eliminate details which will cause troublesome maintenance in the future.

Ackerman is figuring the 1980-81 budget with a 16 percent reduction. "We are going to be hard pressed to do grounds maintenance work on areas like ball diamonds, playground equipment, and that sort of thing," he says. He will be losing 40 to 45 people for the fall/winter season and that will curtail leaf pickup and late autumn mowing.

Tree care is fairly safe of budget cuts because 90 percent of its funds come from the state Gas and Weight Tax and other reimbursements outside the city. Under the Federal Block Grant Program, Detroit can plant 20,000-25,000 trees a year along residential streets. The city contracts out tree and stump removal and tree planting.

Snow removal, ice rink maintenance, and grounds funds all come from local taxes, which will mean some drastic cutbacks. Fertilizing has been almost eliminated except in the downtown area. The two foresters have a soil sterilization program along fences which they will try to keep and have installed mowing strips under fences to prevent grass from growing.

In the past few years, the city has begun to install splash strips along roadside curbs, but not enough in Tatti's opinion. "Wherever they use salt they're killing off all the grass and plant material along the curbs. They're going to have to design splash strips all over with a little more pitch to them. It's folly to plant seed or sod in the spring and have it killed off in the winter."

Tatti began an early morning operation during the summer with a seven-man crew that was willing to work on any type of project. They started at 4 a.m., hours before the traffic began to inhibit their mobility and freedom to work. Tatti figured he covered more in three hours than a regular shift crew could do in five. Without traffic, they could park heavy vehicles on the street instead of on top of the grass.

No maintenance operation in the country is immune to the bite of inflation and budget reductions, but some have been hit harder than others. One that took it on the chin this summer is Dallas, TX, where gasoline for park and street maintenance was reduced 80 percent. Eddie Hueston, superintendent of park maintenance, said the situation caused a whole new schedule of priorities and a shakeup of traditional methods, but the final effect may be positive.

Safety items were put at the top of all priorities, followed by public health, landscaped areas that were irrigated, active recreation areas, large picnic areas, and down at the bottom was routine forestry work and mowing of median centers that weren't irrigated. Since everybody noticed the unkept medians, these became the most controversial. Hueston says, "Some of the furor may have helped the city fathers realize some areas are pretty sacred and could not be touched."

But no gas from mid-June through August also meant a total reorganization of the maintenance program. "We had to abandon our method of thinking for all kinds of maintenance," Hueston says. The first thing to do was to break down the five city districts further so there would be less travelling. In smaller parks, individual caretakers have been reinstalled to take care of the whole area and equipment has been redistributed. "We're probably getting better care of our parks now," Hueston says. "There's quite a bit of pride if one person knows that's his park."

In Dallas, gasoline for park and street maintenance was reduced 80 percent and caused a shakeup in traditional methods.

Hueston says that he actually caught up on tree maintenance in many areas, mostly in corrective tree work. "We sent people into a large park and they didn't drive around a lot to different projects but just worked right there with hand tools." The crew noticed what had to be done in nearby areas. Turf care didn't suffer much because it fell into the category of landscape areas, which were a priority.

"It made us take a real hard look at how efficient we had been," he says. "I think the overall effect caused us to look at how we were doing things and we began to look at them in a whole different manner. I think we probably trimmed down some areas better than we had been doing before. We kept better track of things because we had to account for them."

Although Hueston's department is not facing the same cutbacks for next year, it still must scrutinize how much to spend on gasoline with the possibility it may be 50 percent of the budget. He thinks it is very likely that he will continue the reorganization undertaken over the summer. He must decide what emergency measures to retain and still keep quality maintenance. It is a situation many others may soon face.

Involving the community is one way Thomas Metz, superintendent of lands and buildings of Bowling Green, OH, has received response to a lack of manpower. With only five people and some CETA workers to maintain 300 acres of parkland and plant 500 trees a year, Metz took his plight to the downtown merchants.

