

where the nitrification does not take place at all. It begins only where decomposition has considerably advanced, and it requires the presence of alkaline salts, the function of which is to ensure disaggregation and mineralization of the humic substance. In order perfectly to effect nitrification, nitrogenous materials should be applied in the form of humates. We may observe in passing that the ammoniacal humate is that which contains the largest proportion of nitric nitrogen, whilst potassic and sodic humates will be much less rich. The nitrogenous element in the latter comes entirely from the transformed humus.

We cannot expect therefore to correct the want of humus quickly by heavy applications of farmyard manure. And besides soils naturally fertile are always much superior to others. In the first place they obviate expensive operations necessitated by the maintenance of the productiveness of the soil. Also this natural fertility is characterized by abundant food reserves which give to plants slowly, economically and with precision, the nutritive principles they need. In this remarkable way 'nature truly shows its genius' and justifies the terms 'fat land' or 'land of pristine vigour,' that is applied to soils of natural fertility which it is so important to preserve. It is incontestable that planters, although it was a long time ago, found themselves in possession of soils of this kind. Yet this natural fertility tends inevitably to disappear or at least to decrease rapidly. Removal of the crops, feeding of farm animals, losses of nitrogen at the stable and in the yard by ammoniacal fermentation, all result in rapid exhaustion of soil reserves.

We no longer believe in the possibility of supplying the want of mineral substances by strong applications of chemical manures; in fact these by their nature are very soluble and consequently are apt largely to disappear, especially in tobacco culture which requires a light deep soil that lends itself easily to losses by drainage. The dissolving action of water is not the same on all the mineral constituents of the soil. Potash and phosphoric acid, for instance, do not disappear readily. Sulphuric acid and nitric acid are easily lost. Chlorine also drains away easily, and this in tobacco culture is an advantage, because chlorine has an unfavourable effect upon the combustibility of tobacco. Of all the constituent elements of the soil, it is the lime which disappears with greatest facility. On this point there is an important remark to be made. Tobacco needs a great deal of potash, and in soils poor in lime potassic salts are with difficulty changed into carbonates when they are very soluble; their tendency to drain away is thus considerably reduced. For tobacco it is necessary therefore to choose a soil that is not too rich in lime, and especially because when the snows are melting the excessive washing of the soil renders the draining away of the potash particularly easy. Once they have disappeared many years will be required for the restoration of these valuable nutritive reserves. Doubtless these substances are not lost since they accumulate and will become operative some day; but this is not the object aimed at by the use of chemical fertilizers, the action of which is expected to be rapid.

The lack of humus and of mineral substances indispensable for plant growth, through a main cause of soil exhaustion, is not the only one.

In fact in certain cases phenomena of a purely chemical nature may result in the insolubility of a fertilizing ingredient of the first importance, or may produce a substance injurious to the quality of the tobacco. In ground that is rich in lime and in