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SOIL HEALTH

Know your soil

Realizing the importance of healthy soil can help you diagnose and treat its problems

BY JOHN FECH

S

oil is the lifeblood of landscapes. Even though it provides nutrients and water and serves as anchorage for plants, it's taken for granted and commonly overlooked by the general public and landscape professionals alike. This article will point out the fallacy of that assumption and show that soil is one of the most important components of a healthy landscape.

Good soil/bad soil

Good soil is so crucial to landscape health that it's usually the first factor I consider during pest diagnosis inspections. A soil probe, bucket and screwdriver are helpful in determining soil attributes and how it stacks up against the ideal. Trees, shrubs, annuals/perennials, grasses, bulbs and groundcovers growing in well-drained, fertile, slightly acid soils normally perform well, with attractive flowers and green leaves, providing beauty and function for the property.

When plant roots are forced to grow in poor soils, they not only grow slowly and develop abnormally but are susceptible to insects and disease infestation. Pests are repeatedly attracted to weakened, stressed out turf and ornamentals. The same is true in the animal kingdom; when watching one of those animal shows on The Discovery Channel, you learn that the lioness always sets her sights on the sickest or oldest wildebeest. As such, good soils are a hallmark of Integrated Pest Management, as trees and turf growing in a healthy medium will be able to resist a higher level of pest activity than weak ones growing in poor soils.

What's the problem?

So why do we have this problem of poor soils — soils with extreme pH, heavy clay, excessively well-drained, low on nutrition — in the first place? Many fingers can be pointed at the housing and construction industry because construction disturbs soil dramatically. It seems the larger the equipment, the more the soil is messed up.

The two most common disruptions are soil profile changes and soil particle compaction. When a basement is dug or extensive grading is performed, soil that was in one place is moved to another. Careless equipment operators often bring subsoil to the surface and redistribute it as a final grade for the landscape professional to use for plant installation. Subsoil is low in fertility and is usually either sticky clay or rocky chunks, neither of which support good plant growth.

Conscientious construction companies direct their operators to remove the topsoil for stockpiling off-site, then excavate what's needed for the basement. After the rough grade, the topsoil is then redistributed and spread out, and the final grade established. If soil profile changes aren't to blame for poor soil, it might be compaction, which is caused by heavy construction equipment pressing soil particles together and eliminating essential voids, or air spaces. These air spaces provide oxygen to the roots and avenues for excess water to drain out of the root system. Compaction is more likely to occur if the soil is wet when the equipment moves over it and/or if it's mostly comprised of clay or silt.

Let it drain Ideally, soil would be comprised of half air spaces and half mineral

RAISING PH WITH LIMESTONE

(pounds of ground limestone per 1,000 sq. ft.)

<table>
<thead>
<tr>
<th>change in pH desired</th>
<th>sandy soil</th>
<th>silty soil</th>
<th>clay soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.5 to 6.5</td>
<td>50</td>
<td>160</td>
<td>200</td>
</tr>
<tr>
<td>5.0 to 6.5</td>
<td>40</td>
<td>130</td>
<td>150</td>
</tr>
<tr>
<td>5.5 to 6.5</td>
<td>30</td>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td>6.0 to 6.5</td>
<td>15</td>
<td>50</td>
<td>55</td>
</tr>
</tbody>
</table>

LOWERING PH WITH SULFUR

(pounds of elemental sulfur per 1,000 sq. ft.)

<table>
<thead>
<tr>
<th>change in pH desired</th>
<th>sandy soil</th>
<th>silty soil</th>
<th>clay soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.5 to 6.5</td>
<td>45</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>8.0 to 6.5</td>
<td>30</td>
<td>35</td>
<td>45</td>
</tr>
<tr>
<td>7.5 to 6.5</td>
<td>10</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>7.0 to 6.5</td>
<td>3</td>
<td>5</td>
<td>7</td>
</tr>
</tbody>
</table>
Masonry work, especially around the foundation of a house, can cause problems with soil pH.

components. When compaction occurs, soil particles are pressed together, causing just about anything with a root to suffer. Why?

All plants have an optimal amount of water and air they need for root growth. In poorly drained soils, the voids between soil particles fill up with water faster than it can flow out, and the roots don't get the oxygen they need. If this condition continues for an extended period, the roots will rot or stop growing, causing the plant to wilt or take on a scorched appearance.

