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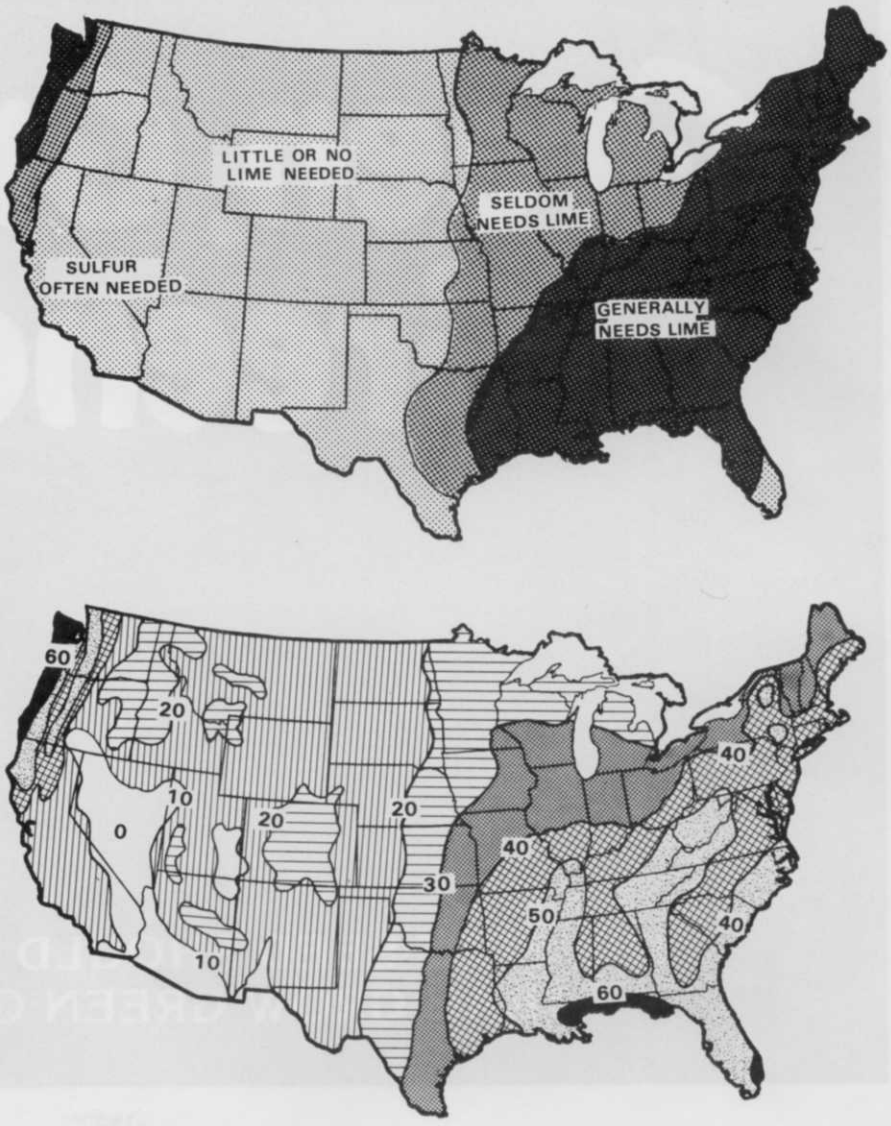
THE GREENER KENTUCKY BLUEGRASS

more alkaline, the higher the pH. The number 7 is considered neutral and is also the optimum pH for growing turfgrass. Many things can cause soil pH to change; irrigation water of a different pH and materials containing sulfur such as ammonium sulfate. Soils containing large amounts of clay and organic matter tend to be acid. Periodic applications of limestone may be necessary for these soils. Excessive acidity reduces the amount of available phosphorus in the soil, reduces the activity of beneficial soil organisms, and increases the ionic concentration of potentially toxic minerals such as aluminum and manganese. Secondary effects include poor rooting, increased thatch accumulation, and reduced turfgrass vigor. Due to the effect on rooting, pH should be checked prior to seeding or sodding and corrected. Acid rain is a possible source of acidity.

Alkaline soils are usually associated with areas that have saline ground water, low rainfall, or are waterlogged. Overuse of lime can cause alkaline soil conditions. Alkaline soils restrict the utilization of iron, manganese, copper, zinc, and boron by turfgrass. Sulfur or fertilizers containing sulfur can be used to neutralize alkaline soils.

Saline soils are associated with areas of low rainfall where soluble salts have not been sufficiently leached out over time. They tend to be present in the ground water making irrigation with it little help. Irrigation with collected rainwater or use of salt tolerant turfgrasses are the only practical remedies. In the same general category are sodic soils which contain high levels of soluble sodium. Sodium has a detrimental effect on soil structure causing the breakdown of aggregates and clay particles. Application of gypsum can improve sodic soils.

