tative growth." It also allows crews to spray roadsides before neighboring farmers set tobacco or tomato transplants.

"Early sprays are for garlic, young brush and winter biennials," says Moffett. "This calls for selective herbicides such as 2,4-D or 2,4,5-T, depending on what's to be sprayed." As crews work northward they vary chemicals, rates and application techniques to match the vegetative conditions of the area.

"We don't want brown out," says Moffett. "We're after herbaceous material but not at expense of changing the color or the natural vegetation. Last year we sprayed out further into the ROW. The fall coloring that resulted seemed to blend into the surrounding countryside and people didn't notice it so much."

The agronomist has tested residual chemicals around sign posts, markers and guardrails with success. However he finds that these chemicals contribute to erosion problems when used in too high a concentration.

"For guardrails we prefer to apply residual and contact chemicals that will give abatement in a two-step operation, he says. "This combination allows for vegetation control within the guardrail area but not the problems associated with lateral movement of chemicals.

Another area where Moffett and Cober have applied their chemical knowledge is in growth retardants. They report varying results with applications of maleic hydrazide in the fall. But good inhibition has been obtained in the spring when treatments are made between April 20 and May 15. Areas sprayed after this time require mowing to remove seed heads.

"Use of growth regulators has been more effective on better turf areas," says Moffett. "We fertilize weak stands of grass in areas where we anticipate using MH-30T. There is a slight discoloration to grass when treated in the spring. Compared to untreated grass, a treated section will remain a lighter green color, then progress to a richer green color in later June. The darker green color is retained until fall."

Moffett notes that the period to apply maleic hydrazide is only about a month long. "If the material can be put on in the early part of the application month, the grass will grow to a height of approximately 8-10 inches," he says. "But as you approach the latter half of the month, there will be at least one mowing required to eliminate the seed heads. The formal cost of the material restricts its use to high maintenance cost areas such as guardrails, curbed medians, bridge abutments and steep slope areas which require hand mowing. In the last two years, the cost of MH-30T has dropped significantly so that it is now used in quantity along our roadsides."

Don Cober says that one indicator of their success with this integrated approach to ROW maintenance has been the acceptance of the program in the districts. "We try to stay ahead of things," he says,

Staying ahead means coming up with new and different approaches and solutions to maintenance problems. Moffett and Cober are currently working on a series of manuals including such aspects as herbicides, slope management, mowing standards and others. Closely tied to this will be different job titles for personnel involved with chemicals and their application. Underlying the entire concept is the fundamental principle of safety to the motoring public.

HERBICIDES *(from page 16)*

In downtown areas we have some lined ditches plus an underground storm drain system, but elsewhere in the city most of the ditches are open and unlined. The average ditch is 10 feet deep and about 10 feet wide with a 1½:1 slope. Some of our main ditches, however, are 20 feet or more in depth. Vegetation flourishes and can quickly crowd and overrun ditch banks, bottoms and berms.

Obviously, these drainage ditches must be kept clear to allow for a free flow of water that is carried through the system of laterals to the main ditches or canals and eventually into the St. Johns River.

Historically, the city has depended on cutting and chopping to keep weeds and brush in check. But increases in hourly wage rates ranging five and six times above levels of a decade or so ago and shortages of people interested in the hard physical labor involved in hand chopping and mechanical cutting have spurred our interest in alternate methods of keeping the ditches clean. One of the largest expense items in our maintenance budget has been ditch bank weed and brush control. It, therefore, offered real potential for operating economy — if we could demonstrate feasibility for a new approach.

Investigation showed that proper application of a safe weed and brush chemical such as Ammate X would halt weed and brush growth in the ditches. We found this non-volatile, water soluble compound could be safely used in the residential areas served by the drainage ditches, because it is low in toxicity to man and to animals. And so in 1970, we decided to move ahead with this new chemical spray program.

Initially we purchased a Myers trailer-mounted spray rig. Success with this rig encouraged us to add two John Bean truck-mounted rigs. So we now have three spray units in operation. The Myers sprayer has a 300 gallon tank while the other two rigs have 500 gallon tanks. All are equipped with 300 feet of hose. This makes it possible to reach remote areas away from roads and to operate for worthwhile periods of time without recharging.