Another common drainage issue is that of the perched water table, which occurs when horizontal layers of soil are created, each with different soil characteristics such as organic matter, large air spaces, clay content and pH. The most dramatic difference is when a layer of soil with large air spaces exists over one that has small air spaces. The laws of soil physics prevent water from the top layer to pass quickly into the second layer. Instead, the rate of downward water movement is dramatically slowed, forcing most of the water to rise vertically.

The downside to a perched water table is that the roots are wetter than they need to be, and they decline. Ironically, this is what happens when misguided landscape professionals add a layer of compost, sand or peat moss on top of a heavy clay layer in an attempt to improve the site's drainage. "Fixing" these problems is discussed under the section on soil modification at www.landscapemanagement.net.

Good soil mix

Over the years, various soil types' attributes have been fairly well-documented. Clays hold water and nutrients tightly, and tend to produce fertile landscape soils that drain continued on page 44
Construction activities can cause pH changes as well as soil compaction and layering. This creates difficult growing conditions for turf and landscape plants near the foundation of a building or house where considerable amounts of concrete, gypsum and other materials can accumulate.

continued from page 43

poorly. Sandy soils allow for excess water drainage, yet can cause plant stress from drought and lack of nutrients. Silty soils are somewhere in between these two extremes, usually on the clay side in terms of drainage and nutrient-holding capacity.

Extreme soil types present challenges to landscape professionals, but soils with low levels of organic matter pose even more difficulty. Organic matter is deposited in soils over time, filtering in from the decomposition of tree leaves, thatch and other plant remains. It serves as a loosening agent in heavy soils, and a holding agent in well-drained soils. A desirable level is between 3%-5% of the total soil volume.

The relative alkalinity or acidity (soil reaction) of a soil is another component to consider. The optimal level of pH for most landscape plants is between 6.0-6.7. Exceptions include clematis, azaleas, holly, rhododendron, blueberry and many conifers, but for the most part, optimal growth is observed when the level is slightly acid or neutral.

It's common for construction activities to cause pH changes as well as soil compaction and layering. This can create difficult growing conditions for turf and landscape plants near the foundation of a building or house, where considerable amounts of concrete, gypsum and other materials being mixed can spill. These building products tend to be alkaline, and can create "hot spots" in soil, especially in the areas where portable concrete mixers and wheelbarrows were parked.

At pH levels above or below optimal, certain nutrients such as iron, phosphorous and manganese become unavailable to plants. Plants growing in soils with these pH levels appear stunted, chlorotic or misshapen and distorted. The classic problem of pin oak chlorosis falls into this category, with high pH soils tying up the iron needed by the plant. The result is yellow leaves produced on stunted-looking stems. Left unchecked, many plants suffering from iron chlorosis eventually die.

Soil modification

If your soil isn't up to snuff, you may want to offer soil modification. More details are available on-line at www.landscapemanagement.net.

— John Fech is a horticulture educator for the University of Nebraska Cooperative Extension.

Visit our Web site's "This Month's Features" page for specific details on how to modify your customers' soil through aeration, drainage, pH and fertility.
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Efficiency is key to profitable cleanup

BY CURT HARLER

Mike Gilmore, owner of Growing Solutions, Lutherville, MD, knows a landscape professional makes money only when moving quickly from one job to the next.

Gilmore's company can aerate and clean 25 acres a day. He runs two Deere TC125 material collection systems behind four aerators. He'll likely obtain a third TC125 next season. "It's a great machine with simple setup. It does an effective job," Gilmore says.

Gilmore, partnering with a designer on Maryland's East Shore, is developing a machine that shreds the aerator plugs and blows the mulch out the back. "That would make the job even quicker," he says.

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The FLGR-62 model of the new Grapple Rake from Worksaver, Warsaw, IN mounts to a tractor and comes standard with 1-in. pin-type mounting channels. The SSGR-62 for skid steer loaders uses the "universal attach" system for quick installation. Circle #272
Yucky yucca
Two years ago I removed an overgrown and diseased Yucca plant from a flower bed, but it keeps growing back. On two different occasions I dug deep down to remove the thick, fibrous roots, but I guess I didn’t get all of them out because the plant shot up out of the ground again after just a few weeks. Can you recommend a product that will kill the roots?

— IL

Consider using a systemic herbicide such as Roundup or a contact herbicide such as Finale on actively growing green plant tissue. Since the active ingredient may have difficulty penetrating into a succulent plant such as yucca, you may also want to consider Accord SP. This product contains the same active ingredient as Roundup with a proprietary surfactant that aids in penetration. Thorough coverage is important. Repeat treatments as needed. You could also dig as you have done before or use a stump grinder to destroy the roots.

