466—19-7-1923

Department of Agriculture, Madras

Bulletin No. 84

A SOIL SURVEY OF THE PERIYAR TRACT

BY

ROLAND V. NORRIS, D.Sc.

M. R. RAMASWAMI SIVAN, B.A.

AND

S. KASINATHA AYYAR, B.A.

MADRAS

PRINTED BY THE SUPERINTENDENT, GOVERNMENT PRESS

PRICE, 1 *rupee* 14 *annas*] 1923

A SOIL SURVEY OF THE PERIYĀR TRACT.

In previous bulletins, Nos. 68, 70, 75 and 83, the results have been described of the soil surveys carried out in the paddy lands of the four chief deltas of the Presidency. The present publication contains an account of a similar survey of the district controlled by the Periyār irrigation system. The area surveyed consists roughly of a large triangular tract lying between the main Periyār channel and the Vaigai river.

The Periyār system derives its water-supply from a lake formed by the damming of the Periyār river which previously flowed from the hills to the West Coast. The water is now led in the opposite direction into the Suriliyar river coming from the Cumbum Valley, which in turn joins the Vaigai, a large river flowing in a south-easterly direction to the Bay of Bengal. The Vaigai is dammed by the Peranai Anicut and the main Periyār channel takes off from this anicut and runs generally in an easterly direction, irrigating by means of a series of sub-channels portion of the taluks of Nilakkōttai, Madura and Mēlūr. This tract has long been under cultivation using water from the tanks with which it is liberally supplied. Many of these tanks in the western portion derived their water from the Vaigai river, but those in the north and east were rainfed only and the supply was therefore precarious. Since the advent of the Periyār project, however, these tanks receive sufficient water to provide for two crops in the two taluks first mentioned and at least one in Mēlūr.

The land adjoining the Vaigai river at the western end of the tract which, as already stated, has previously possessed a fairly assured water-supply, has always been well cultivated and has a considerable reputation for fertility. On the other hand, the eastern portion of the district and in fact most of the land fed by the new channel has only been under paddy cultivation since the Periyār supply began. In other words there has been a large conversion of dry land into wet consequent on the provision of an assured supply of water.

The Periyār channel has twelve main distributaries, of which one is incomplete. These distributaries, as a rule, discharge into the tanks already referred to, but sometimes the water is directly led into the fields by sluices from the main channel or its distributaries.

Much of the old paddy land in the district had a reputation for alkalinity, but this defect has, except in a few localities, been very largely rectified by (1) the application of fresh soil in very large quantities, a practice very common in the tract, (2) the use of municipal refuse including nightsoil, a plentiful supply being obtainable owing to the proximity of the city of Madura and (3) by the extensive use of green manuring which has been encouraged by the Agricultural

Department and which is assisted by the proximity of the north eastern tracts to forest areas. An account of some of these alkaline soils has already been published in the Year Book of the Madras Agricultural Department for 1918.

The Periyār district, therefore, differs considerably both in its origin and subsequent treatment from the delta areas previously surveyed, a fact which is reflected in the analytical results obtained.

The scheme of analysis has been the same as in the previous surveys, that is to say confined to the estimation of nitrogen, phosphoric acid and potash (both total and available), lime and magnesia. The analytical results obtained will be found quoted in detail in the table at the end of the bulletin. The samples were collected from sixty-seven typical soils under paddy cultivation, the places from which they were taken being indicated in map I.

Distribution of nitrogen.

The distribution of soil nitrogen is shown in map No. II and it is satisfactory to find that only seven of the samples examined contained less than 0·05 per cent while in 21 the amount exceeded 0·1 per cent. The area is therefore generally well supplied with nitrogen, a result no doubt due to the practices referred to above of employing green manures, nightsoil and other nitrogenous manures.

Distribution of phosphoric acid and potash.