Our vegetation problems involve the control of tall growing weeds and grasses such as giant dog fennel, ragweed, camphorweed, canegrass and coffeeweed and also control of woody plants like elderberry, wild plum and willow. When this undesirable vegetation is controlled, however, we find we can develop a useful ground cover of Bahiagrass, centipede grass and Bermudagrass. This is our ditch bank objective, for

Looking over a map of Jacksonville's drainage ditch system is C. C. Holbrook (seated), division superintendent, Streets and Highways. Behind him are (l-r) Stanley C. Abramson, technical supervisor for Southern Mill Creek Products, Inc., a chemical distributor; Cone Revels, Works Agency superintendent; W. M. Hood, supervising engineer, Streets and Highways; and F. Eugene Gonzalez, Du Pont weed specialist.

these grasses can be readily trimmed and maintained. Sometimes adjacent lot owners help with the maintenance since they are interested in a neat appearance in their neighborhood, but they can be overwhelmed and discouraged by high dense growth.

To control the ditch bank vegetation with the minimum amount of material and to eliminate any possible spray drift problems we have been using an invert emulsion. This system combines Ammate X with oil and emulsifier, so that the oil and water mix. By using one gallon of emulsifier, 14 gallons of No. 2 diesel oil and 60 pounds of Ammate X in 100 gallons of water, we obtain a thick, water-in-oil inverted emulsion.

We have three maintenance areas in the city — North, South and West — and we have a spray crew working in each of the areas during the growing season which sometimes is 10 months long. Our aim has been to cover the entire system of ditches during the course of this period. This is all the more difficult as we do not have direct access to many of the ditches and much of our material must be applied with the truck parked at a remote location. Each of the our crews, however, has averaged 900 gallons per day.

Overall, we have been able to get more effective and economical weed and brush control with these three crews on the job than we used to have when we relied entirely on chopping and cutting. For in those days we could see that two or three cuttings a year were the only way to keep vegetation down — yet it was tough hard work and we never really caught up with the job. It is significant that with the chemical program our three crews can now control weed growth and in effect handle a job that must be done, yet would not attract workers if we were still relying on cutting and chopping on the slopes. In a sense, a spray crew can do as much as 30 or more cutters and choppers.

Naturally, we still do considerable mechanical cutting of areas adjacent to the ditch banks. But the chain-link fences near housing developments make it impossible to move heavy duty cutters in close. Other ditches are not accessible to mechanical cutters. To control weeds and brush in these situations, we park a spray rig as near as possible to the ditch and use a spray gun and hose to reach vegetation areas. Good planning is vital, since it is often difficult to reach remote ditch areas from available roads or drives.

A weed abatement program such as ours can be modified to provide for longer control of unwanted vegetation. Initially, we have been concerned with stopping growth of undesirable weed and brush species.

We have not experienced any concern from the public on the chemical program but in the event any question should arise, our crews have the facts to summarize our program and emphasize its safety.

As our program develops, we can see the need for keeping our crews properly trained, so the materials they use will be correctly applied. On-the-job training is, therefore, very much in our minds.

We recognize that our ditch bank chemical program is still new — and we have much to learn. But we have been encouraged by what we have been able to do with safe, non-volatile chemicals. Our ditches look better; they will carry a greater volume of water. And we have been able to achieve the improvement without increasing costs to the taxpayer. We have had a good, positive reaction from the public. We intend to keep it that way.

Management Factors Affecting Sod Heating

The production of turfgrass to be sold for sod has become one of the fastest growing areas of agricultural production in Maryland, says an agronomist from the University of Maryland. Production methods have relied upon a combination of trial and error and research data on turfgrass for other uses.

"Until recently research in the area of sod production has been negligible," says Charles H. Darrah.

He conducted a study to increase the level of knowledge in the area of quality sod production. Specifically the research was concerned with post-harvest injury of turfgrass sod.

The affect of sod heating after harvest has been under investigation at the University of Maryland since the summer of 1969. Pre-harvest treatments have included different mowing heights, nitrogen rates, clipping removal, cutting depths and time of day of harvest. Each of these treatments has been evaluated for its effects on sod heating and regrowth.

