for control of annual weeds and grasses, and Paraquat is applied for immediate knock-down of both perennial and broadleaf weeds. Paraquat is frequently used for right-of-way weed control, along both railroad tracks and highways, and is desirable because of its fast contact action and broad-spectrum effectiveness.

Keeping a railroad spray train running smoothly is no simple trick. Maintenance of equipment is a daily routine, and an important one; breakdowns can be extremely expensive. And the physical demands of the job are exhausting.

"Our train usually covers about 15,000 miles in a year," Shetron said. "We usually start on the West Coast, then as the weather permits, work our way across the country."

To cover those miles, his crew must stay on the road for approximately 165 days. When weather conditions are favorable, they usually run seven days a week and work as much as 15 hours a day. By the time they mix the chemicals and get started in the morning, it usually takes that long to cover the desired 125 miles.

McIntosh added that Bogle's ten spray trains covered a combined total of approximately 75,000 miles of track in 1977. It is, indeed, a big change from the time back in the 1920's when that company first strapped a pressurized tank on a flat car to spray for right-of-way weeds. **WTT**

RAILROAD RECLAMATION RESTORES INDIAN LAND

New tracks and banks of wheatgrass on both sides. Winds whip across the area at 70 mph.

This spring the Blackfeet Indians turned their livestock out to graze near Spotted Robe, Montana, on thick, tall wheatgrass grown in defiance of constant winds up to 70 miles per hour. The wheatgrass was successfully planted alongside Burlington Northern's new railroad tracks and it will provide pasture for cattle, prevent erosion, and reduce snow drifts blocking the tracks in the winter.

Such reclamation is little known, but a routine aspect of railroad construction today. When work gangs cut a new track route through the countryside, reclamation crews follow right behind to restore land and vegetation disturbed by the work.

In this instance, the reclamation crews had 116 miles on both sides of a new track from Orin, Montana, to Gillette, Wyoming, to reseed, fertilize and protect through establishment.

At Spotted Robe, reclamation stemmed, curiously enough, from an effort to help the wild winds blow even more freely. Explains Linus L. Tumbleson, BN's director of agricultural development:

"The railroad had long ago built a snowshed there, a kind of wooden tunnel, to protect the track from heavy snow drifts. But the wood had deteriorated, so the structure was dismantled and the hills on each side were leveled to let the snow blow freely and not drift on the tracks."

But that constant wind, which can hit 70 miles per hour, was the big difficulty when it came to reclamation, Tumbleson said.

"Our task was to get the vegetation started before the wind could blow it away," he said. "The natives told us we probably couldn't do it. But we did, by spreading two tons of straw mulch per acre over the entire 100 acres, after laying grass seed. To insure that the mulch would stay in place, a chisel plow was used to crimp the hay into the soil and form ridges to hold the moisture for better germination."

