A CHEMICAL STUDY OF SOME OREGON BEAVERDAM SOILS.

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In an effort to work out the fertilizer requirements of some Willamette valley onion soils, a chemical examination of a number of these soils has been made in this laboratory in connection with some field experiments on the same. The results obtained are of interest, since the important features of these most valuable lands are shown.

The beaverdam soils, when virgin, are composed largely of organic material of a peaty nature. The decomposition of leaves, twigs, and fine débris gives rise to one grade, the decay of larger bodies of wood another, while these soils are still further modified by clay washings from surrounding slopes. The term beaverdam is applied to these lands from the fact that beavers were instrumental in forming these swamps by damming the streams which drain them. The vegetation common to these soils is reed-grass, willow, spanish needle, hard-hack, cattails, wild parsnip, etc. The greater portion of these areas overflows in the wet season.

These soils are black when moist, changing to a gray when dry. They are porous, light and loose with no tendency to bake or form lumps. Their characteristic sponginess is shown by a quaking of the earth when loads are driven over them. On account of their large organic content they burn readily when dry, and in consequence of this fact great damage is wrought in these soils by fire. A curious feature is their ability to shed water, due to a resinous content which may be extracted with ether as has been shown. There is no subsoil except at considerable depths.

The following table gives the results of an examination of five of these soils which are typical ones of this class. The crop history and relative productiveness of each is known. The determinations were made by the methods of the Association of Official Agricultural Chemists and the values refer to air-dried samples. The samples were taken to the depth of about twelve inches.

	1.	2.	3.	4.	5.
Silica	20.43	51.45	36.25	21.05	53.05
Volatile, loss on ignition	63.95	36.48	45.22	59.72	31.50
Phosphoric acid	0.26	0.31	0.22	2.30	0.21
Potash	0.14	0.28	0.13	0.10	0.20
Soda	0.17	0.16	0.20	0.27	0.43
Lime	1.09	0.26	0.47	0.92	1.18
Magnesia	0.22	0.06	0.10	0.33	0.25
Ferric oxide	8.29	4.00	8.40	9.21	8.03
Alumina	4.95	6.78	8.07	6.16	5.11
Manganese oxide	.....	.....	trace	0.12	.....
Sulphuric acid	0.23	0.10	0.15	0.14	0.08
	99.73	99.88	99.21	100.32	100.04
Humus	.....	.....	7.72	12.75	6.56
Potash, 0.5 per cent. HCl	.....	.....	0.022	0.052	0.010
Potash, J. Law. Smith	.....	.....	0.22	0.21	0.27
Phosphoric acid, 0.5 per cent. HCl	.....	.....	0.15	1.51	0.11
Phosphoric acid by HF	.....	.....	0.42	2.56	0.38
Nitrogen	1.56	.....	1.81	2.06	0.78
Organic matter, $CO_2 \times 0.471$	42.14	.....	.....	.....	.....

No. 1 is a virgin soil, the others are long farmed. The most productive soils are 3 and 4. Nos. 2, 4 and 5 have had applications of various fertilizers. The field which No. 3 represents has never had an application of any form of fertilizer, but has grown fifty successive crops of onions of good quality and yield. Nos. 2 and 5 have been filled in by washings from sandy soils.

The nitrogen content of these soils is seen to be large, and some application is made of them as nitrogenous fertilizers for clay lands. Potash is present in liberal quantities but is of low availability in the table which corresponds also to the results from field tests, the plants responding quite readily to potash applications. The phosphoric acid is seen to be largely available. The abnormal amount in No. 4 is probably due to the concentration of phosphates in the ash from previous burning of the soil.

The lime content of these soils is sufficient to keep them sweet. Lime is always in excess of magnesia.

The use of 0.5 per cent. HCl for determination of available plant food was suggested by Prof. A. L. Knisely of the Oregon Experiment Station.

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