Small pads of Kentucky bluegrass-red fescue sod, 18 inches by 18 inches, were harvested and stacked in insulated boxes, where they were allowed to heat for three days, reports Darrah. Temperatures were measured and recorded in two hour intervals by means of thermocouples placed in the center of the stack. At the termination of the experiment, eight inch diameter plugs were cut from the center pads.

"Plugs were then transplanted into pots filled with a sand-soil-peat mixture and allowed to grow for 20 days," says the agronomist. "At this time root and top regrowth measurements were made."

Results indicate that mowing at one inch and removing the clippings are the most effective ways to reduce sod heating injury, he reports. Close cutting and clipping removal reduced the temperature build-up and respiration rate. Top regrowth was significantly increased and root production was equal to or better than sod mowed at either two or three inches.

The researcher notes that high rates of nitrogen (2 lbs/1000) have also been shown to be detrimental to sod recovery. The rate of heating and final temperature of high nitrogen sod were much higher than sod maintained at low nitrogen levels.

Time of day at which the sod is harvested also affects temperature buildup in the stack. Temperatures between a 6 a.m. and a 3 p.m. harvest differed by as much as 10 degrees F and 101 degrees F, respectively, after only 24 hours of heating.

Darrah concludes that experiments involving cutting depth have shown one-half to three-fourths inches give optimum results. Although a no soil treatment gave root regrowth equal to that of the one-half and three-fourths inch depth, its heating rate was excessive. The average was 8-10 degrees F higher than the three-fourths inch cut. Although one inch depth of cut showed less heating, root initiation was exceptionally slow at this thickness.

Midwest Turfgrass Growers Attend Meeting In Lincoln

The third annual meeting of the Midwest Turfgrass Growers Association was held in Lincoln, Nebraska, in early January.

Elected officers are: President, William Latta, Princeton Turf Farms, Kansas City, Mo.; Vice-President, Don M. White, Iowa Nursery Sod Co., Des Moines, Iowa; Secretary-Treasurer, Claude L. Wiewel, Wiewel's Sod Farm, Inc., Quincy, Ill.

Directors for the organization are: Ed Keeven, Emerald View Sod Co., O'Fallon, Mo.; Joe McDermott, Loveland Turf, Omaha, Neb.; Mel Briggs, Briggs Sod Co., Stilwell, Kans.; Paul West, West Sod Farm, Fountain, Colo.; Norman LeGrande, Hendrick's Sod Co., Lincoln, Neb.; and, Don Hanson, Hanson Sod Co., Holdrege, Neb.

Committee reports indicated progress being made in several areas. Seed people generally accepted the full 25-grain analysis on all seed and full 50 grams on Merion. Seed specifications of the Midwest Turfgrass Growers Association are being met in full.

Ed Keeven reported that Wynard Aslin, Standardization Chairman of the American Association of Seed Certification Agencies, has specifications. He pointed out that AAOSCA had been most generous by asking for suggestions and approvel of standardization practices.

Norman LeGrande, Lincoln, Nebr., expressed concern for the effect of the Occupational Safety and Health Act on the industry. He highlighted the requirements and penalties as they apply to sod producers.

The removal of sod production acres from crop acres — no longer acceptable as set-aside acres — in the Feed-Grain Program was also discussed. A committee was appointed to investigate and recommend possible steps that might be taken by the Association to correct the situation.

Agrico Moves Sales Division to Memphis

B. J. Farmer, Jr., vice president of Marketing for Agrico Chemical Division, Continental Oil Company, has announced the transfer of the Turf and Garden Products Sales Division headquarters from Carteret, New Jersey, to Agrico headquarters at 5050 Poplar Avenue, Memphis, Tennessee.

Scientists Honored By Northeast Weed Society

Awards were presented for two outstanding papers at the 26th annual Northeast Weed Science Society. Honored were Madelene E. Pierce, Denise Alessandrello, A. R. Templeton and W. Hurtt.

In "A Study of Organisms Living in the Heated Effluent of a Power Plant," Madelene Pierce and Denise Alessandrello compared the flora and fauna in the heated effluent of of a power plant with that of two adjacent control areas on the Hudson River. They found that due to rapid cooling of the heated effluent entering the river, little adverse effect on the river as a whole occurred. In the area nearest the outlet of heated effluent, however, only two species of aquatic weeds were found and their distribution was limited as compared with the control areas.

