REPORT ON SOIL SAMPLES FORWARDED BY THE DIRECTOR OF AGRICULTURE, RABAUL, NEW GUINEA, TO THE WAITE AGRICULTURAL RESEARCH INSTITUTE.

1. Soils from Talasea District, Island of New Britain, New Guinea.

Twenty-four soil samples, representing five profiles to a depth of 72 inches have been examined.

These soil profiles have formed upon geologically recent, layered deposits of volcanic ash and are in consequence extremely immature in their development. From an examination of the pumiceous and other stone within the profiles and from a consideration of the mechanical analyses of the soils, it is apparent that a number of ash showers were deposited in the area, one on top of the other. At least three distinct layers in which the material varies from distinctly pumiceous to andesitic or rhyolitic in character are to be observed in each profile. The andesitic type of parent material is apparently dominant throughout the soils although, as in the lower layers of profile five, the rhyolitic type may be pronounced.

While the surface layer of the soils to a depth of about 12 inches is practically free from stone, about 6 per cent. of pumiceous material occurs in the second foot. The pumiceous stone reaches a maximum concentration of as high as 30 per cent. in the third or fourth foot, where lumps of pumice up to several inches in diameter may be found. Below 3 feet the lumps of pumice decrease in size and amount, their place being taken by less scoreaceous and smaller fragments of rhyolitic or andesitic material. In the lower depths, below 4 feet, these latter fragments together with glassy material and large grains of heavy minerals are present, to the virtual exclusion of pumice within the gravel fraction.

The soil profile consists of a 12-inch surface layer of a dark brown to grey yellow brown loam to clay loam, rich in organic matter overlying a light brown to yellow brown sandy loam to clay loam. To this depth of 24 inches the soils have a distinctly silty feel and a comparison of their mechanical analyses with those for soil formed from similar parent volcanic ash in New Zealand would suggest that they fall within the silt loam class. Below 24 inches the soils consist of pumiceous or andesitic or rhyolitic extremely sandy deposits yellow brown to yellow in colour, the yellow shade increasing markedly with depth.

There is little variation in the reaction values of the soils from profile to profile, although within the profiles themselves a change from slight acidity in the surface to neutral at the lower depth is to be noted.

The soils in the surface are well supplied with plant foods, the nitrogen, phosphoric acid and potash contents showing mean values of 0.4 per cent., 0.25 per cent. and 0.14 per cent., respectively. While there is a distinct decrease in the content of the nitrogen and phosphoric acid in the second foot, the potash content rises slightly.

The mechanical analyses and chemical data for the soils are given in the accompanying table. (Table 1.)

2. Soils from Upper Ramu Valley, New Guinea.

Two soil profiles, one from the alluvial flats and a second representative of the hill slopes from the Upper Ramu Valley, northern New Guinea, have been examined.

The profiles are essentially similar, being typically podsolized soils. They consist of a surface black to grey-black sandy loam, rich in organic matter to a depth of 12 inches, overlying a grey to yellow brown mottled sandy clay or light clay subsoil. Ferruginous gravel to the extent of about 27 per cent. occurs in the alluvial profile and to the extent of about 40 per cent. in the second profile.

The soils are distinctly acid. In the surface the pH values lie between pH 5.0 and pH 5.5, and rise gradually to a pH of over 6 in the subsoil.

The soils contain an adequate supply of plant nutrients as shown by Table 2.

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TABLE I.

SOIL SAMPLES FROM TALASEA DISTRICT, ISLAND OF NEW BRITAIN, NEW GUINEA, FORWARDED BY THE DIRECTOR OF AGRICULTURE, RABAUL, NEW GUINEA.