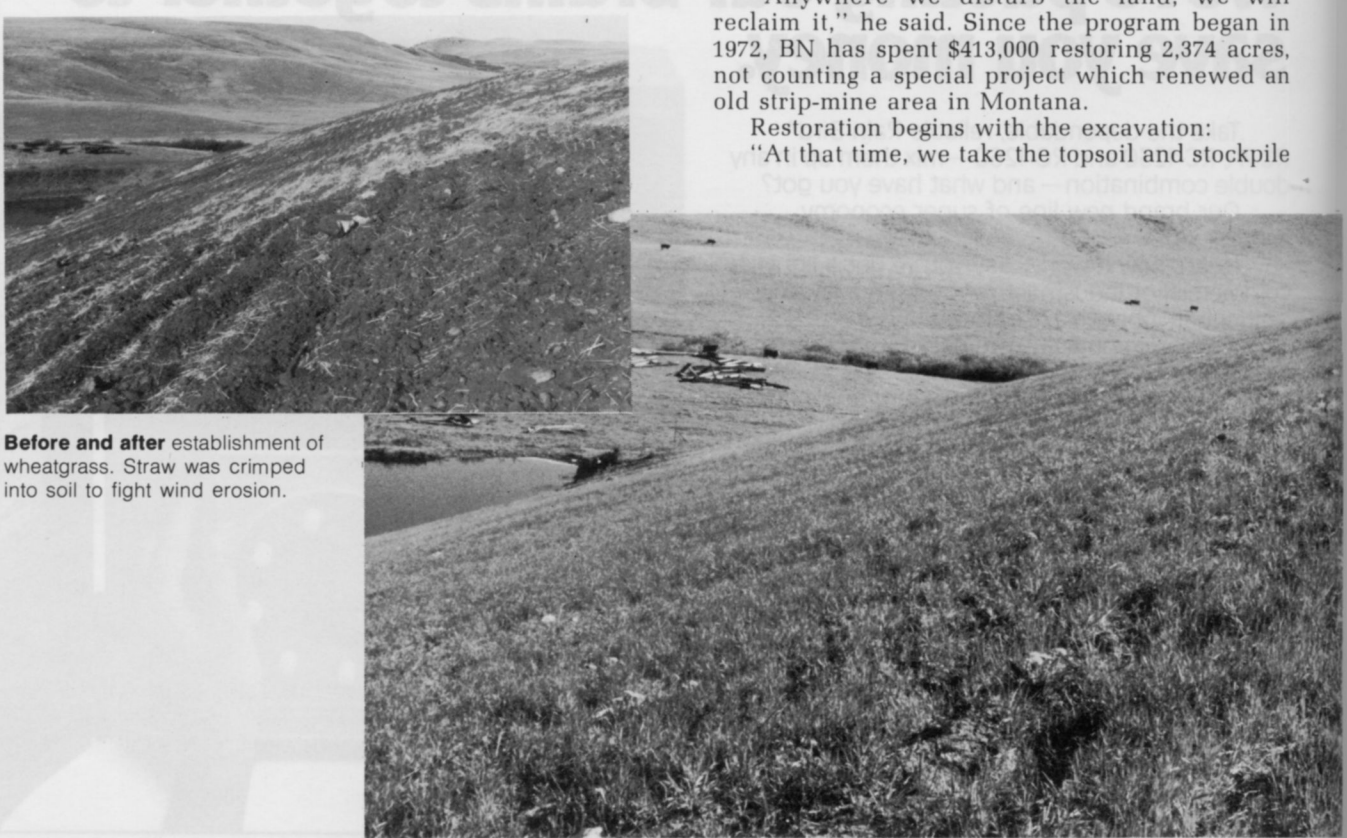
Two years after that 1976 seeding, "grass was belly high to grazing cattle," Tumbleson said. "Of all the projects we have done, I suppose I am proudest of that."

Tumbleson, who earned his agricultural degree at the University of Minnesota, supervises land reclamation throughout BN's 19-state operating region, from company headquarters in St. Paul.

"Anywhere we disturb the land, we will reclaim it," he said. Since the program began in 1972, BN has spent $413,000 restoring 2,374 acres, not counting a special project which renewed an old strip-mine area in Montana.

Restoration begins with the excavation:

"At that time, we take the topsoil and stockpile



Before and after establishment of wheatgrass. Straw was crimped into soil to fight wind erosion.

it," Tumbleson said. "Later, we will replace that to a depth of six inches, so we use the original soil for seeding."

Meantime, soil samples are sent to a scientific laboratory, such as at Montana State University, for analysis. The analysis determines the best type of grass to sow and what fertilizer will work best, among other things.

"This helps us to get the grass established as soon as possible, and we usually get better grass than was there before," Tumbleson said.

Seeding is done in several ways: by tractor-drawn seeder, by hydraulic mulchers from railroad flatcars if the land is too steeply banked for a tractor, or by plane if the area is really rugged. A combination of wood fiber mulch, seed and fertilizer is used for hydromulching.

A third of the new Orin-Gillette line has been seeded and the rest will be done as construction is completed. The line, being built to carry coal trains out of the Powder River Basin to meet the country's increasing coal needs, is to be finished this fall. One six-mile stretch of the new route, comprising a total of 200 acres, was seeded by just three workers in 2½ weeks, Tumbleson said.

One of the largest and most successful reclamation projects was at Colstrip, Montana, where huge "spoilbanks" were created by strip mining between 1923 and 1958. The goal was to create an improved habitat for native game and birds, to stabilize ground cover with good forage grass and encourage recreation. A mixture of wheatgrass, alfalfa and sweet clover was planted over the 1,000 acres, along with 2,300 trees, of 14 different species. The three-year, $660,000 project was so successful that BN recently was given the "Top Industry Award" of Keep America Beautiful, Inc., for "an outstanding voluntary effort to improve the environment and quality of life in a locale within which it operates." **WTT**

VEGETATION MANAGEMENT

By Roger Funk, Ph.D., Davey Tree Expert Co., Kent, Ohio

Q: *My supervisor and I have a difference of opinions as to fertilizing newly planted trees. In the past I have fertilized, while planting with 10-6-4 or 10-6-4 Fe. As our department is seriously understaffed, I feel it would be more beneficial to fertilize during the planting process than to put it off indefinitely. What is your opinion?*

A: We have considerable research and field experience that demonstrates the benefits of fertilizer applied to newly planted trees. However, plants are more sensitive to overfertilization during the establishment period because of their limited root systems.

