage costs is being investigated. An automatic baling machine for wood wastes, recently developed in England, significantly decreases bulk and increases handling ease.

There is considerable variation between the chemical and physical properties of wood residues among species and tissues within a species. Thus, any high-grade utilization usually requires large amounts of clean, dry, relatively homogeneous material from a single species or from a limited number of species with similar characteristics. Frequently, however, the residue obtained is from a mixture of unrelated species and some undesirable "waste" remains even after processing. These factors indicate that initial commercial development should concentrate on the utilization of whole residues independent of its physical and chemical properties.

The primary uses for low-grade wood wastes can be grouped under three main categories: (1) fuel, (2) agricultural and (3) fiber.

Recent appraisals of the use of wood wastes as a fuel and of the equipment necessary for firing have appeared favorable. Improved multiple-fired burners have been developed, together with heavy duty presses that are capable of obtaining positive fuel values even from water-soaked material. Wood residues with up to 65% moisture can be burned. Kiln-dried wood residues produce about one-half the amount of heat from fuel oil or three-fourths of that from mineral coal.

Anerobic decomposition of wood wastes produces methanol, a high quality fuel that can be used in the basic areas of energy, such as transportation and heating. Wood wastes could be composted alone or in conjunction with other organic wastes such as garbage and sewage.

Methanol processing plants have been operational in Europe for a number of years but, although the economic and ecological value is well established, widespread interest has not developed in the United States.

Widespread interest, however, has developed in charcoal briquets and artificial logs in all parts of the United States as well as other nations.

Operational plants in Maryland, West Virginia, and Oregon utilize sawdust, woodchips and bark to produce compressed briquets for outdoor grills. Particle size or the species is not a primary concern since the material is shredded and mixed to produce a relatively uniform product.

Artificial logs for household fireplaces, barbecues and stoker fireplaces are produced by pressing and extruding fine wood particles with or without a wax binder. Either kiln-dried or green material can be used, depending upon the process.

The value of wood residue as a mulch, soil conditioner, and for animal bedding and roughage is well documented.

As a soil conditioner, wood and bark improve tilth, structure and

(continued on page 42)

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Often referred to as the ecology fish, the White Amur has proven to be the most economical way to control under-water weeds, grasses, moss and algae. The AMUR eats only vegetation, does not eat other fish, does not reproduce in your pond and will give control for 10 years or more. The AMUR has been used very successfully in private lakes, golf course ponds, and industrial waters. Fish should be stocked only in confined waters.

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JULY
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Three months of heavy emphasis on equipment in the green industry. The July, August and September issues of WEEDS TREES and TURF will carry more features, more data, more photographs on equipment than ever before. Rolling stock, engines, tree care and sod equipment, golf cars and course maintenance equipment, tractors, trucks and hand tools. Watch for the biggest green industry equipment rally ever held.

Maryland's Sod Industry Seeks State Assistance

Maryland's turf and sod industry, one of the state's newest and fastest growing agri-businesses, is actively seeking more technical and marketing assistance from state government.

At a joint meeting the industry-wide Maryland Turf Grass Council and the sod growers' organization, the Maryland Turf Grass Association, requested the support of various state officials, including Comptroller Louis R. Goldstein, Senator Howard J. Clark (D. Howard), Secretary of Agriculture young D. Hance and University of Maryland Vice President Frank Bentz.

The turf industry is requesting the addition of two specialists for the agronomy department of the University, which now has just one such specialist and no funds to employ more. Industry leaders pointed out that while Maryland produces more commercial sod than the states of Virginia, Pennsylvania and New Jersey combined, those states have the services of eleven turf agronomists.

Industry leaders also requested representation of the Maryland Agricultural Commission, the state agriculture agency's advisory body which is made up of commodity group members representative of the state's agricultural segments, and which has not yet had a member representing the commercial turf and sod industry.

Another request related to crop reporting, a function of the Maryland-Delaware Crop Reporting Service, which serves USDA and the Maryland Department of Agriculture. The turf people complain that their product ranks among the state's major crops, along with corn, wheat, soybeans and tobacco. Yet, it is not included in reports on production, dollar value, etc.

Addressing the industry meeting, Dr. John R. Hall, the University's only turf agronomist, estimated that there are now about 250,000 acres of turf being maintained in the form of lawns, golf courses, roadway strips and shoulders, parks, etc. and that it costs $80,000,000 per year all told to maintain.

The state's commercial sod growers now have about 13,000 acres of grass under cultivation. This "crop", according to Hall, has a potential market value, when installed at consumers sites, of an estimated $43,000,000. The state's largest producers of sod are Montgomery, Carroll, Harford and Howard Counties. However, sod is also produced in other counties, including Anne Arundel, Caroline, Queen Anne, Prince George, Washington and Allegany.