Experience has shown that only a portion of the phosphoric acid and potash present in the soil is in a form in which it can be utilized by the crop. In order, therefore, to ascertain the manurial requirements of the soil, it is necessary to estimate not only the total amounts of phosphoric acid and potash, but also the percentages which are present in an *available form*. The methods for so doing are empirical, but the results obtained are found to agree fairly well with conclusions drawn from field experiments and are, therefore, of considerable value. In practice, it is found that, in the case of the paddy crop, if the percentage of available phosphoric acid falls below 0·01 per cent and that of available potash below 0·005 per cent, the soils will respond to an application of the appropriate manure.

Phosphoric acid.

The distribution of available phosphoric acid is shown in map III and it will at once be obvious that the position is very unsatisfactory. Three-quarters of the district, coloured yellow or brown in the map, is deficient in this most important plant food and in at least half this area the deficiency is very marked indeed, figures as low as ·002 per cent being common. The only portion of the tract which is in a satisfactory condition as regards phosphoric acid is the area in the south-west portion of the district contiguous to the Vaigai river which comprises the original paddy lands of the district and which is well known for its fertility.

While the extensive use of nitrogenous manures in the rest of the district has maintained the nitrogen figure, there can be but little doubt that this treatment, in the absence of any concurrent effort to maintain the supply of soil phosphates, has accelerated the depletion of phosphoric acid. It is clear therefore that, while the continued use of nitrogenous manures is on every ground desirable, they must be accompanied by a liberal application of phosphatic manures. As green manures are generally available, ground mineral phosphate might well receive an extended trial in this district, being applied to the soil with the green manure. At the same time every effort should be made to increase the supply of bonemeal and render this available to the ryot at a reasonable cost.

Map IV illustrates the distribution of *total* phosphoric acid. While only the *available* phosphoric acid is of any immediate benefit to the crop, the amount of *total*, i.e., soluble and insoluble phosphate present in the soil is of importance as there is a slow conversion of insoluble phosphate into soluble and hence the phosphate present in an insoluble condition may be regarded as a reserve supply, which, under favourable conditions, may become of use to the crop. Here again the position is not reassuring. With the exception of the strip of land contiguous to the Vaigai river, practically the whole area contains less than 0·05 per cent of phosphoric acid, while in much of the eastern portion of the district the supply is less than half this amount. Not only therefore is the supply of *available* phosphoric acid quite inadequate, but the reserves in the soil from which this might be formed are also low. The situation therefore calls for very definite action.

Potash.

The distribution of available potash is shown in map V and the whole area is well supplied. No sample analysed contained less than 0·005 per cent while the great majority yielded figures above 0·01 per cent. There is therefore no necessity at present for special potassic manures.

The supplies of *total* potash, charted in map VI, are also adequate, nearly all the samples containing more than 0·2 per cent. The richest area is that adjacent to the Vaigai river doubtless due to the deposition of river silt.

Distribution of lime and magnesia.

The lime and magnesia content of the soils is shown in maps VII and VIII. More than three-quarters of the district contains less than 1 per cent of lime, while a very large proportion of the eastern half of the tract contains less than a quarter of this amount. The magnesia figures, while also low, are generally in excess of those for lime and consequently the lime-magnesia ratio, which is charted in map IX, is less than unity over a very large area. Considering the tendency of these soils to become saline, this is an unsatisfactory position and it is probable such land would benefit materially by applications of lime.

General conclusions.

1. The nitrogen content of the Periyār soils is generally satisfactory and but few samples exhibit any present deficiency. The continued use of bulky green manures, a practice much in vogue, is, however, desirable on account of the tendency of many of these soils to become alkaline.

2. The supply of both *available* and *total* phosphoric acid is very inadequate particularly in the eastern portion of the district. With the exception of the strip of land bordering the Vaigai river and hence receiving the river silt, practically the whole area is urgently in need of phosphatic manures.

3. Potash is present in reasonable quantity throughout the district and special potassic manures are not therefore at present required.

4. The lime-magnesia ratio is unsatisfactory throughout much of the district, magnesia being generally in excess. Here again the eastern portion of the tract is the worse. Dressings with lime would therefore probably be beneficial and would tend to counteract the tendency to salinity exhibited by many soils of the district.