Although differences in flora and fauna between the areas tested were minimal the authors warned that if the heat plumes of several closely spaced power plants were to merge, significant biological effects could occur.

A. R. Templeton and W. Hurtt reported on "the Effect of Pre-treatment Environment on Herbicidal Response and Morphological variation of Three Species." They said that plant growth habit and herbicide response were affected in all species tested. They used growth chamber, greenhouses and field locations to provide three separate sets of environments. Light, temperature and humidity recordings were made and plant responses were noted in each environment.

Plants were then sprayed with sub-lethal doses of acetic acid at different stages of growth. The authors concluded that plant responses to herbicides growth under different environments can be affected greatly by the environment.

Jacobsen Publishes Service Manual For 2-Cycle Motors

The first easy-to-read service manual entirely devoted to the subject of 2-cycle engines has been published by the Product Training Center of the Jacobsen Manufacturing Company, Racine, Wisconsin.

The manual has been designed for easy reading and quick reference for the classroom, the service shop, and the consumer.

Both vertical and horizontal 2-cycle engines are covered in the profusely illustrated 104-page book. Its subjects include: principles of operation; troubleshooting; service data; engine overhaul, and cleaning and storage. Special introductory chapters deal with horsepower, torque and speed.

According to Ronald J. Eckhardt, Supervisor of Product Training for Jacobsen, the program was developed with several groups in mind—industrial arts classes, service schools, dealer training and user orientation.

"In aiding the industrial arts instructor," says Eckhardt, "the manual would be the student's workbook."

Jacobsen expects that the 2-cycle instructional program also will be of significant help to the consumer and commercial distributor in training dealers and commercial users such as golf and parks department personnel in both operating and servicing of 2-cycle engines.

For more details about the manual, please circle (721) on the reader reply card.

ASPA Plans Canadian Summer Meeting

Canadian members of the Nursery Sod Growers of Ontario will host a major summer event for the American Sod Producers Association July 10-12 at Toronto, Ontario, Canada.

Headquarters will be the Skyline Hotel with registration and a "get-together" the evening of July 10.

The feature program will include several sod farm visits during the next two days plus a major field day with demonstration equipment. Manufacturers of sod harvesting equipment are tentatively slated to be in action.

A complete ladies program for both days is in the planning stage. Tentatively it includes a visit to Ontario place and special shopping tours.

Complete details will be announced as plans for the summer field day events are firmed up.

Vandermolen To Market New Brush Chipper

Diadem chipper, a new, compact chipper for trimmings, roots and branches up to 2½ inches diameter has been introduced by the Vandermolen Corporation of Livingston, N. J.

According to the manufacturer, the chipper can reduce a mountain of brush to a bagful of small chips. Chips make ideal mulch or ground cover.

Compactness is the key feature of the Diadem chipper. The 7 horsepower skid model measures 30 inches high by 18 inches wide. It is also available as a wheeled model. Weight is 153 pounds.

For more details, circle (723) on the reader reply card.

Florida Group Sets Trade-Education Show Date

"Better Turf-Grass for Better Ecology" is the theme of the 11th Annual Florida Turf-Grass Association's Educational—Trade Show. The educatonal and commercial exhibits as well as the meetings will be held at the Deauville Hotel, Miami Beach, Florida, May 7-10. Equipment demonstrations and the annual Scholarship Golf Tournament will be at the North Dade Country Club.

The event is a coordinated activity of the Association and the Florida Institute of Food and Agricultural Sciences, University of Florida, as well as County Extension Directors and the Extension Service of the University.

Over 700 turfgrass and ornamental maintenance oriented personnel are expected to attend this meeting. It is the only educational —Trade Show in the United States encompasing the materials equipment for management of Florida and the Caribbean turfgrasses. This rapidly populating area plus an impact of increased level of turfgrass management for better ecology in this twelve months a year of turfgrass maintenance climate has made this market one of the fastest growing in the United States.

A number of speakers are scheduled for the educational meetings, according to Dr. Bryson James, Center Director Agricultural Research Center, Ft. Lauderdale.