Hall estimates that it costs about $3,279 to purchase, transport and lay an acre of sod.

Sod is used in large quantities by golf course operators, apartment house owners, industrial plants, schools, hospitals and private institutions, as well as by homeowners. The recent housing construction slow-down has created a slump in sod sales. Industry leaders, however, believe that this is just a temporary situation. They are optimistic about the future, as homeowners discover that a sod lawn often proves far more satisfactory and sometimes more economical than preparing a new lawn from seed, or trying to revive an old, weed-infested yard.

Commenting on the meeting, Secretary Hance said that state officials are most sympathetic to the needs of the industry.

Edward Croft (above), an associate of the O. M. Scott & Sons Company for 50 years, was fatally injured in a farm accident June 3 near his home in Salem, Oregon. Croft started with Scotts in 1924 and over the past 50 years has worked in essentially all areas in the operation. Croft started Scott's first contract seed production program with growers in Washington in 1960, and gradually expanded contract seed production to areas of Oregon.

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EQUIPMENT PARADE

SOD CUTTERS & HARVESTERS

The Brouwer Sod Harvester, its manufacturer says, will produce up to 1300 square yards of sod per hour with 2-3 people. The unit will roll, slab or fold sod and is built to cut in one of four widths: 15", 16", 18" or 24". Designed to mount on either a Ford or Massey Ferguson standard farm tractor, the Brouwer unit's most recent development is a 3-inch blade. The "throw away" side blades and bottom blade, the manufacturer says, are less expensive than conventional blades.

This is the Princeton 4020, a harvester which the manufacturer says can produce 1500 square yards per hour with a three-man crew. It is powered by a 172 cubic inch Ford industrial engine with Funk double-pump gear case. It has a Sundstrand pump and drive motor, Rockwell-Standard transmission/differential and Vickers accessory drive unit. It cuts 20" wide slabs, 40" long. (Another model, the 4816 is designed to produce 16" wide sod). Base price of the 4020 is $28,000 . . . options include a diesel engine, rear flasher lights and aux. elevator drive.

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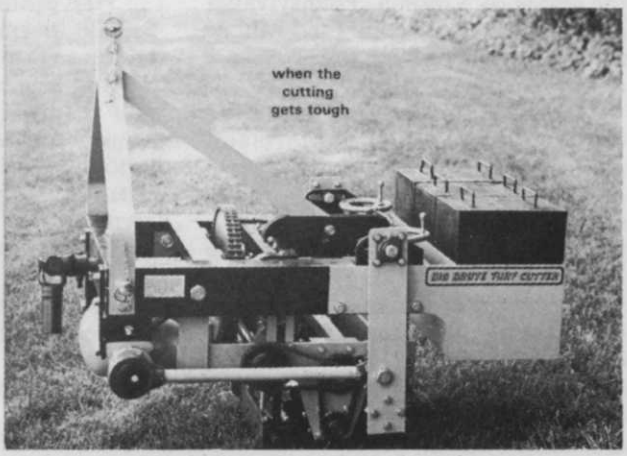

The Big Brute Turf Cutter (made by Finneyfrock's) is driven by a three-point hitch tractor and its P.T.O., at speeds of low, second, and third. The cutter, the manufacturer says, has yield of 33¼ square yards a minute in second gear, and 3 to 4 acres in an 8-hour day. Average blade life is 6 to 15 acres, the manufacturer says, and the side coulters will yield 25 to 35 acres. Models are available with cutting widths of 12", 15", 16" and 18" . . . all with or without Cut-off.

The Nunes Mechanical Sod Harvester features hydraulic controls which the manufacturer says allow for quick and easy adjustment to different field, terrain, soil and sod conditions while the unit is in operation. The unit, Nunes says, will cut, lift roll (or slab) and palletize more than 1000 square yards of sod per hour. The unit handles either rolls or slabs 12 to 20 inches wide (24-inch width machines on special order).

This is the Ryan Heavy Duty Sod Cutter, which through conversion can cut 12", 16" or 18" wide. The manufacturer says one man can cut 1¼ to 1½ acres of sod per day. The cut-off model offers automatic, vertical cut-off adjustable from 1 to 9 feet. There are two propulsion speeds on all models. The drive to the eccentric is now through heavy-duty spur gears. There's also an improved belt drive, the manufacturer says. A sulky roller attachment is available.

