lime, magnesia, alumina, soda, and potash, so well known in the arts; also *chlorine, phosphorus, sulphur, silicon, and iron.* Other elementary bodies occasionally present themselves in small quantity, but they do not appear to be essential constituents of plants. Nor are they, with perhaps the exception of sulphur, any where found in their elementary or uncombined state. The relative proportions in which the several compounds thus formed exist, is of more importance to be ascertained than that of the elements from which they are derived. The following table exhibits the proportion in which they are present in a few of the cultivated crops, 1,000 parts of each being taken.

	Wheat.		Barley.		Oats.		Turnips.	Carrots.	Potatos.	Rye-Grass.	Beans.	Peas.
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.				Hay.		
Potash	2.25	0.20	2.78	1.80	1.50	8.70	23.86	35.33	40.28	8.81	4.15	8.10
Soda	2.40	0.20	2.00	0.48	1.32	0.02	10.48	9.22	23.34	3.94	8.16	7.39
Lime	0.06	2.40	1.06	5.54	0.86	1.52	7.52	6.57	3.31	7.34	1.65	0.58
Magnesia	0.00	0.32	1.80	0.75	0.67	0.22	2.54	3.84	3.24	0.90	1.58	1.36
Alumina	0.26	0.90	0.25	1.46	0.14	0.06	0.36	0.39	0.50	0.31	0.34	0.20
Oxide of iron	—	—	—	0.14	0.40	0.02	0.32	0.33	0.32	—	—	0.10
Oxide of Manganese	—	—	—	0.20	—	0.02	—	0.60	—	—	—	—
Silica	4.00	28.70	11.82	38.56	19.76	45.88	3.88	1.37	0.84	27.72	1.26	4.10
Sulphuric acid	0.50	0.37	0.59	1.18	0.35	0.79	8.01	2.70	6.40	3.53	0.39	0.53
Phosphoric acid	0.40	1.70	2.10	1.60	0.70	0.12	3.67	5.14	4.01	0.25	2.92	1.90
Chlorine	0.10	0.30	0.19	0.70	0.10	0.05	2.39	0.70	1.60	0.06	0.41	0.38
Total inorganic matter in 1,000 parts	11.70	35.18	23.49	32.42	25.80	57.40	63.03	66.19	82.83	52.86	21.36	24.64

The difference in constitution between the grain-crops and root-crops is manifest by glancing over the foregoing table, and will in some degree account for the different effects produced by each of these classes of crops on the soil. Some idea of the constitution of plants has been also afforded, and the inquiring farmer will not fail to see the necessity which exists to become likewise acquainted with the composition of the soils on which they are to be produced. The ingredients to be applied as manures then become apparent, and hence the foundation of a rational and economical system of manuring—rational, as supplying the particular matters required, and economical, inasmuch as those only are supplied.

The advantages of such a system being generally acted upon must be evident to every thinking mind; and the rapid progress in the path of improvement in this department of agriculture which has lately taken place, encourages the hope that the advent of such a system is more closely at hand than could have been anticipated some time ago. The physiology of vegetables is not now mere matter of speculation, as in times past; the component ingredients of the different classes of vegetables with the source from which each is derived have also been ascertained, at least so far as is necessary for practical purposes. The various kinds of manures, too, which are applied for the purpose of increasing their growth have often formed the subject of analysis; but in regard to them the same degree of precision cannot be acquired, the same substance being very different in quality, under different circumstances; and hence the impropriety of arriving at general conclusions with regard to the composition of manures from isolated cases of analysis. In the case of soils the variation in quality is still greater than in that of manures. In their analysis, moreover, the greatest accuracy is required, in order that any conclusions of practical value may be deduced from them. The quantity of some of the inorganic ingredients of plants is so small, though their presence is not the less essential, that a due supply might be contained in the soil, and still not be found in any appreciable quantity in a specimen submitted to investigation. While, therefore, chemical analysis is calculated to do so much for the farmer in this department, it must be recollected that before such analysis can be of any value, they must be strictly accurate, otherwise the deductions from them will be calculated to mislead. It is, indeed, no difficult matter to perform an analysis, in the ordinary acceptation of the term, which is merely directed to the discovery of the predominating ingredients; but it is frequently the absence or presence of those contained in small quantity only which it is most important to ascertain. The fertility of soils being dependent on the facility with which they can supply certain constituents of plants, it is only the most refined analysis that, in many cases, is capable of determining whether they are present or not; much less of explaining to what their peculiar excellencies or defects may be owing, what ought to be added to render them productive, or why, in short, certain remarkable effects are produced by the addition to them of organic or inorganic matters.

This subject admits of illustration by a familiar example. Gypsum is well known to be essential for the production of red clover in luxuriance; but such a small quantity as 2 cwt. to the acre is found to be amply sufficient for the purpose. Now supposing this quantity to be equally distributed through every part of the soil to the depth of twelve inches, the proportion found in a pound weight of soil would be about half a grain; and in one hundred grains (a very common quantity of soil to submit to analysis) the quantity of gypsum present would not be more than one seven-thousandth part of a grain—a proportion which only the most careful conducted analysis would be able to detect, and yet the detection of it would be of the utmost importance were it desired to know whether gypsum should be applied to that particular soil. While, therefore, chemistry is calculated to do much for agriculture, it is important that the farmer should know in what way it is likely to serve him. A very slight acquaintance