Cemetery operators, horticultural spraymen; city, county and state parks; schools, military and highway personnel as well as lawn maintenance contractors and golf course superintendents will be studying the more efficient, effective and economical way to do their job of producing "Better Turf-Grass For Better Ecology."

industry people on the move

GEORGE LIECHTY, named field sales manager for central and western U.S. for Hesston Corporation. **JIM BARDEN,** named field sales manager for eastern U.S. region. Will have responsibility for sales through distributors and supervising all related activities in marketing Hesston's grounds maintenance tractor.

* * *

WESLEY R. HALL becomes regional sales manager for the Weather-matic division of Telsco Industries, Garland, Tex. Will provide dealer and distributor assistance and irrigation consultation in west coast states.

* * *

JOHN BING to division manager of Jacobsen Mfg. Co. Rogers Division. He replaces C. D. Rogers. Rogers Division manufactures power sweepers, soil aerators, utility trailers and utility vehicles for off-highway use.

* * *

RICHARD W. FIELDS appointed manager, Industrial Vegetation Control Department, Velsicol Chemical Corporation to head up marketing and development of chemicals for industrial brush and weed control.

* * *

JAMES H. KELLER to serve as director of marketing for Hahn Corp. Will also assist in the design and installation of electronic data processing equipment for Hahn's three divisions.

* * *

VIRGIL MEIER joined O. M. Scott & Sons research division in the plant breeding research group at Marysville, Ohio.

* * *

ROBERT M. COQUILLETTE and **CARL N. GRAF** elected executive vice presidents of W. R. Grace & Co. Coquillette will be responsible for corporate administration and Graf becomes deputy group executive of the company's Chemical Group.

* * *

W. L. MARLOW appointed marketing manager, Seed Department, and **NICK LAZANEO** to dealer-consumer sales manager, Western Department for the Niagara Chemical Division of FMC Corporation.

* * *

CLAUDE MARSHALL joins Nunes Turfgrass Nurseries, Calif. as sales representative for the southern California area.

* * *

MILTON D. WEST becomes public relations manager for Ford Motor Company's Tractor and Implement Operations — North America. Will head up public relations programs involving Ford's line of farm, industrial, and lawn and garden tractors and equipment in U.S. and Canada.

* * *

EUGENE C. OKIN named president of Walton Laboratories, a division of Beatrice Foods Company. Will continue as vice president-marketing for Melnor Industries and vice president of Turf Irrigation.

* * *

HENRY B. TILLOTSON to director, procurement planning and research in the Toro Company's manufacturing services group. **ROBERT A. KENKEL,** former vice president for operations of Wheel Horse Products, Inc. succeeds Tillotson as director of engineering and manufacturing for Toro.

No One Answer To Pollution Solution

Getting rid of pollution in one respect often creates other undesirable effect, says an agricultural economist at Penn State University.

Dr. Donald J. Epp finds this "trade-off" between alternatives may exist in four aspects — between environmental quality and other needs, between geographical areas, within the various parts of the environment, and in degrees of environmental cleanliness.

Just as a family must sometimes choose between alternatives, society must make choices in the kinds of pollution it accepts, he said.

"I think we will face rather quickly the trade-off between environmental quality and other needs," he declared.

"As we . . . continue working on environmental problems, we must make known the alternative ways of getting whatever benefits people want from the environment. These are as important as knowledge of the standards for environmental quality," he said.

Dr. Epp described a Federal government estimate of $105.2 billion needed over the next 6 years to clean up the environment thoroughly. This amounts to about $17.5 billion dollars annually.

People will ask whether this is the best way to spend the money. They may point out that this money could double expenditures of all state and local governments for police protection, correctional institutions, and public assistance, he said.

The $17.5 billion is about two-thirds of what the nation spends annually for all public elementary and secondary schools. A two-third increase in financing for school systems might improve communities substantially. Cleaning up streams could also improve communities. The people must decide which expenditure will be made.