Three or four men can cut and roll 1200 yards of sod an hour with this machine, according to its manufacturer. It is the Beck Sod-o-Matic, a harvester which brings sod into large rolls, 3-16" strips 45 feet long, 180 square feet, 20 square yards. The big roll is started around either cardboard tubes or other type tubes and, when completed, can be moved and loaded by fork lift. At a job site, the big rolls are unloaded by and picked up by the tractor equipped with a laying device.

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Superintendent Without Grass

By STAN METSKER, superintendent, The Country Club of Colorado, Colorado Springs

During the construction of a golf course, a golf course superintendent can make a vital contribution to its successful completion. Few superintendents go through this experience more than once or twice. It is a completely different set of responsibilities compared with the normal routine of maintaining a golf course with grass.

Ordinarily, the whole thing gets started when an owner of land makes a deal with a golf course architect. The architect may or may not also do the building. Many times there are other contractors brought into the project as sewers, water, electricity, telephones and houses are put in.

In all of the confusion of construction, many times there is only one man who will remain after all the building is done — the golf course superintendent. He is the man who must live with the results. Therefore, it makes a lot of sense to get the superintendent hired and on the job early in the construction period.

Usually, the golf course superintendent is the owner's representative on the job site. His responsibilities may include keeping track of which contractors are working each day and with how many men and what machinery. He may need to record when there is weather impairing the work. These records can be valuable if there is a time penalty in the contract. He should keep maps up to date, handle necessary invoices, and help to coordinate activities in the field with those in the owner's office.

To help control the quality of the course, the superintendent should be constantly aware of the drainage problems. He should personally have tests made of the materials used in the construction of the greens. Also, soil tests should be taken throughout the course so that fertilizer needs can be determined. According to the effect the golf course architect may want to achieve, the superintendent should help select grasses to do the job.

For example, architect Pete Dye, in an effort to emulate the Scottish effect on the Gates Course in Colorado Springs, did not want Kentucky bluegrass from fence to fence, even though the automatic water system covered the entire area.

The irrigation system and its pumping station are the heart of the golf course. The golf course superintendent should help decide which system will do the job best and then he should see that it is installed properly. He should personally take part in the staking of the heads. During the installation, he should have the authority to control the quality of the workmanship. His intimate knowledge of the system will serve the club in good stead during the difficult months the seedlings are being nursed into being the foundations of a golf course.

The golf course superintendent can save the owners of a new course time, money and many built-in headaches if he is on the job throughout the entire construction of the new golf course. He is not an architect or a contractor, but he knows what needs to be done to make the course maintainable. He is in a position to grease the wheels of progress which can avoid expensive delays. Above all, it is only he that can make the transition from raw ground to finished golf course complete.

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Meeting Dates

American Sod Producers Association, summer convention and demonstrations, Crown Center, Kansas City, Mo., July 17-18.

American Association of Nurserymen, centennial convention, The Palmer House, Chicago, Ill., July 19-23.

Horticulture Research Institute, New Horizons Day '75, The Palmer House, Chicago, Ill., July 23.

Penn Allied Nursery Trade Show, Hershey Motor Lodge and Convention Center, Hershey, Pa., July 29-31.

TVA Fertilizer Conference, Executive Inn, Louisville, Ky., July 29-31.

New York State Turfgrass Field Day, Warren's Turf Nursery, New Hampton, N.Y., July 30.

Turfgrass Field Day, The Ohio State University, turfgrass research plots, Columbus, Ohio, July 31.

Southern Nurserymen's Association, annual convention, Atlanta, Ga., Aug. 3-5.

Landscape Maintenance Symposium, Union Building, Michigan State University, E. Lansing, Mich., Aug. 4-5.

Rutgers 1975 Turfgrass Research Field Day, College Farm Road, New Brunswick, N.J., Aug. 5.

Illinois Landscape Contractors Association, Summer Field Day, Burr Oak Nursery, Round Lake, Ill., Aug. 6.

Garden Industry of America Market, Las Vegas Convention Hall, Las Vegas, Nev., Aug. 8-12.

Canadian Parks and Recreation Association, annual conference, Quebec City, Aug. 10-14.

International Shade Tree Conference, 51st annual meeting, Heritage Hotel, Detroit, Mich., Aug. 10-14.

Rhode Island Golf Course Superintentendents, annual turfgrass field day, University of Rhode Island, Kingston, R.I., Aug. 20.

Illinois Turfgrass Foundation, Golf Day, Indian Lakes Country Club, Bloomingdale, Ill., Aug. 25.

Irrigation Seminar, sponsored by the Northern California Turfgrass Council, Asilomar Conference Grounds, Pacific Grove, Calif., Sept. 5-7.