Locality Site Number.	1			2		3						4			5			
Waite Institute Sample Number.	5065	5066	5067	5074	5075	5078	5079	5080	5081	5082	5083	5088	5089	5090	5097	5098	5099	5100
Depth in Inches.	0–12	12–24	24–36	0–12	12–24	0–6	6–12	12–24	24–36	36–48	48–72	0–12	12–24	24–36	0–6	6–24	24–48	48–72
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Stone	..	5.3	30.1	..	5.2	..	1.4	5.8	29.3	18.1	18.2	2.3	8.3	15.2	..	8.2	1.9	..
Fine Earth ..	100.0	94.7	69.9	100.0	94.8	100.0	98.6	94.2	70.7	81.9	81.8	97.7	91.7	84.8	100.0	91.8	98.1	100.0
Coarse sand ..	9.0	36.3	63.5	11.9	7.5	9.0	3.6	5.1	61.1	77.8	71.4	14.6	33.7	74.0	11.2	15.8	46.0	50.7
Fine sand ..	28.3	30.8	23.2	33.6	35.7	26.9	18.3	27.1	24.0	13.8	17.6	24.6	22.4	18.1	27.4	20.4	34.5	14.9
Silt	18.9	15.9	6.2	17.5	18.5	18.2	19.3	33.1	6.5	3.5	3.8	24.9	16.0	2.1	18.4	19.8	9.0	14.8
Clay	24.5	4.1	1.7	13.2	20.7	25.1	36.0	18.6	2.1	1.1	2.4	13.7	8.8	1.4	17.1	18.2	3.8	7.0
Loss on Acid Treatment	2.9	2.0	1.4	2.1	1.6	2.3	1.8	1.9	1.3	1.1	1.3	2.5	1.5	1.1	2.9	1.5	1.4	1.2
Moisture ..	13.3	10.7	4.4	18.3	17.8	13.8	21.1	17.1	5.6	3.5	3.9	20.0	12.6	3.2	19.9	27.3	6.0	12.6
Loss on Ignition..	13.9	5.7	2.2	8.8	7.1	13.0	8.5	8.3	3.5	2.3	2.3	9.8	6.7	2.3	13.6	7.1	3.8	5.1
Phosphoric Acid P_2O_5	0.33	0.09	..	0.26	0.14	0.31	0.16	0.10	..	0.07	..	0.17	0.11	..	0.18	0.08	..	..
Potash K_2O ..	0.18	0.31	..	0.13	0.18	0.15	0.15	0.23	..	0.16	..	0.11	0.13	..	0.14	0.13	..	..
Nitrogen N ..	0.51	0.04	..	0.33	0.05	0.47	0.15	0.06	..	..	..	0.28	0.02	..	0.53	0.12	..	..
Soil Reaction pH..	6.6	6.8	7.1	6.4	6.8	6.2	6.6	6.7	6.2	6.7	6.8	6.6	6.5	6.5	6.9	6.5	6.7	7.0

Soil No.	Depth in inches.	% stone.	pH.
5068	36–48	24.2	7.3
5069	48–72	19.3	7.2
5076	24–48	2.6	6.8
5077	48–72	10.2	6.9
5091	36–48	28.3	7.0
5092	48–60	12.5	6.9

TABLE 2.

SOIL SAMPLES FROM UPPER RAMU DISTRICT, NEW GUINEA, SUPPLIED BY THE DIRECTOR OF AGRICULTURE, RABAUL, NEW GUINEA.

Locality.	Profile Number.	Waite Institute Sample Number.	Depth in Inches.	Moisture.	Loss on Ignition.	* Soil Reaction.	Nitrogen.	K_2O.†	P_2O_5.†
				%	%	pH.	%	%	%
Alluvial flats ..	1	5049	Surface	6.48	14.08	5.2	0.36	0.12	0.11
		5050	6	8.47	13.15	5.4	0.34	0.12	0.10
		5051	9	7.64	12.24	5.8	..	..	..
		5052	12	6.03	10.88	6.0	0.23	0.10	0.09
		5053	16	5.68	10.33	6.3	..	..	..
		5054	24	3.59	6.86	6.3	0.08	..	..
		5055	36	3.94	6.04	6.0	..	0.19	0.03
Slopes and Undulations	2	5056	Surface	11.10	14.26	5.5	0.31	0.10	0.12
		5057	6	8.61	14.36	6.2	0.24	0.07	0.12
		5058	9	9.10	14.13	6.2	..	..	..
		5059	12	13.03	13.30	6.1	0.19	0.10	0.11
		5060	16	8.71	13.49	6.4	..	..	..
		5061	24	11.70	11.32	6.3	0.08	..	..
		5062	36	10.15	10.60	6.3	..	0.13	0.07

NOTE.—All figures obtained on air dried samples.
* pH values obtained with the Glass electrode using a soil : water ratio of 2.5 : 1.
† K_2O and P_2O_5 determinations on the Stand and hydrochloric acid Extraction.