5. The immediate manurial requirements of the district are shown in map X which is a combination of maps II and III.

ROLAND V. NORRIS,
Government Agricultural Chemist.

COIMBATORE, *July* 1922.

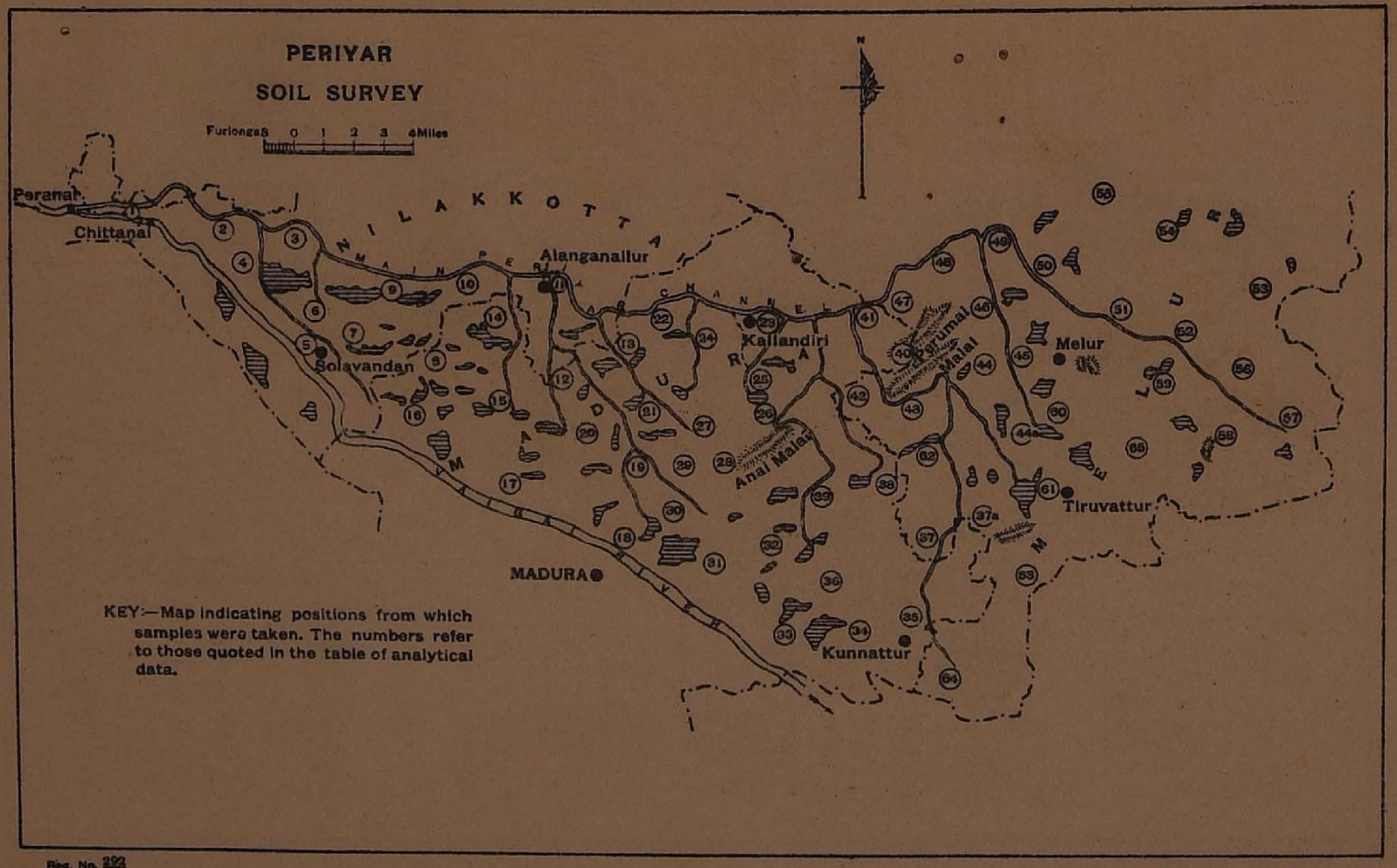
Table of Analytical Data.

