

up the ground water on each side, and prevent over-rapid and erosive drainage from the soil.

The branches and leaves of most trees contain from one to four parts of ash per 100 of dry weight, whereas the dry wood usually contains less than 1 per cent. of ash. Some idea of the relative proportions of the valuable ash constituents can be obtained from the following comparative values per 100 parts of ash:—

	Wheat		Wheat		Potatoes	
	Straw	Leaves	Grain			
Potash	10	.. 20	.. 30	..	28	
Lime	6	.. 12	.. 3	..	2	
Magnesia	1	.. 6	.. 11	..	4	
Sulphuric acid.....	2	.. 4	.. $\frac{1}{2}$..	5	
Phosphoric acid.....	5	.. 9	.. 48	..	10	

The nitrogen practically does not appear in the ash, but in ordinary decomposition in the soil it is slowly set free as nitric acid, which combines with the bases in the soil to form soluble nitrates.

The value of trees as humus-producers can hardly be exaggerated, for the benefits conferred upon soil by the presence of humus in it are many and various. It increases the water-holding capacity of the soil. Thus a soil containing a fair quantity of humus will hold from two to three times as much water available for the plant's use as a pure sand. The presence of humus, and in this respect the humus formed from the decaying leaves of trees is especially valuable, increases the chemical actions in the soil, and causes more of the insoluble constituents of the soil to be rendered soluble and available for mineral plant food. In addition to this, the humus itself has a special power of retaining these soluble constituents in such a manner that the loss by washing from the soil by rain is reduced to a minimum, while at the same time they can still be absorbed by the roots of the plant, and handed over as they are required. Finally, humus lightens heavy soils, and favours their aeration.

A simple experiment to show the beneficial action of humus upon the roots of plants is to place on a heavy soil or clay surface a layer of leaf mould or well-rotted manure an inch or two thick, and cover this with 3 or 4 inches of clay or clayey soil. Soaked seeds planted on the surface soon strike downwards, and if the plants are dug up and examined by the time the stems are half-a-foot to a foot high, it will be found that the greater part of the root-system has been developed in the layer of humus. This is especially well shown by the garden "Nasturtium," but also by cereals and other agricultural plants, although, when the plants are older the roots are forced to strike deeper in search of water.