Since all the city's trees are bought with revenue sharing funds, the dilemma for Metz once he planted the trees, was to be able to maintain them. So he started an adopt-a-tree program. He went to the downtown merchants and asked if they would maintain, water, and keep litter from around a tree outside their business. The response was very positive and Metz estimates the success rate of trees has increased from 60 to 76 percent.

"A lot of people didn't know we existed," Metz says. He and the tree commission visited many people and issued pamphlets with their names and

Continues on page 38

TESTS INDICATE PERSISTENCE OF VEGETATION ON TOXIC SPOILS

By Paul Sutton, Professor of Agronomy, Ohio State University

Many studies have been conducted on the establishment of vegetation on acid coal mine spoils in the eastern United States. Acidity results from expc re of sulfur-containing minerals to air during the ining operation. When exposed to air and moist , iron disulfides oxidize to produce soluble sa and sulfuric acid. Exposure of toxic materials s now eliminated by selective placement of spoils during mining. Under present mining methods, the toxic materials are buried and materials suitable for vegetation, usually topsoil, are replaced on the surface.

Topsoil, limestone, and municipal sewage sludge were tested as aids in establishing vegetation on acid coal mine spoils at the Eastern Ohio Resource Development Center, Unit II, near Caldwell, Ohio. The test area was contour strip-mined for number nine coal in 1966 and reclamation grading was completed in 1967. The overburdened material consisted of soil, sandstone, and a dark gray shale. The spoil material on the surface of the spoilbank had a pH of 2.3 and was composed of sand (25.1%), silt (43.7%), clay (31.2%), and sulfur (1.5%). It contained 45.8 meq/100 g (milliequivalents per 100 grams) of exchangeable hydrogen and 6.6 meq/100 g of extractable aluminum.

The toxic materials are associated with the gray shales in the overburden between and above the coal seams. The surface layers of this spoilbank are predominantly gray shale. The spoil was very acid and initially contained a high level of soluble salts (40,000 ppm). Although the analyses indicate approximately two-thirds of the spoil was sand and silt, the material was very compact and had very poor structure. This prevented rapid infiltration of water. These dark-colored spoils may develop high surface temperatures, lethal to emerging seedlings.

It is important that these areas have good vegetative cover to prevent erosion and reduce acid mine drainage. Sediments from this area have filled nearby stream channels and road ditches. Also, leaching of salts and acid will improve the spoil if erosion is controlled to prevent the removal of the weathered materials. In a leaching study conducted in the laboratory, the spoil remained highly acid after large amounts of salts and acid had been removed. However, leaching will reduce the amount of limestome required to raise the pH to a level where plants can be successfully grown.

Paul Sutton is professor, Department of Agronomy, Ohio State Agricultural Research and Development Center, headquartered at Caldwell, Ohio. This article is reprinted from the Sept.-Oct. 1979 issue of Ohio Report on Research and Development.

Topsoil and Forages

In spring 1968, eight plots (10 ft. x 10 ft.) were established by covering the spoil with soil material having a pH of 6.5, 14.5 lb/A of available P (phosphorus), and 288 lb/A of exchangeable K (potassium). The material was an Upshur soil removed from a road bank cut. A border of wooden planks held the soil in place. Depths of uncompacted soil were 2, 4, 6, 8, and 10 inches. Plots were seeded with Kentucky 31 fescue. The following spring, Korean lespedeza and orchardgrass were also seeded.

Some vegetation was established on the 4, 6, 8, and 10-inch depths of topsoil, but a good vegetative cover was sustained only on the 6, 8, and 10-inch depths.

First year growth of Kentucky 31 tall fescue was poor and a good vegetative cover was not obtained. The second year, growth was mostly from Korean lespedeza, suggesting a need for additional nitrogen for good growth of grasses. Using topsoil with a higher organic matter content would have reduced the need for additional nitrogen. However, grass growth should not be stimulated with fertilizer nitrogen to the point where it would eliminate the legumes.