Number of sample.	Per cent nitrogen.	Per cent lime.	Per cent magnesia.	Ratio $\frac{\text{lime}}{\text{magnesia}}$.	Per cent phosphoric acid.		Per cent potash.		Name of village.
					Total.	Available.	Total.	Available.	
				Nilakkottai taluk.					
1	0·095	0·65	0·80	0·80	0·122	0·012	0·573	0·013	Vilampatti.
2	0·089	0·20	0·29	0 69	0·026	0·002	0·519	0·009	Ramaraja-puram.
3	0·094	0·65	0·24	2·70	0·046	0·006	0·256	0·009	Nirettan.
4	0·085	0·54	0·54	1·00	0·085	0·026	0·345	0·012	Karupatti.
5	0·085	3·48	1·22	2·80	0·093	0·027	0·303	0·043	Sholavandan (Pettai).
6	0·124	0·40	0·39	1·00	0·057	0.017	0·177	0·013	Kattakulam.
7	0·034	1·20	1 07	1·20	0·090	0·061	0 309	0·023	Nedunku-lam.
8	0·075	1·73	0·78	0·96	0·038	0·026	0·343	0·022	Sithalangudi
9	0·063	0·40	0 62	0·64	0·024	0·005	0·126	0·008	Kondaiyam-patti.
10	0·079	0·39	0·55	0·71	0·032	0·006	0·175	0·012	Pudupatti.
11	0·148	2·74	1·51	1·80	0 087	0·009	0·369	0·015	Alanganal-lur.
				Madura taluk.					
12	0·091	0·43	0·62	0·70	0·066	0·007	0·451	0·017	Kumaram.
13	0·074	0·22	0·45	0·48	0·092	0 008	0·263	0·018	Panaikadi.
14	0·052	1·43	0·51	2·80	0·029	0·017	0·252	0·015	Sirnvalai.
15	0·113	0 85	1·10	0·77	0·049	0·008	0·344	0·015	Adalai.
16	0·066	0·79	1·15	0·68	0·082	0 025	0·334	0·017	Samayanal-lur.
17	0·062	2·05	1·01	2·00	0·148	0 058	0·473	0·018	Vilangudi.
18	0 089	1·76	0 98	1·80	0·203	0·076	0·563	0·031	Sellur.
19	0·086	0·19	0·30	0·63	0·054	0·018	0·205	0·013	Attikulam.
20	0·039	1·37	0·49	2·80	0·029	0·015	0·131	0·015	Melappanan-gudi.
21	0·106	0·35	0·58	0·60	0·023	0·006	0·242	0·011	Virapandi.
22	0·078	0·20	0·45	0·44	0·044	0·006	0·268	0·009	Velichinat-tam.
23	0·126	0·55	0·58	0·94	0·040	0·006	0·573	0·005	Kallandiri.
24	0·162	0·31	0·45	0·67	0·054	0·006	0·502	0·013	Manjampat-ti.
25	0·115	0·33	0·48	0·70	0·041	0 012	0·327	0·018	Pandi.
26	0·143	0·27	0·40	0·67	0·047	0 003	0·507	0·009	Arumbanur.
27	0·059	0·21	0·40	0·50	0·018	0·005	0·147	0·011	Kadaikinaru.
28	0·030	0·76	0·36	2·10	0·029	0·010	0·264	0·009	Narasingam (Tirumugar).
29	0·050	1·59	0·59	2·70	0·049	0·034	0·132	0·022	Kodikulam.
30	0·051	2·34	0·47	5·00	0·037	0·016	0·238	0·021	Ilandaikulam
31	0·110	0·27	0·65	0·41	0·063	0·008	0·435	0·019	Pulangulam.
32	0·109	0·19	0·31	0·61	0·032	0·004	0·278	0·017	Kalikappan
33	0·077	0·17	0·26	0·65	0·057	0·003	0·220	0·017	Elamanur.
34	0·062	0·15	0 24	0·62	0 019	0·0013	0·192	0·020	Alavandan.
35	0 058	0·43	0·29	1·50	0·035	0 013	0·209	0·018	Kunnattur.
36	0·023	0·24	0·23	1·00	0·013	0 009	0·099	0·012	Varichiyur.