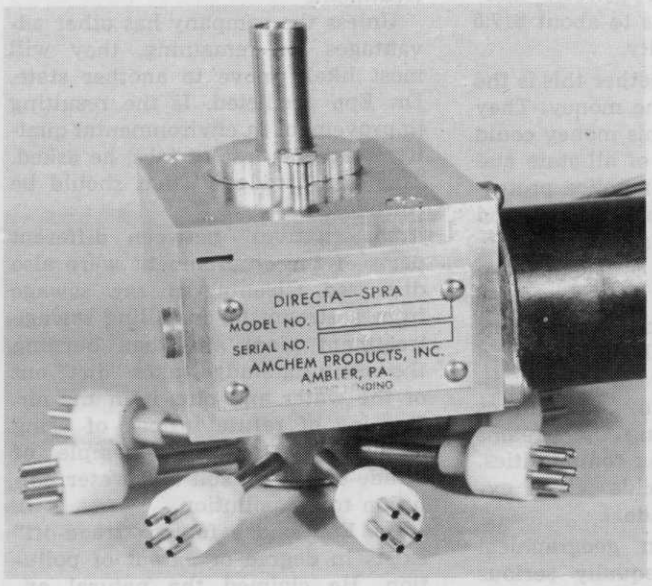
The "trade-off" in geographical areas could prove equally serious for some Pennsylvania industries, he claimed. Certain industries may be compelled to move elsewhere because of high costs required to meet strict environmental standards. Increased standards for one stream receiving sewage effluent from a paper mill will raise production costs for sewage treatment by $17.80 per ton of product. This is almost 6 times the current cost for sewage treatment.

Unless the company has other advantages for remaining, they will most likely move to another state, Dr. Epp predicted. Is the resulting improvement in environmental quality worth the loss of jobs, he asked. This is a "tradeoff" that should be considered.

"Alternatives" between different parts of the environment were also discussed. Cleaning up raw sewage from a stream by installing sewage treatment plant and then burning the resulting sludge takes "dirt" out of the water and puts it in the air. Burning of refuse instead of using land fill is another example of "trade-off" from soil and water pollution to air pollution.

Dr. Epp said a fourth "trade-off" exists in degree or extent of pollution. He claimed the natural environment consists of various degrees of cleanliness. Pollution is not strictly a man-made activity and the natural state of environment is not absolutely clean.

Man can use the environment to dispose of many waste products and the environment will clean it up—provided the system is not overloaded, he said.



DIRECTA-SPRA: Amchem Products, Inc., Ambler, Pa.

Compactness and spray drift control are the two features of this unit. It's small enough to be held in a man's hand yet capable of spraying a 20-25 foot swath. Powered by the 12-volt battery of a truck or spray unit on which it can be easily mounted with only one bolt. Considered ideal for roadsides, rights-of-ways, fencelines or other places where drift control is important. Standard or invert formulations can be applied with the Unit. For more details, circle (705) on the reply card.

TRACTOR-POWERED ROTARY LAWN MOWER: Wood Brothers, Inc., Oregon, Ill.

Three-point hitch convenience and high speed lawn mowing capability are built into this new tractor-powered rotary lawn mower. Model RM 59 has triple blades and mows a five foot swath. Unit has high suction blades and features a single V-belt drive for smoother, trouble-free operation. Standard equipment includes adjustable side skids, dual rear casters and check chains for accurate control of mowing height. For more details, circle (706) on the reply card.

CIRCULAR BRUSH SAW: Limb-Lopper Co., Inc., Santa Fe Springs, Calif.

Here's a hydraulically powered nine inch circular saw designed for brush clearance and roundover work by street maintenance and utility line clearance personnel. Mark II, Model HRSA has a 20 degree offset angled rotary saw blade that cuts at 4300 rpm and rated at four horsepower. Angled cutting head enables operator to work ground level, on slopes or overhead with virtually equal facility. Weighs only 6½ pounds. Draws power from lifts, tractor and other hydraulic power systems. Shaft lengths may be specified 48 or 60 inches insulated or 48, 60 or 72 inches aluminum. For more details, circle (707) on the reply card.

TRUCK CRANE: Weldex Corporation, Grafton, Mass.

Change a multi-man lifting job into a one man operation with this new Series T-25 truck crane. Boom can be set horizontally or raised to a 60 degree angle to give greater lift. Can be extended or retracted to meet most requirements. The worm type winch with positive self-locking can lift up to 2500 pounds with full circle swing. A standard 25 foot cable length permits maximum use as crane or as horizontal winch. For more details, circle (708) on the reply card.