Turf and Landscape Day, Ohio Agricultural Research and Development Center, Wooster, Ohio, Sept. 9.

Pacific Horticultural Trade Show, San Diego Convention Center, San Diego, Calif., Sept. 13-15.

Illinois Turfgrass Foundation, Inc., 1975 Field Day and Open House, University of Illinois, Urbana, Ill., Sept. 16.

California Association of Nurserymen, annual convention, Town and Country Hotel, San Diego, Calif., Sept. 16-18.

Outdoor Pest Services Clinic, sponsored by the National Pest Control Association, Inc., Kansas City, Kan., Sept. 26-27.

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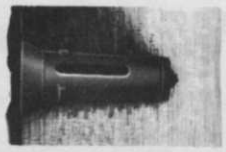

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Air Pollution

What Role Do Trees Play in Cleansing the Air?

By BRUCE R. ROBERTS and ALDEN M. TOWNSEND, Agricultural Research Service, U.S.D.A., Delaware, Ohio

Table 1. Foliar uptake of sulfur dioxide by woody plant species fumigated at 1.0 ppm for 1 hour.*

Species	SO_2 uptake (mg) Per unit area	Per unit weight
Red Maple	0.088[a]	0.260[a]
White birch	0.086[a]	0.268[a]
Sweetgum	0.074[ab]	0.267[a]
Firethorn	0.072[ab]	0.213[ab]
Privet	0.068[ab]	0.134[bc]
Rhododendron	0.056[ab]	0.079[c]
White ash	0.046[b]	0.118[c]
Azalea	0.044[b]	0.072[c]

***Values followed by different letters in the same column are significantly different at the 5% level.**

ONE DETRIMENTAL side-effect of the increasing energy demand in this country is the possibility of higher levels of air pollution. With more and more industries converting to coal as an alternative source of energy, the concentration of certain atmospheric pollutants, particularly sulfur dioxide (SO_2), will increase proportionately. Thus, despite our efforts now and in the future, a certain degree of air pollution is inevitable. The problem then becomes one of maintaining pollution at some acceptable level. This can be accomplished in two ways: (1) by controlling the source of pollution through proper legislation and surveillance; and (2) by maintaining an adequate and effective reservoir for existing pollutants. Much has been said and written about the former approach; let us look briefly at the latter possibility.

There are three naturally-occurring reservoirs for atmospheric contaminants: soil, water, and vegetation. Only in the past few years have scientists considered the potential ability of plants to influence air pollution levels. Recent

Recent research at the USDA's Shade Tree and Ornamental Laboratory has been directed at helping to understand the role of wood plants in influencing air quality.

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research at the U.S. Department of Agriculture's Shade Tree and Ornamental Plants Laboratory has been directed at helping to understand the role of woody plants in influencing air quality.

Container-grown seedlings of white birch, red maple, white ash, sweetgum, rosebay rhododendron, kurume azalea, privet and firethorn were fumigated with SO_2 for one hour at a concentration of 1.0 ppm (Table 1). Fumigations were performed in a specially designed chamber under carefuly controlled environmental conditions. The results of this research indicate that maple, birch and sweetgum are capable of removing greater quantities of SO_2 from the air than are rhododendron, ash, and azalea. Privet and firethorn show an intermediate response.

Another investigation with the same group of plants shows that there is variation in SO_2 uptake at different pollutant concentrations. For example, white ash does not respond differently to SO_2 levels of 1.0, 0.5, and 0.2 ppm, whereas white birch takes up significantly less SO_2 at 0.2 ppm compared with uptake at higher concentrations. This variation probabaly reflects differences in stomatal response to SO_2, and is a problem which needs additional research. Significant variation was also demonstrated in the amount of ozone (O_3) absorbed by leaves of white oak, white birch, coliseum maple, sugar maple, redvein maple, red maple, Ohio buckeye, sweetgum and white ash (Table 2). Seedlings of each species were fumigated at 0.2 ppm in a plastic chamber contained inside a controlled environment room. In these experiments it was found that oak and birch remove the largest quantities of O_3 and red maple and ash, the least. The remaining species show an intermediate response.

Differences in O_3 uptake were also found to be significant among red maple seedlings from Pennsylvania, Minnesota, Maine, and Alabama. Seedlings from the Pennsylvania source demonstrated higher rates of O_3 uptake than red maple seedlings from the other locations. This information illustrates that it may be possible to select certain plants within a species which exhibit exceptional potential in removing gaseous pollutants from the air.