Listed in Table 1 are the pH's of samples taken in August 1978. Initially, one major concern was that the acid from the spoil would move up into the topsoil, making it too acid for plant growth. Although there has been a decrease in pH of the topsoil, there has also been an increase in the pH of the spoil beneath the topsoil. Since the forage from the plots was not harvested, it appears that some of the bases from the topsoil moved into the spoil and acid from the spoil reduced the pH of the topsoil. After four growing seasons, the plant roots were found penetrating to within one-half inch of the spoil. After 11 growing seasons, plant roots were starting to penetrate into the spoil approximately one-fourth inch. The spoil was sampled from 0 to 0.5 inches and the pH measured. The pH's (Table 1) showed an increase as compared to the check, but pH was too low for good root growth.

The change in conditions suitable for root growth when a toxic spoil is covered with topsoil appears to be rather slow. Limestone mixed into the spoil ahead of topsoiling would probably speed up root penetration. This would become a more important consideration if shallow layers of topsoil were being applied or if steep slopes were being topsoiled where a root contact between the topsoil and spoil would reduced the possibility of the topsoil sliding.

This study shows that vegetation can be established on toxic spoil by topsoiling with a minimum of 6 inches of topsoil. Erosion control would be essential when the minimum depth of topsoil is used.

Continues on page 26

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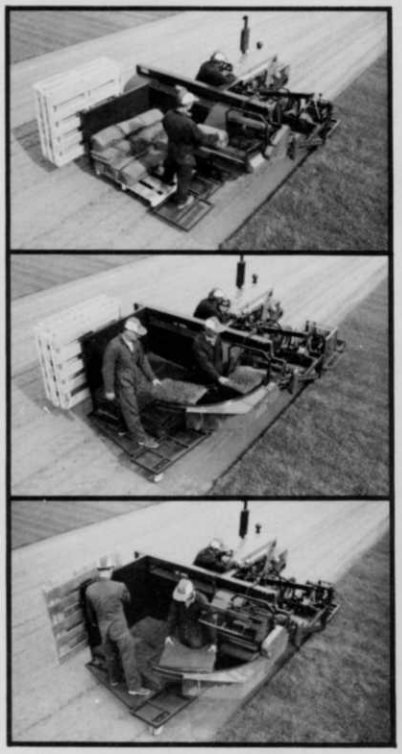

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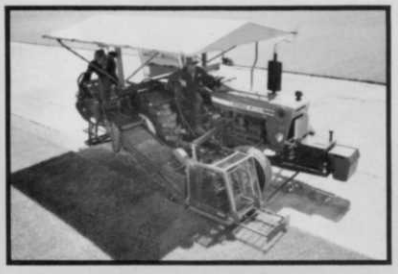