Traditional fertilizers used in the tree care industry are soluble and apt to injure some roots that contact the fertilizer granules or are close enough to the granule that the soil solution is saturated with nutrient salts as the granule dissolves. With most trees that are established, this loss of a few actively absorbing roots is more than compensated for by the stimulation of new roots. A newly transplanted tree, however, has already lost a significant amount of active roots. Additional root losses through overfertilization may seriously injure or even kill the plant.

The use of slow-release fertilizers or a reduction in the recommended amount of soluble fertilizers will reduce the risk of overfertilization while at the same time stimulating new growth and reducing the time required for establishment. I suspect that the reluctance of some people to fertilize newly transplanted trees is the result of their experience with overfertilization.

Q: *Besides conventional deep-root feeding and pruning, what can be done for oaks suffering from soil compaction due to construction?*

A: Periodically test the moisture in the root zone and water whenever necessary or, if applicable, install drains.

Construction can cause a disruption in the natural flow of ground water, particularly with the installation of foundations and with grade changes, which may cause the root systems of existing trees to be subjected to unaccustomed levels of soil moisture as water is diverted either toward or away

from the root areas. In addition, compaction can interfere with water penetration and drainage.

Q: *Can you recommend a machine or system to fertilize a large number of trees in an industrial park?*

A: Applying soluble or suspension fertilizers with a soil injector is the most efficient and economical system for fertilizing large numbers of trees in a lawn situation. If a suspension fertilizer is used, mechanical (paddle) agitation in the tank is recommended to prevent settling. We have found that a foot plate on the soil injector prevents much of the arm and shoulder strain normally experienced with liquid injection.

Q: *Textbooks say that red fescues are excellent for shaded areas, but now I find that research has developed Kentucky bluegrasses which are better. Can you comment on this?*

A: All turfgrasses will grow better in sun than in shade but some are more tolerant of shade than others. The red fescues are the most shade-tolerant of the common lawn grass species. A few of the newer Kentucky bluegrasses such as 'Glade' and 'BenSun' will tolerate 60°-65° shade and have performed very well in our shade test plots. However, they did not outperform the red fescues.

Q: *I have an American elm that is 80'-90' in height and 3'-4' in diameter. I don't want to lose this tree, but I would like to put young tulip and basswood trees in this wood lot. Is there a possibility that Dutch elm disease could be brought in on the young transplanted trees?*

A: Tulip trees and basewood are not susceptible to nor are they carriers of Dutch elm disease. However, if your proposed woodlot planting would in any way weaken your American elm (for example, planting injury or increased competition) you may want to reconsider. Tests have demonstrated that some bark beetles are attracted to weakened trees and Dutch elm disease is spread by a bark beetle.

Q: *What would cause the lower outer bark to split on newly transplanted trees? These trees are approximately 12'-14' tall and have a diameter of four inches. How would I eliminate this problem?*

A: Winter injury and certain herbicides have been reported to cause bark splitting near the base of trunks of certain species. Both of these factors could cause injury of a general nature (as was apparently the case with your trees) or affect specific trees. Without knowing the species or situation, diagnosis is pure guess work.

Herbicides should be used sparingly and with caution or not at all.

For prevention of winter injury, the young trees might be wrapped with burlap or other tree wrap in late fall. **WTT**

PROSCAPE

By Michael Hurdzan, Ph.D., golf course designer and consultant

Q: *How can a home owner really have a turf disease program — self applied — with such complexities of identification, fungicide availability, and almost an after-the-fact situation? S. G. E., Allentown, PA.*

A: Properly diagnosing and treating turfgrass diseases is perhaps one of the most perplexing tasks for a professional turf manager, let alone the average homeowner. This problem is becoming more acute as plant pathologists learn more about specific organisms, fungicide resistant strains, and pathogenic complexes involving more than one organism.