The most complicated phenomenon of soils is the cation exchange capacity. Basically, chemical reactions involve the attraction of positively charged molecules (cations) to negatively charged molecules (anions). Plants require positively charged molecules of elements to carry out basic processes, such as calcium and potassium. The plant depends on the soil to hold these cations until it can use them. The ability of the soil to exchange a cation of its own for one of benefit to the plant is termed cation exchange capacity. The type of soil, texture, and organic matter content effect cation exchange capacity. Addition of organic matter increases the cation exchange capacity of the soil. The higher the cation exchange the better the soil holds onto valuable nutrients. Leaching is reduced in these soils.



Acidity and alkalinity *of regions in the U.S. (top) is closely related to average rainfall (bottom). Nutrient availability changes with soil pH.*

There is no one preferred CEC. It varies according to the type of clay, organic content, and other components. If correction was advised, addition of organic matter would be the likely solution.

To provide the best environment for seed or for sod rooting the soil should contain appropriate nutrients, be neutral or slightly acid (6.5 pH), have an acceptable CEC, contain aggregates by cultivation and moderating or eliminating sodic conditions, and organic content of at least 20 percent. Best results with sod rooting are obtained by purchasing sod grown on approximately the same type of soil as the site. Most sod is grown on muck soil. Decomposed organic material is preferred for amendment since decomposition of the organic matter consumes nitrogen that could be utilized by the turfgrass. Material should be composted before use.

To improve heavy clay soils, coarse sand can be mixed with the clay and organic matter to lower the clay content to 75 percent if possible. Calcined clay will also contribute to better water characteristics of soils. Sand and calcined clay can improve silty soils as well.

Sandy soils require the addition of clay and organic matter. Clay content of at least five percent is

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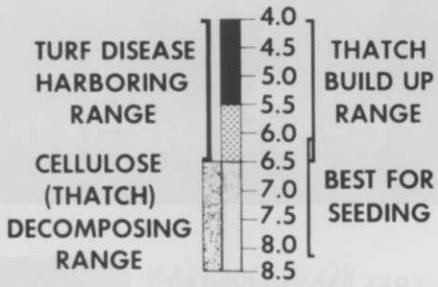

desired. Fine sand content should be reduced as much as possible.

The perfect soil has never really been determined. The United States Golf Association recommends that pore space should be in the range of 40 to 55 percent. Since the size of sand, clay aggregates, and organic material varies, arriving at one combination is impossible. California research has indicated a mixture of 85 percent sand (.25 mm and bigger), 7.5 percent clay, and 7.5 percent peat is successful. That is an impractical amount of sand in the case of soil modification.

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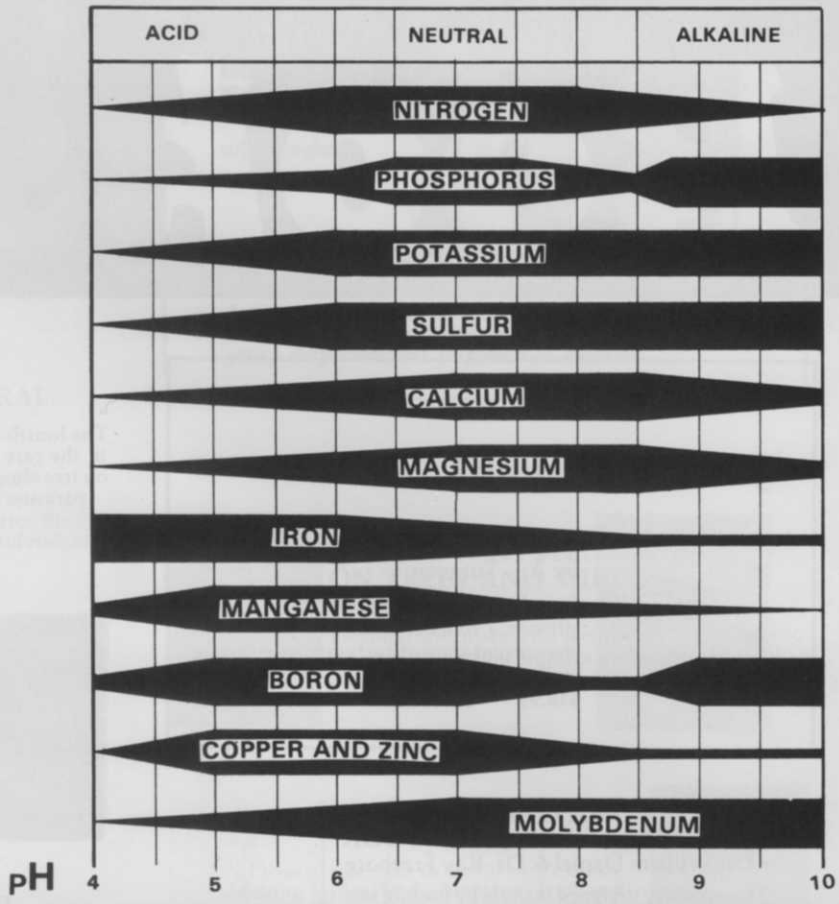