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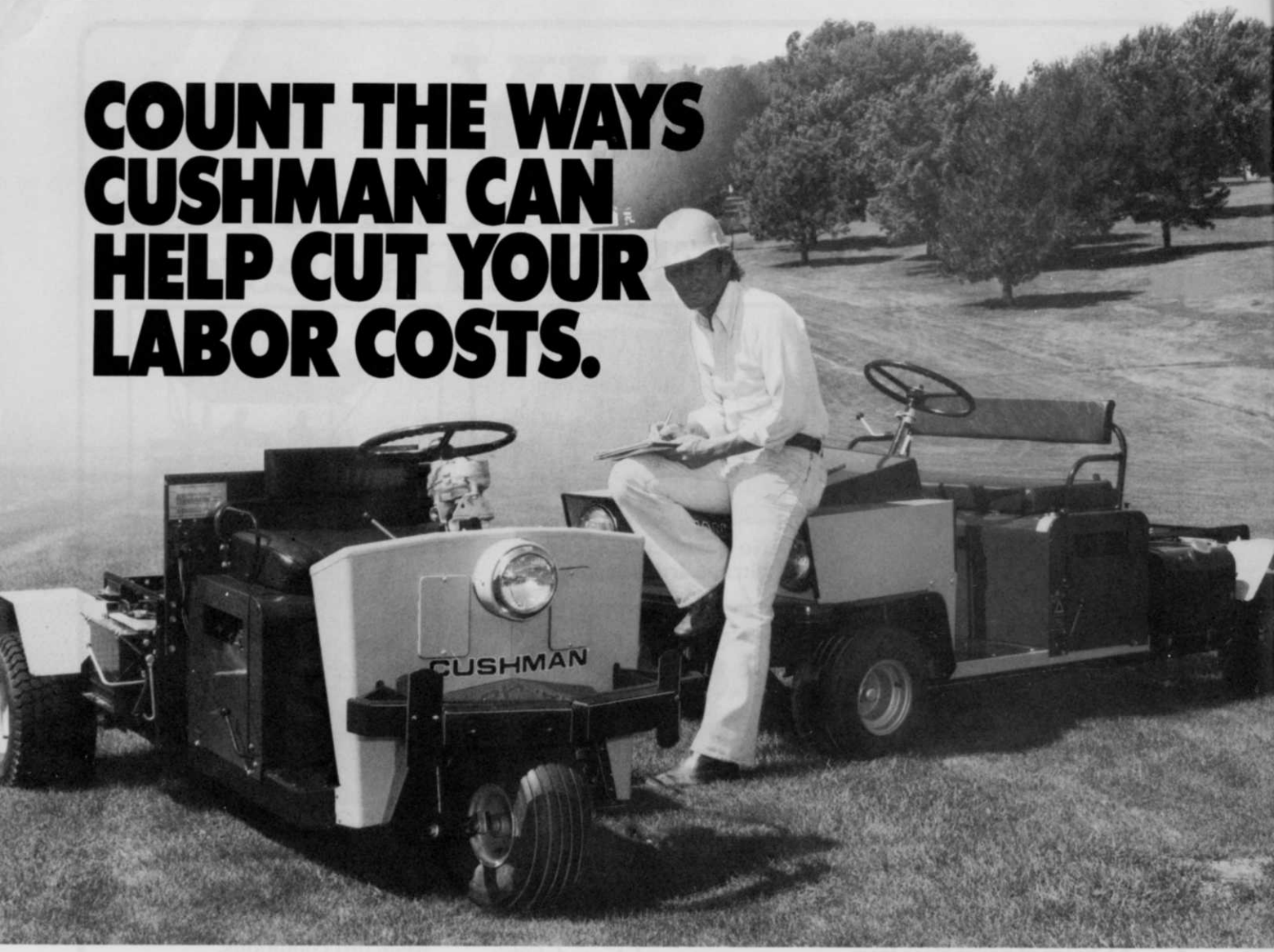

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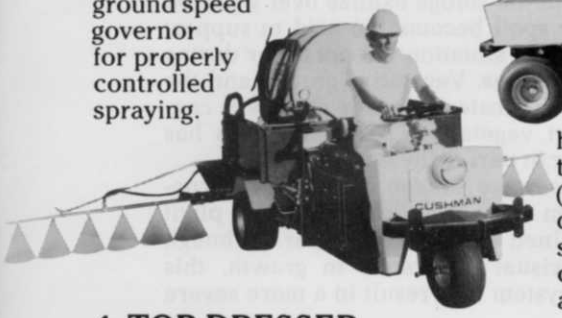

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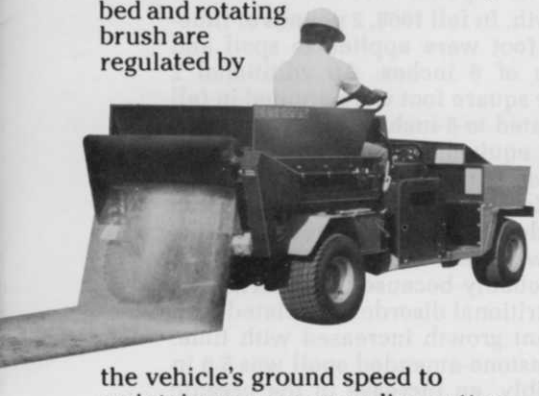

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Persistence *from page 22*

Also, the topsoil should be limed and fertilized according to soil test recommendations.