At a recent Turfgrass Pathological Symposium, a speaker showed several slides of what appeared to be the same disease symptom and then explained that the typical 'frog-eye' spots were caused by 4 distinctly different fungi. The point he made so dramtically was that physical symptoms are not a reliable means of identifying the causal organism. It has been known for sometime that identification by symptoms alone has weaknesses, thus, more recently it has become vogue to attempt identification by examining diseased tissue under a microscope.

Through microsopic inspection one is able to see and identify fungial organisms by charactistics of the mycelial mass or it's fruiting bodies. However, even this technique has limitations for it presupposes if a certain organisms is present or identified, it may be the causal agent. In fact the identified agent may only be causing a secondary infection to the already weakened plant.

The only certain way to identify a disease is to isolate the probable causal factor in the laboratory and then reinfect healthy plants under the same conditions that existed during the initial infection and see if the disease re-mainfests itself. Obviously this is time consuming, expensive, and requires a great number of trained people and laboratory equipment. In time, short cut methods of disease identification will be developed so that the person in the field can make positive identification.

At this point you may be asking why should one be so concerned about such specific identification when all you really want to know is which chemical should you apply to stop the disease. The reason is certain chemicals are more effective against certain diseases then are others, and by having a specific identification of the target population, one may apply the proper chemical at the proper rate, under the proper conditions. This makes sense monetarily, ecologically and in terms of general overall efficiency. Thirdly, more fungicide-resistant strains of common disease are being identified so that the problem of applying the right chemical is critical. The fungicide that worked last month may be completely ineffective this week. With proper identification the resistant strain may be properly treated.

The professional turf manager should train himself and his crew to recognize the earliest symptoms of the diseases, to varify on a secondary basis that the suspected organism is present by microscopic inspection, and then to send a sample of the diseased tissue to a diagnosic lab. If time permits wait for the lab results. If the disease is active, the turf manager must evaluate the evidence he has and make a decision about which chemical to apply. If the disease stops, then all is well but should not be forgotten.

The professional turf manager will use the lab results to check himself and his diagnosic techniques. Thus each infection becomes a learning experience and soon his ability to make more accurate identification will improve. In addition, records should be kept on the specific disease identified, the chemical applied and it's rate, the weather conditions, and notes on the progress of the disease. With the marvel of computer science and a large number of carefully kept records, perhaps plant pathologists could develop a model that would aid in disease identification, occurrence and treatment.

For the homeowner, who was the point of this question, the problem is even more complex for he has neither the time, money, or education to properly implement a self-applied disease program. In addition, most of the fungicidal chemicals are legally unavailable to him. (Perhaps one day we will have lawn doctors who will have office hours to look at diseased samples of turf, write a prescription for a chemical cure that is filled at a garden store pharmacy, so the homeowner may legally get the fungicide for application to his sick lawn.) Therefore the homeowner must attempt to reduce incidences of home lawn diseases by practicing a total management system of preventative maintenance. These include controlling thatch by de-thatching and topdressing, planting disease resistant varieties of lawn grass, keeping fertility levels at balanced and adequate levels, controlling soil water by installing drainage and/or using proper irrigation practices, and following accepted mowing practices.

The homeowner may also employee a professional and licensed company to apply fungicide on either a preventative basis or on an emergency curative basis. But it is assumed that this company will use the same process described above for the professional turf manager and not just take the shotgun approach. Remember Murphy's Law that says "what we abuse today, will be restricted tomorrow; especially chemicals." **WTT**

In the August issue, the editor chose to remove an unscientific part of my answer on locating pipes under the soil surface. Upon my request, Shank finally broke down and agreed to print the portion of my answer which follows. If you have had any success with the art of divining, write my skeptical friend and let him know it works.

But, the easiest and fastest way of finding lost

plastic tile or pipe is to use "magic" and witch them. Most of us scoff at dowsers who claim to be able to find underground water sources using a forked stick; but don't laugh until you at least try the following method for finding tile and pipe. Take 2 pieces of steel wire (coat hangers work well) that are about 18″ long and form them into a L shape by putting a 90° bend in each wire about 6″ from the end. Now hold one wire in each hand by the 6″ section with your hands comfortably in front of you with the palms facing each other and the 12″ section of wire pointing to your front. Loosely hold the wires so that they are free to twist in your hands. Now go to a known location of a tile or water line and holding the wires as described, start back about 15 feet from the know line and walk at right angles to it. As you slowly approach the line the wires should turn freely in your hands and will cross when you are directly over the known line. Back away from the line and the wires should uncross, reapproach it again and they should again cross. Practice a couple times to get the feel of it and then set off to find illusive tile and water lines. After using the wires to find the general location, now I usually use a steel probe and I probe on 1-2″ center where the wires crossed to find the lost pipe or tile. **WTT**

I always reserve the last word. There are many respected dowsers in the world, and there are many hacks. Science just makes it easy to tell the difference. If you want to try this "magic" yourself, that's certainly your business. Just be careful when hiring someone to do it for you. Also, be careful when probing with a metal rod. Most irrigation lines also lay next to electrical lines. Older wires may not be insulated like when they were new. I hate to lose subscribers. The skeptical editor.