Although all of our research to date suggests that woody plants do, indeed, absorb contaminants from the air, the practical significance of this phenomenon is not yet clear. Despite predictions to the contrary, it seems unlikely that vegetation can significantly reduce high gaseous pollutant levels for long periods of time. However, it does seem probable that certain trees can have an influence on air quality if pollution levels are not too high. Thus, the strategic location of greenbelt plantings containing especially effective "sink" species may be an effective way to achieve acceptable air quality levels in localized areas.

Table 2. Rates of ozone uptake by various shade tree species from an atmosphere containing 0.2 ppm O_3.*

	O_3 uptake (mg)	
Species	Per unit area	Per unit weight
White ash	0.635[a]	1.318[b]
White birch	0.536[ab]	2.347[a]
Colesium maple	0.502[b]	0.991[c]
Sugar maple	0.371[c]	0.863[c]
Ohio buckeye	0.362[c]	0.927[c]
Redvein maple	0.285[cd]	0.911[c]
Sweetgum	0.278[cd]	0.854[c]
Red maple	0.272[cd]	0.555[d]
White ash	0.239[cd]	0.555[d]

***Values followed by different letters in the same column are significantly different at the 5% level.**

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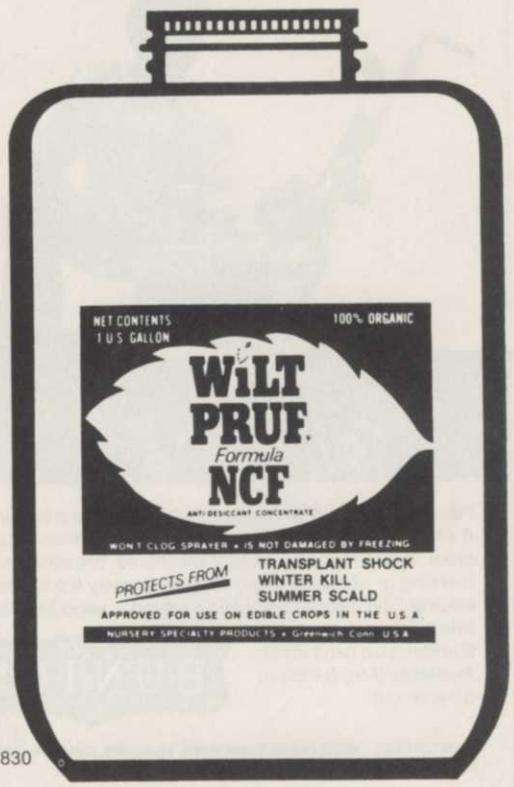

Circle 104 on free information card

Circle 135 on free information card

Circle 116 on free information card

People on the Move

William D. Hughes, Tom Chapman and **John King** have been appointed district sales managers for Toro's consumer product lines. In other company moves, **James Lovaas** has taken charge as general manager of the Toro assembly plant in Tomah, Wis.

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Allis-Chalmers Corp. named **Daniel H. Nelson** advertising manager for Agricultural Equipment Divisions.

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E. James Nilmeirer has been promoted to an agricultural chemicals district sales manager for the Elanco Products Co. He will manage the Lubbock sales district and reside in the Dallas, Texas area. **Oran H. Nunley, Jr.** and **Harry L. Peck** were also promoted within the organization to the positions of sales representatives.

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Pennwalt Corporation's Agchem Division named **Cecil Reeder** to represent Agchem in the states of Illinois, Missouri, Kansas and eastern Iowa. At the Division's Technical Research Center in Tacoma, Washington new Field Technical Supervisors include: **Dr. Jeffery Huether** in the Northeast region; **Bruce MacCoy** in the North Central region; **John Rinehold** in the Northwestern region.

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Badger Dynamics, Inc. named **Thomas D. Lyons** to its board of directors. Lyons is vice president of Carney-Rutter-Roberts Co., a Milwaukee based insurance company.

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Jerome K. Green, J I Case senior vice president - Finance and Corporate Planning, has been promoted to the position of senior vice president and general manager of the company's International Division.

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Michael H. Blake, elected president of Lowden, Inc., tree care specialists located in Needham Heights, Mass.

* * *

Peter McGonagle, appointed regional sales manager for Western Plastics Corp.

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A. Cleve McCarty, named chief operating officer of all of Beker Industries operations. **Jim R. Clare,** elected vice president, finance, and executive assistant to the chairman of the board. **Joseph C. Minio,** elected vice president and treasurer.

* * *

Hugh Lautner, appointed manager, research and development, Carburetor Div., Walbro Corp. **John W. Underwood,** appointed managing directer of the company's subsidiary in Hamburg, West Germany.