

Peruvian guano promptly produces a large proportion of ammonia, which, as well as its phosphates, become readily soluble in the soil, and are therefore better adapted to a stiff than a light soil.

Super-phosphates, owing to their solubility, are better retained in stiff than in light soils for the use of the crop, but if, as is often the case, salts of iron and alumina be present, the phosphoric acid will be precipitated as phosphate of iron or alumina and remain dormant in the soil, unless it be dissolved with the aid of alkaline silicates. This may account for the want of effect of super-phosphates in many cases.

The ordinary phosphate of lime in bones and phosphatic guanoes is slightly soluble in water with the aid of carbonic acid, which exist in all soils.

Barn-yard manure is adapted to every variety of soil, for the simple reason that it *all came out of the soil*, and is returned thereto with proper proportions of plant food in conditions to be readily available to plants.

As the farmer may use either of these, or other manures that need not be referred to in this place, and yet fail to get good results, we may advert briefly to the causes of failure in too many instances:

A soil may abound in every element of fertility, and yet fail to give remunerative crops with or without any kind of manure, if it be saturated with water during most of the growing season. When this is the case, the gases contained in the atmosphere cannot be absorbed with their supplies of ammonia, and nitric and carbonic acids, so important to plants. Besides, the oxygen of the air is essential for producing chemical actions upon the iron and vegetable matters which furnish materials in the soils useful to plants.

The inference is, that it is better not to incur the expense of manures and tillage in decidedly wet soils, and that no time is to be lost in draining them. I have seen so many instances of the good effects of draining, that I must earnestly call the attention of farmers to the importance of the process. As one of the cases in which a most perfect system of *surface* draining was effected, I may name the farm of Dr. George U. Dennis, in Somerset county. His land is low and is almost a dead level, so that underground drainage is impracticable; yet the location, and form of his drains are such that not a spot in his large fields is injured by water except perhaps a foot in width in the bottom of the drains. Instead of allowing the earth thrown out of the drains to form unsightly embankments along them, it is distributed in the lowest spaces between the drains.

It is not for me to indicate the circumstances under which either surface or underground, draining is to be preferred, but to urge the necessity for getting rid of stagnant water in the soil.