Style and Design of Landscape Art

By Franken Bros., Inc

All forms of matter known to man are composed of about ninety-four different chemical elements, that is, of *substances which cannot, by any known means, be separated into two or more kinds of matter*. For example, pure sulphur is an *element* because, whatever processes we may put it through, we cannot get anything out of it but sulphur; pure sulphur contains nothing but sulphur. Similarly, nitrogen is an element because no one has ever been able to show it contains more than one thing, nitrogen. Other examples of elements are oxygen, carbon, phosphorus, iron, calcium, etc. Some of the elements, as commonly known to us, are gases, such as hydrogen and nitrogen, but most of them under ordinary circumstances are solids.

Although there are thousands of different kinds of plants growing on this earth, nevertheless, with all their variation of stem, foliage, flower and fruit, they are made up from comparatively few elements. Of the ninety-four elements known, *the following fourteen are commonly found in plants: Calcium, chlorine, hydrogen, iron, magnesium, manganese, nitrogen, oxygen, phosphorus, potassium, silicon, sodium, and sulphur. These elements occur in very unequal amounts in the vegetable world.* For example, *carbon hydrogen and oxygen alone make up over ninety-five per cent, on the average of all plants.*

Neither are these elements of equal importance to plant life. It has not been satisfactorily demonstrated that chlorine manganese, silicon and sodium perform any necessary function in plant growth, unless, perhaps, in isolated, exceptional cases. So far as we actually know, it is probably true that only ten chemical elements are really essential to plant growth under ordinary conditions.

There are other elements, in no way essential to plant life that occur under special conditions more or less frequently in plants; among these may be mentioned aluminum, arsenc, barium, boron, bromine, copper, flourine, iodine, lead, lithium, nickel, tin, and zinc. Their occurrence is more a matter of general interest than of any actual value to the person interested in growing plants. Such substances may be regarded as straying into a plant without purpose or plan simply because they happen to be in solution in the neighborhood of growing plant-roots and go into the plant in company with the plant-food proper.

The elements required by plants are divided into two quite distinct classes. which show rather marked differences These two classes are air-derived elements and soil-derived or mineral elements. The air-derived elements are: Carbon, Hydrogen, Nitrogen and Oxygen. The soil-derived elements are: Calcium, Iron, Magnesium, Phosphorus, Potassium, Sulphur (Chlorine, Manganese, Silicon, Sodium). These two classes differ about as follows: The air-derived elements come exclusively from the air (this may be directly, or it may be indirectly, through the medium of the soil). The soil-derived elements come directly and exclusively from the soil. When a plant is burned, the air-derived elements disappear, for the most part, in the form of gases; the soil-derived or mineral elements, usually much the smallest part, are left in the form of unburned residue or ash, upon which further heating has no effect. This distinction is not perfectly sharp, since some oxygen is always found in ash, while a small amount of chlorine, phosphorus and sulphur may be driven off in the form of gases during the operation of burning. Air-derived elements make up more than 95 per cent of the whole vegetable kingdom, while the soil-derived elements occur in small amounts, varying in different plants and in different parts of the same plant, from a fraction of one per cent to 10 per cent, or even in some cases, taking the plant as a whole. However, because the soil-derived elements occur in such small proportions, does not mean that their importance is slight. Without them plants would not grow. This fact has a most important application in enabling us to influence the growth of plants. We cannot, to any appreciable extent, directly control, at least economically, most of the air-derived elements in the feeding of plants, but we can do so indirectly through the soil-derived elements. In other words, by controlling under certain conditions, the five per cent or less of the elements that enter into the composition of plants. we can, in a large measure, control the the other 95 per cent.

The chemical elements do not commonly exist separately from one another as pure elements. While we are familiar with impure carbon in the form of coal and charcoal, and with nitrogen and oxygen as they are mixed together in the air, we never find, under ordinary conditions, elements like hydrogen, phosphorus and potassium, etc., existing separate from other elements. Different elements combine to form compounds somewhat as the different letters of the alphabet combine to form words. The few chemical elements

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