WT&T PRODUCTS

Turf Sweeper model 48 from Olathe Manufacturing, Inc., picks up clippings, leaves, rocks, cans, bottles, and other debris. It converts to a truck in minutes for year-round use. In addition to its functions with the hopper, model 48 also works as an athletic field conditioner, aerator, seeder, and top dresser. Features include 10 mph speed, hydrostatic drive, instant reel adjustment and rubber-fingered reels.

Circle 701 on free information card

An indoor potting soil, called Success, is a high-quality, all-purpose soil which combines five key ingredients — peat humus, vermiculite, perlite, sphagnum moss, and charcoal. The ingredients have been blended to attack the problem of root-rot caused by overwatering. The charcoal absorbs potentially harmful fluorides and chlorines from the water and also helps absorb excess salts from overfertilizing, the two primary causes of root-rot.

Success is available in four-, eight-, and 20-quart sizes from Stim-U-Plant, a subsidiary of Johnson Wax.

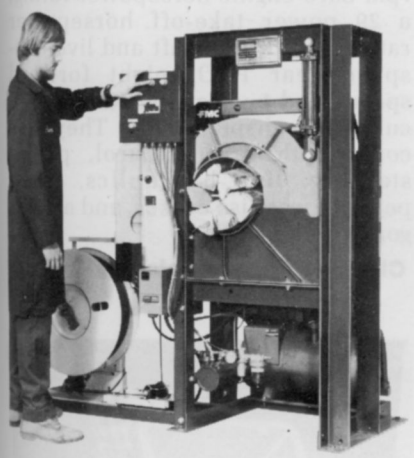
Circle 702 on free information card

The Firewood Compactor, a self-contained machine, bands logs up to 24 inches long in 12- or 17-inch-diameter bundles. Its hydraulically-powered scissors action collar compresses nested logs under 10 tons of equalized pressure. An FMC Strapper loaded with ½-inch polypropylene strapping with a burst strength of 600 pounds, securely bands wood bundles for convenient handling.

The machine's cycle is completely automatic: load in and nest wood to self-regulating capacity, press the safety controls and in 9 seconds the wood is compacted, strapped, sealed, and ejected to the front.

Specifications and a Super 8mm demonstration film are available from Carlson Systems Engineering.

Circle 703 on free information card



Ditch Witch introduces a utility backhoe module, the Model A320, which is designed for use with 30-horsepower-class R30 equipment. The backhoe fits on the front of the R30 vehicle, leaving the rear for use with trencher, vibratory plow, or Combo modules.

The A320 digs to 7 feet, 5 inches deep; its reach is 10 feet, 8 inches. A two-lever control system provides easy operation. Twelve 18- and 24-inch buckets are available.

Circle 704 on free information card

Sturdy, light utility tractors, the L345F and the L345DT from Kubota Tractor Corp. suit general contractors and city or institutional grounds maintenance. Both models have water-cooled, diesel-powered engines. The L345F has four cylinders and two-wheel drive and the L345DT has four cylinders and four-wheel drive.

Standard features include a 2,800 rpm bare engine horsepower rating; a 29 power take-off horsepower rating with front shaft and live two-speed rear PTO; eight forward speeds and two reverse; and a 90.7-cubic-inch displacement. They also come with draft control, power steering, live hydraulics, independent wet disc brakes, and a Category 1 3-point hitch.

Circle 705 on free information card

Bulkitilt BK-30 tilt truck from the Plastech Div. of Pennsylvania Pacific Corp. makes dumping simple and sure. A square tube steel frame has curved metal rockers on which the tilt truck pivots for even dumping. A stiff polyethylene body and solid phenolic wheels contribute to its strength. The BK-30 holds 1 cubic yard and measures 72 inches long by 32 inches wide by 42 inches high. It is also available in ½- and 2-cubic yard models.

Circle 706 on free information card