

two soils, which in their general character as well as in their productiveness, materially differ, can show exactly the same elementary composition ; the difference between them is only a necessary consequence of the different mode in which the various constituents in them are united to each other. Even if we look at the composition of "Grauwacke," a rock, which is composed of quartz and mica, we can hardly find out a difference between its elementary composition and that of a fertile soil.* A body of this kind would be very similar in composition to a loamy soil, which is capable of producing the fairest crops ; while the grauwacke, even if we would crush it into the finest powder, would not be able to support the life of our cultivated plants in a prosperous manner, until it became decomposed.

ON THE PHYSICAL PROPERTIES OF THE SOIL.

We perceive by the different analyses of soil, that the most considerable mass of the soil, is formed of only four substances, viz : Silica, Oxyd of Iron, Clay and Humus, and that all others, in comparison to the quantity of these, are present only as traces. This is true of all soils with the only exception of those which are characterized by a notable quantity of Carbonate of Lime and Magnesia which they contain, (calcareous soils.) The physical properties of soils consequently depend on the relative quantities of those four fundamental ingredients of which they are constituted, and are, therefore, as different as the numerous proportions may differ, in which these substances can be mixed ; or by the same relative proportion of them, as different as the various modes of combination may differ, in which these substances are united to each other. All these circumstances are at once considered by the farmer's practical eye and judgment whenever he gets a soil under examination, and they give him indeed a true and sure

* The composition of the Grauwacke is the following :

Sand and Silica	-	-	-	72.2
Oxyd of Aluminum, (Clay,)	-	-	-	11.7
" " Iron	-	-	-	10.4
" " Calcium, (Lime,)	-	-	-	1.0
" " Magnesium, (Magnesia,)	-	-	-	2.3
" " Potassium, (Potash,)	-	-	-	} 1.0
" " Sodium, (Soda,)	-	-	-	
Phosphoric acid	-	-	-	0.4
Traces of Chlorides	-	-	-	} 1.0
" " Sulphates	-	-	-	
" " Organic Matter and Water	-	-	-	
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