

**Table 9.** Making soils more alkaline.<sup>1,2</sup>

Buffer pH <sup>3</sup>	Desired pH			
	5.5		6.5	
	Incorporation lbs./cubic yard	Top Dress tsp./1 gal. can	Incorporation lbs./cubic yard	Top Dress tsp./1 gal. can
7.4	0.0	0	0.0	0
7.2	0.4	1/10	0.5	1/10
7.0	0.7	1/8	1.0	2/10
6.8	1.4	1/4	2.0	3/10
6.6	3.8	7/10	5.4	1.0
6.4	6.1	1.0	8.7	1.4
6.2	8.4	1.4	12.0	2.0
6.0	10.7	1.8	15.3	2.6
5.8	13.1	2.2	18.6	3.2
5.6	15.3	2.7	21.9	3.8
5.4	17.6	3.1	25.2	4.4

<sup>1</sup> Ag ground limestone or dolomitic lime if the soil is low in both calcium and magnesium.

<sup>2</sup> If present pH is less than the desired level, add amount shown above.

<sup>3</sup> Buffer pH measures total soil acidity (H<sup>+</sup> & Al<sup>+++</sup>) while pH measures H<sup>+</sup> only.

## SUMMARY

Information on the nutrient content of soil is of value only when the soil is properly sampled, accurately analyzed and the results correctly interpreted. This report attempts to provide guidelines for interpreting soil analysis results and suggests nutrient sources and rates to correct an imbalance or deficiency of a nutrient.

## FIELD FERTILIZATION PRACTICES

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Soils in the Cincinnati area are not ideal for agriculture. They are a clay loam top soil, which is rather shallow, with a heavy clay subsoil that is very slow to percolate. Nurseries in our area are much delayed for spring digging because of the wet soil. Our nursery is located on the highest point in our county. It is slightly rolling ridge land, and still drainage is a problem. The fertility of the soil is poor, and unless we apply ample fertilizer, the nutrients are not there. Now, with all this against our soils, we do find some bright sides. We have no rock until we get 9 feet deep and, if the nursery business is not profitable, the land is very valuable for development! Our biggest claim to fame is that we can successfully transplant trees even in the summer months. We contribute this to the

heavy clay soils having nothing to offer any further down. There are ample moisture and nutrients near the surface if we apply them properly, and the root system has no reason to grow a long distance as it does in the sandy and more granular soils. As a result, there is a more compact root system in the ball area.

We produce shade and ornamental trees from one year seedlings grown in close rows and later transplanted as whips or branched trees. We also use whips or branched trees purchased from others, mainly nurseries on the West Coast. Conifer trees are lined out into the field as heavy transplants. Grafted plants such as Hoopsi blue spruce, weeping blue and green spruce, pyramidal and weeping pines, and upright junipers are grown in one gallon containers and lined out into the field when they become heavily rooted in the container.

Before we replant a new field, a green manure crop of sudan grass is planted in late spring. Before the sudan grass is planted we plow under 800 pounds of 4-12-12 fertilizer and 2 tons of ground limestone per acre. When the sudan grass is about 5 feet tall, it is cut with a bush hog mower and allowed to grow back to that height again. In late summer it is again mowed, and we then apply 250 lbs. of ammonium nitrate and 3 tons of gypsum per acre. The soil is subsoiled 24 to 30 inches deep, 3 feet apart in two directions and then plowed about 12 inches deep. This plowed soil lays over the winter and is disced and planted as early as possible in the spring. We prefer 7 to 8 feet size whips or branched shade and ornamental trees for transplanting. The rows are spaced 9 feet apart with the trees set 3 feet apart in the rows. This spacing allows ample room for digging with hydraulic 24 to 30 inch tree spades mounted on a Vermeer T30 tractor or a "Bob Cat" skid loader.

In June we side dress the trees with a 20-5-10 fertilizer that has 50% immediately available nitrogen and 50% slow release nitrogen. This is applied at the rate of 500 pounds per acre, measuring the actual area fertilized, which is a band approximately 3 feet wide. This leaves a space 6 feet wide between the rows that is not fertilized except for the original application plowed under prior to planting the sudan grass. This 6 foot strip is allowed to grow into grass and is kept mowed. The 3 foot strip is kept free of weeds with pre-emergent herbicides (Casaron and Princep). If necessary a post emergent herbicide (Roundup) is also applied. All herbicides are applied in liquid form with a 100 gallon sprayer mounted on the rear of a 140 International tractor. A spray nozzle, which makes a flat spray pattern about 6 inches above the soil, is mounted behind the front right tractor wheel.

The fertilizer is applied through an International side dressing attachment on the 140 International tractor. The tube carry-

ing the fertilizer from the hopper drops the fertilizer in front of a 13 inch disc, which throws the fertilizer in towards the tree and covers it. We go down each side of the row.

In early November, when fall colors are beginning to show, we again side dress with the same fertilizer at the same rate. This method and amount is continued each year until the trees are removed. The trees are harvested as 1-1/2 to 2 inch caliper to 2 to 2-1/2 inch caliper in 3 to 4 years following planting. The field is again planted into sudan grass before it is used for a new crop of trees.

We find the November application of fertilizer is extremely important. By the time the fall colors begin to show, the plants are going into a dormant stage, and there is no danger of getting excessive succulent growth that would probably freeze. However, the roots are still active enough to absorb the nutrients and store them in the plant where they are readily available for the big spring flush of growth. We believe spring-applied fertilizers are usually not available until the big growth period is over.

When applying fertilizer by this method, the disc will build up a ridge in the row. To correct this we use a hydraulic vineyard hoe purchased from Timm Enterprises, Toronto, Canada. This hoe automatically goes in and out between the trees pulling the ridge down and cultivating the soil.

When one-year seedlings are planted in the nursery row, they are spaced 2 feet apart in rows 3 feet apart. These are planted in early spring. The following November, a 20-5-10 fertilizer is applied at the rate of 500 pounds per acre by the use of a cyclone fertilizer mounted on the rear of the tractor. In February or early March these seedlings are cut to 1-1/2 to 2 inches above the soil. As buds are formed in the spring all but one are removed in an attempt to promote one fast growing stem. These trees are cultivated and fertilized again in June at the same rate. At the end of the growing season we hope to have whips approximately 6 to 8 feet to transplant the next spring into 9 foot wide rows. We choose only the select trees to line out into the wide rows. Some types of trees such as pin oak and red oak may take an extra year in the close rows before they are of sufficient size to transplant into the wide rows.

We find it is a problem to get a clean straight trunk if a tree under 6 feet is lined out into the wider spaced rows. However, when we use the right size trees, properly pruned, this method of growing has given us top quality trees.