Sewage Sludge and Forages

Another study conducted on this spoil used sewage sludge to help establish vegetation. Digested sewage sludge was obtained from the Caldwell (Ohio) treatment plant. It was removed from the drying beds and applied to the spoil at the rate of 294 air dry tons per acre. One area had sludge incorporated with a disc to a depth of approximately 6 inches. In a nearby area, sludge was applied to the surface but not disked in.

Results

- at least 6 inches of topsoil is needed over toxic spoil for plant establishment
- fertilizer is necessary for initial growth
- additional fertilization is critical for growing in materials that consist largely of subsoil
- digested sewage sludge is an excellent material for reclaiming toxic spoils
- trees can be established on toxic spoil if enough topsoil is used to support root growth
- amendments should be thoroughly mixed with the spoil

In fall 1971, both areas were seeded to rye and in March 1972, Kentucky 31 tall fescue, orchardgrass, and sweet clover were broadcast seeded. The pH of the 0-4 inch layer was 5.4.

One initial question with the use of sewage sludge was: "Will the sludge oxidize over a period of time and the spoil become too acid to support plant growth?" This situation did not occur during seven growing seasons. Vegetative growth and the pH of the spoil indicates that this area will continue to support vegetation. Also, bluegrass has started to appear in part of the area.

Where the sewage sludge was not incorporated, vegetation was established but the plant roots were confined to the sludge layer. Although there was no visual difference in growth, this shallower root system may result in a more severe drought stress.

Limestone and Forages

In an earlier attempt to establish vegetation on this type of spoil, 31 tons per acre of limestone were applied but the spoil remained too acid to support plant growth. In fall 1969, 2 pounds of limestone per square foot were applied to spoil and mixed to a depth of 6 inches. An additional 2 pounds of lime per square foot were applied in fall 1970 and incorporated to 6 inches. Following these lime applications, equivalent to 87 tons per acre, the area was seeded to rye and fertilized with 544 lb/A 6-24-12. In March 1972, a mixture of Korean lespedeza, sweetclover, Kentucky 31 tall fescue, and orchardgrass was seeded. At first, plant growth was very poor, probably because of a shortage of moisture and a nutritional disorder associated with the acid spoil. Plant growth increased with time. The pH of the limestone-amended spoil was 5.6 in August 1978. Possibly, an increase in the organic matter of the spoil, resulting from the decay of plant roots, increased water infiltration and moisture availability.

When limestone is added to toxic spoil for establishing vegetation, a sufficient amount must be added to neutralize both the spoil acidity and the acid spoil. Plant growth increased with time. The pH of the limestone-amended spoil was 5.6 in August 1978. Possibly, an increase in the organic matter of the spoil, resulting from the decay of plant roots, increased water infiltration and moisture availability.

TABLE 1—The pH Values for Topsoil and Spoil with Different Treatments.

Treatments	Topsoil	Spoil 0-4" Under Topsoil	Spoil 0-0.5" Under Topsoil
	pH	pH	pH
2 inches topsoil	2.8	2.9	—
4 inches topsoil	4.5	2.8	—
6 inches topsoil	5.2	2.7	2.8
8 inches topsoil	5.5	2.9	3.0
10 inches topsoil	5.7	2.9	3.6
Check		2.4	

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- ☐ Industrial Park Grounds Maintenance
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- ☐ Hospitals, Nursing Homes, (grounds maintenance)
- ☐ Schools, Colleges and Universities (grounds maintenance)
- ☐ Athletic Field Management
- ☐ Airport Grounds Management
- ☐ Military Installation Management
- ☐ Land Reclamation/Erosion Control Specialists
- ☐ Lawn Care Company
- ☐ Lawn Maintenance Company
- ☐ Landscape Contractor
- ☐ Landscape Architect
- ☐ Sod Grower
- ☐ Seed Grower
- ☐ Tree Service Company/Arborist
- ☐ Wholesale Nursery
- ☐ Tree Farm
- ☐ Dealer/Distributor.
- ☐ Other (Specify) _____

D

Topsoil and Trees

A study was conducted to establish trees on the outer slope of a toxic spoil by making holes approximately 12 inches in diameter and 15 inches deep. The holes were filled with soil and one-year-old black locust and European black locust and European alder trees were planted in spring 1969. Initial tree survival was good but growth was poor. After 10 growing seasons, the roots are confined to the soil material and the trees have made very little growth. In some cases, there was movement of acid into the soil and the trees died.