Controlling oxalis
Our small lawn care company uses a dry fertilization program. For weed control, we want to spot treat with herbicides. Is there a pre-emergent herbicide that would help us control oxalis?

— IN

Oxalis is a weed that’s difficult to manage. Spot treating oxalis with herbicides is difficult because it produces many seeds during the growing season, which, when mature, spread by bursting the seedpod. This process gradually spreads the weed plant outward from its mother plant. Even seeds that don’t immediately grow into weed plants are a threat as they can remain viable in soil for 15 to 20 years. You’ll need repeat applications of selected herbicide.

The success of spot treating hinges upon periodic inspection and treatment as needed by a professional lawn care operator. Consider using a pre-emergent herbicide such as Dimension, Pendimethalin or Gallery as the weeds germinate.

Recognize that weeds are opportune pests. They appear for a reason. Poor density and turfgrass health quality can open up weed establishment areas. Therefore, note lawns with a history of oxalis and consider treating with herbicides as needed in the spring.

Spruce tree trouble
A large number of spruce trees we planted in June 2000 did fine until winter, when some needles turned a pale color and others brown. We’re afraid some of the trees may not survive. Any idea what may be the problem? Do you have any tips for helping them?

— MI

Based on your description, the problem appears to be related to transplant shock. Digging and transplanting causes trees to lose a large amount of functional absorbing roots, which leads to water and nutrient uptake problems. This can be further aggravated by too much or too little moisture, including flooding and/or drought. Absorbing roots are the mechanical

pumps, and if they’re broken or diseased they become dysfunctional. This disruption and imbalance in water uptake results in plant tissues drying out, which can be made worse by wind and excessive evapotranspiration from exposed plant parts.

Remember that a transplanted plant such as a Christmas tree may look green for awhile, but that’s only because it’s using its reserve water and nutrients.

Make sure these plants aren’t overfertilized, particularly with a water-soluble source of quick-release fertilizer. Improper fertilization with high salt index can burn some of the absorbing roots. Also, mulching too close to the trunk encourages rodent feeding activity and excessive moisture retention. Examine the roots for decay caused by root rot fungal disease.

Weird fungus
One of my customers has a weird fungus on his lawn that looks like small, white, fluffy tufts sitting among the grass blades. Any idea what this could be?

— PA

The problem appears to be related to a fungal disease called slime mold. This normally grows on grass blades and produces fruiting bodies as it matures. They don’t cause too much harm to turfgrass. It is often more of an aesthetic problem. Sweeping and hosing with water will reduce the problem.

Manager of Research and Technical Development for the Davey Tree Expert Co., Kent, Ohio

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5. E Irrigation Services  26. J Turf Weed Control  41. O Other (please specify)

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○ Yes  ○ No

**5. Do you have Internet access?**

○ Yes  ○ No

**5A. If so, how often do you use it?**

○ Daily  ○ Weekly  ○ Monthly  ○ Occasionally

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   22  ○ E Turf Fertilization
   27  ○ K Paving, Deck & Patio Installation
   18  ○ B Turf Insect Control
   23  ○ O Turf Disease Control
   28  ○ L Pond/lake Care
   19  ○ C Tree Care
   24  ○ H Ornamental Care
   29  ○ M Landscape Installation
   20  ○ D Turf Aeration
   25  ○ I Landscape Design
   30  ○ N Snow Removal
   21  ○ E Irrigation Services
   32  ○ O Landscape Installation

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4b. If yes, indicate which products you buy or specify:  (fill in ALL that apply)
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   33  ○ 2 Blowers
   34  ○ 3 Chain Saws
   35  ○ 4 Chipper-Shredders
   36  ○ 5 De-icers
   37  ○ 6 Fertilizers
   38  ○ 7 Fungicides
   39  ○ 8 Herbicides
   40  ○ 9 Insecticides
   41  ○ 10 Line Trimmers
   42  ○ 11 Mowers
   43  ○ 12 Snow Removal Equipment
   44  ○ 13 Sprayers
   45  ○ 14 Spreaders
   46  ○ 15 Sweepers
   47  ○ 16 Tractors
   48  ○ 17 Truck Trailers/Attachments
   49  ○ 18 Trucks
   50  ○ 19 Utility Vehicles

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