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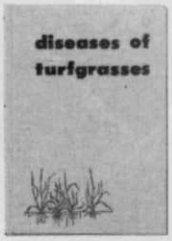

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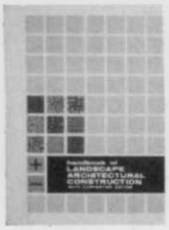

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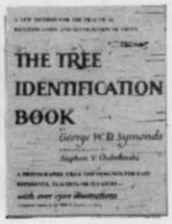

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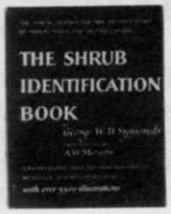

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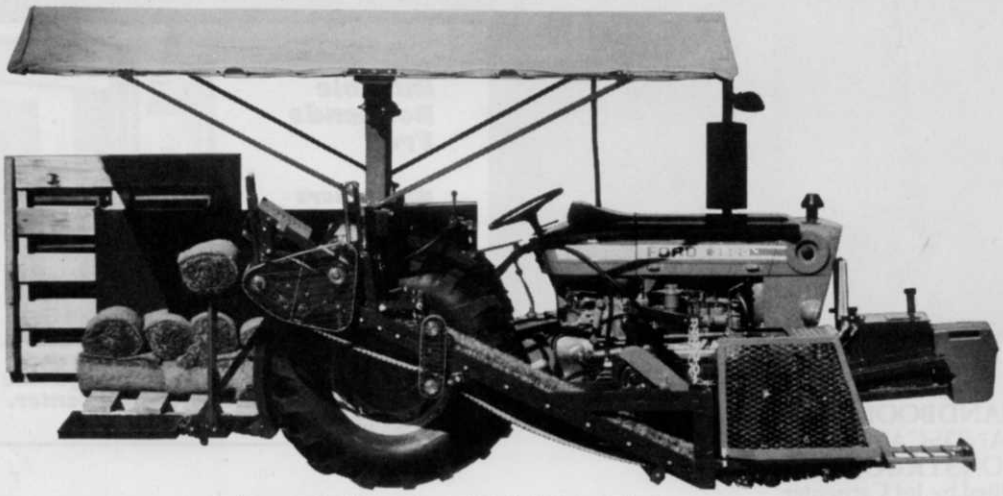

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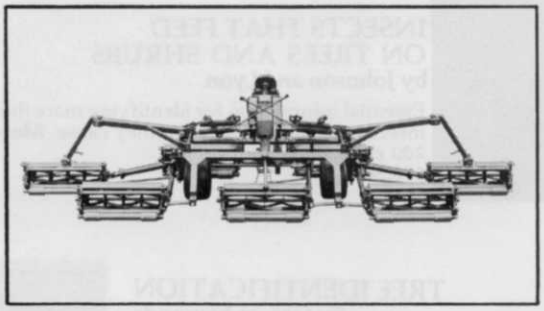

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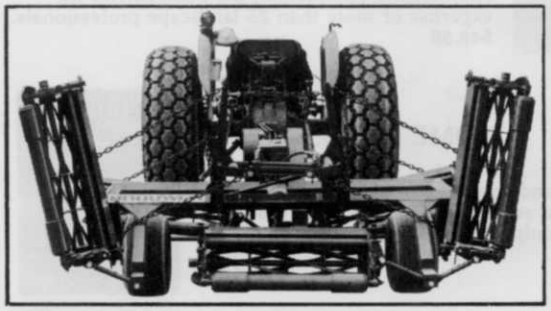

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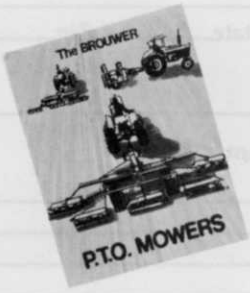

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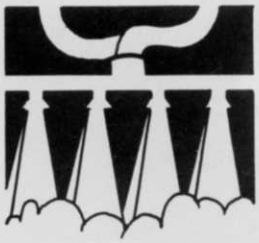

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