This method could be used if large enough holes were made to give a sufficient volume of soil for root growth to support the trees. In another area where 18 inches of nontoxic spoil were used to cover toxic spoil, trees have made relatively good growth and cover over a period of 8 years.

Summary

At least 6 inches of topsoil cover over toxic spoil was needed for establishment of healthy plants. Initial growth of grass without the addition of fertilizer was poor. This emphasizes the need for fertilizing in accordance with soil test recommendations. Also, maintenance applications of fertilizer may be needed to maintain a good vegetative cover. The need for additional applications of nitrogen will be critical where the forage stand consists of grasses growing on materials that largely consist of sub-soil.

Excellent plant growth was obtained with 294 tons per acre of air dry sewage sludge. Because of varying composition, each source of sewage sludge must be evaluated to determine its value in reclamation. If sludge does not contain substances detrimental to plant growth, it is an excellent material for use in reclaiming toxic spoils.

When sufficient quantities of limestone are added to neutralize most of the acidity, vegetation can be established. When large quantities are added, the limestone should be thoroughly mixed with the spoil to obtain a uniform pH throughout the mixing zone. Also, the area should be fertilized according to soil test recommendations. Regular soil tests used for undisturbed lands will not measure the acid-producing potential resulting from unoxidized sulfur in spoils. Direct oxidation of reduced sulfur to acid with hydrogen peroxide has been used to evaluate the acid potential of spoils.

Trees can be established on toxic spoil if a sufficient volume of topsoil is used to support root growth. Drainage should be good or acid seepage into the root zone may reduce growth or even Kill the tree. **WTT**

VEGETATION MANAGEMENT

By **Roger Funk, Ph. D.,** Vice President Research and Development,
The Davey Tree Expert Company

Q: *How do you tell maple wilt from maple decline? Is there anything you can do to treat these diseases?*

A: Maple wilt is caused by the fungus *Verticillium albo-atrum* and is first evidenced by the sudden wilting and dying of leaves on individual limbs. Sometimes the wilting is preceded by a slight yellowing of the leaves. The sapwood may be discolored (olive-green), particularly near the base of the tree. However, since other fungi may cause a similar staining, a positive diagnosis can be made only by culturing the discolored tissue.

Infected trees may die within a few weeks or over a period of several years depending upon the degree of infection and whether the infection occurred through the roots or branches. Occasionally an infected tree will recover and "wall off" the infection with subsequent new growth.

Treatments with high nitrogen fertilizer in the spring have reportedly aided the walling-off process by stimulating new growth.

Maple decline is not associated with any particular insect or disease but apparently is caused by environmental and other abiotic factors. Among those suggested to trigger the decline are drought, road salt, mechanical injury and nutrient deficiencies. Other problems such as root rot are thought to be of a secondary nature.

The symptoms are twig and branch dieback involving initially the upper crown, premature fall coloration, chlorosis, scorch and leaf dwarfing. Sugar maples are more often affected than other maple species and appear to be especially susceptible along roadsides.

Fertilization with high nitrogen fertilizer often dramatically improves declining maples, particularly when supplemented with trunk injections of manganese salts. Of course, if road salts are involved, any action which would reduce the salts in the root area would be beneficial.

