

Soda,  
Chlorine,

We have furnished in a great measure by the soil, but partly also by the air : —

The elements of phosphoric acid containing phosphorus :

The elements of sulphuric acid containing sulphur.

In localities adjacent to the ocean, bay, or indeed any salt water, there is always present in the air both soda and chlorine in the form of common salt.

We have furnished in a great measure by the air, but partly also by the soil : —

Carbonic acid containing charcoal :

Ammonia containing nitrogen.

We have furnished exclusively by the air : —

Water.

These contain all of the elements necessary to the perfection of vegetable and animal life. Those of them which are not present in the soil in sufficient quantities, and which cannot be derived from the atmosphere, must be supplied artificially by what are called

## MANURES.

Manures may be defined to be whatever will contribute to increase the productiveness of the soil, either by furnishing directly food to plants, which may be absent, or by causing that food, which already may be present, to assume a *form* capable of being used by them.

However valuable any substance may be in itself, yet it is no manure to a soil that already contains it in sufficient abundance, or has not some other thing present in a form which plants cannot use, and which by the application of the substance used for manure, may be so changed as to yield food for plants.

Thus lime may act as a manure, when it is deficient in a soil, by being directly used for the structure of plants, or it may act as a manure in a soil when it exists in sufficient abundance, but not in a *condition* to set free other things which may there exist, but not in a form capable of being used.

Vegetable matter may be a manure by yielding its carbon and its salts to plants, or it may act by impregnating water with carbonic acid, which thus acquires the property of dissolving the mineral constituents of a soil, and of placing them in a fit condition for use.

All manures should be in the finest possible state of division, and mixed either directly, or indirectly most thoroughly with the soil. Every particle of manure should be placed, if possible, in immediate contact with a grain of sand.