Q: *I have a myrtle bed where one-third of the plants are rotten or loose from the ground, needing to be raked out. Why is so much of the planting dead or loose? There has not been any change in bedding conditions.*

A: Assuming the myrtle to which you refer is *Vinca*, we have had reports of cases of both canker *(Phoma exigua)* and root rot *(Pellicularia filamentosa)* in your area of Pennsylvania. Both of these diseases can cause a dieback or decaying of stems and are usually more prevalent during rainy periods of the growing season.

Recommended controls include the removal of infected plant parts and a periodic soil drench with benlate (benomyl). Root rot is difficult to control in established plantings. Check with your local extension agent and/or refer to the product label for use and timing instructions.

Q: *Many so-called "tree surgeons" make much of their living from "topping" trees, even though they are aware that the practice is unsound. These specialists often perform this service at the request of ill-advised or uninformed homeowners. Can you recommend a way to eliminate this senseless tree butchering without hurting the income or reputation of tree surgeons?*

A: Topping not only is aesthetically unattractive but also results in weak crotches and a greater potential for decay in the "nests" of branches.

Topping requires less skill and time than selective pruning and allows an untrained person to "trim" a tree for less money than a more knowledgeable tree surgeon. Unfortunately, many homeowners are unable to appreciate the quality difference and judge service by the size of the bill.

We all need to do a better job of educating our industry as well as the public. Organizations such as the National Arborist Association (NAA) and the International Society of Arboriculture (ISA) help to set industry standards and promote public awareness. On a more local basis, each of us can become involved in community activities involving tree planting and maintenance, and participate in civic and garden club programs.

Q: *I have a garden center and during the summer I have to weed every ten days. I want to eliminate this as it can become very expensive. I keep the plants above ground, but what can I use to prevent weeds from coming up?*

A: Without knowing the major weeds or the nursery plants involved, I cannot recommend herbicides for application around a variety of existing plants.

Prior to bringing in the nursery plants, the area could be treated with an herbicide such as Roundup which would kill existing weeds but would not affect subsequent weed germination. Soil fumigants such a methyl bromide could also be applied and would control most weeds for a season. However, fumigants are dangerous and expensive to use and should be handled only by professionals.

Possibly the best solution would be to cover the area with black plastic and a light topping of organic mulch to provide a surface suitable for foot traffic.

Q: *What causes spit spot on oaks?*

A: We have not had many reports of spit spot, but in most cases it was associated with large, recently transplanted pin oaks. Generally, it appeared as small spots of froth or foam on the trunk and disappeared as the tree became established. To date we have been unable to associate an insect or disease with the spots. Perhaps one of the readers has a suggestion. **WTT**

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PRODUCTS

Compact Diesel Tractors: Versatility Plus Durability

Engineers have combined the versatility of the compact tractor with the durability and strength of the diesel engine to produce a useful professional tool.

These tractors, usually in the 16 to 30 h.p. range, provide landscape firms, industrial groundskeepers, and large estate and school maintenance supervisors with a front line or backup tool that has great flexibility and ruggedness. In times of tight budgets, such a tractor and its attachments could substitute for a single-function device and provide a backup for existing machinery during maintenance or repair.

The versatile, compact tractor is receiving serious attention by tractor manufacturers as one of the biggest growth markets in the equipment business in the next five to ten years. The lawn and garden tractor has

grown up into a professional grade machine.

Typical versatility with available attachments includes:

—reel, rotary, and flail mowing
—tilling and cultivating
—raking
—trenching
—discing
—posthole digging
—snow throwing
—backhoe and loader use

Bolens division of FMC Corp. and Iseki have combined resources to produce a line of water-cooled diesel tractors in the 15 to 24 h.p. range. All models are powered by four-cycle, two-cylinder water cooled diesel engines. The largest, 24-h.p. model, the G244 weighs 1,900 lbs. and is approximately four ft. wide and nine ft. long with a 58 in. wheelbase. The tractor includes a three-point hitch, hydraulically activated, and a two or three-speed PTO. A full line of attachments are available from Bolens. Available with switchable four-wheel drive.

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John Deere offers three diesel-powered compact tractors from 22 to 33 h.p. Called 850, 950, and 1050 models, the tractors are powered by

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