Number of sample.	Per cent nitrogen.	Per cent lime.	Per cent magnesia.	Ratio—lime / magnesia.	Per cent phosphoric acid.		Per cent potash.		Name of village.
					Total.	Available.	Total.	Available.	
				Madura taluk—cont.					
38	0·100	0·23	0·34	0·67	0·016	0·005	0·298	0·015	Tirukkanai.
39	0·121	0·19	0·20	0·95	0·043	0·005	0·302	0·019	Kothankulam.
40	0·090	0·27	0·44	0·61	0·012	0·003	0·314	0·022	Arappallam.
41	0·109	0·34	0·47	0·72	0·069	0·011	0·462	0·019	Mankulam.
				Mēlūr taluk.					
37	0·021	0·06	0·12	0·48	0·008	0·002	...	...	Mukampatti.
42	0·169	0·19	0 25	0·76	0 041	0·010	0·455	0·020	Pusaripatti.
43	0·101	0·15	0·25	0·60	0·036	0·003	0·400	0·016	Vellaripatti.
44	0·039	0·30	0·31	0·97	0·014	0·001	0·140	...	Manikkampatti.
45	0·106	0·53	0·43	1·20	0·013	0·002	0·350	0 014	Surakkundu.
46	0 104	0·19	0·20	0·95	0·010	0·003	0·168	0·013	Arittapatti.
47	0·089	0·65	0·31	2·10	0·037	0·018	0·389	0·028	Kidaripatti.
48	0·114	0·40	0·51	0·78	0·035	0·008	0 490	0·019	Vellalapatti.
49	0·165	0·40	0·35	1·10	0·045	0·008	0·598	0·027	Pulippatti.
50	0·073	0·10	0·13	0·77	0·020	0·003	0·163	0·014	Ettimangalam.
51	0·092	0·15	0·16	0·93	0·027	0·002	0·259	0·015	Melur.
52	0·125	0·21	0 26	0·80	0 044	0·003	0·474	0·022	Kilayur.
53	0·089	0·13	0·19	0·68	0·014	0·007	0·119	0·008	Tumbapatti.
54	0·043	0·12	0·24	0·50	0·016	0·001	0·180	0·014	Kilavalavu.
55	0·053	0·24	0·41	0·58	0·006	0·004	0·171	0·014	Malampatti.
56	0·085	0·17	0 26	0·65	0·029	0·002	0 223	0·014	Thanayamangalam.
57	0·085	0·14	0·17	0·82	0·020	0·001	0·212	0·008	Orangampatti.
58	0·079	0·23	0·26	0·88	0·018	0·004	0·206	0·021	Kotainattampatti.
59	0·092	0·12	0·19	0·63	0·016	0·001	0·163	0·008	Vannanparaipatti.
60	0·061	0·22	0·19	1·10	0·012	0·001	0·174	0 014	Padinettankudi.
61	0·077	0·73	0·39	1·80	0·035	0·018	0 324	0·014	Tiruvadur.
62	0·035	0·18	0·28	0·64	0·008	0·001	0·073	0·006	Marudur.
63	0·099	0·19	0·40	0·47	0·034	0·002	0·295	0·018	Punjutti.
64	0·054	0·17	0·20	0·85	0·037	0·006	0·125	0·006	Thuvaraugulam.
65	0·063	0·09	0·15	0·59	0·019	0·009	0·250	0·012	Arasappampatti.

MADRAS : PRINTED BY THE SUPERINTENDENT, GOVERNMENT PRESS—1922.

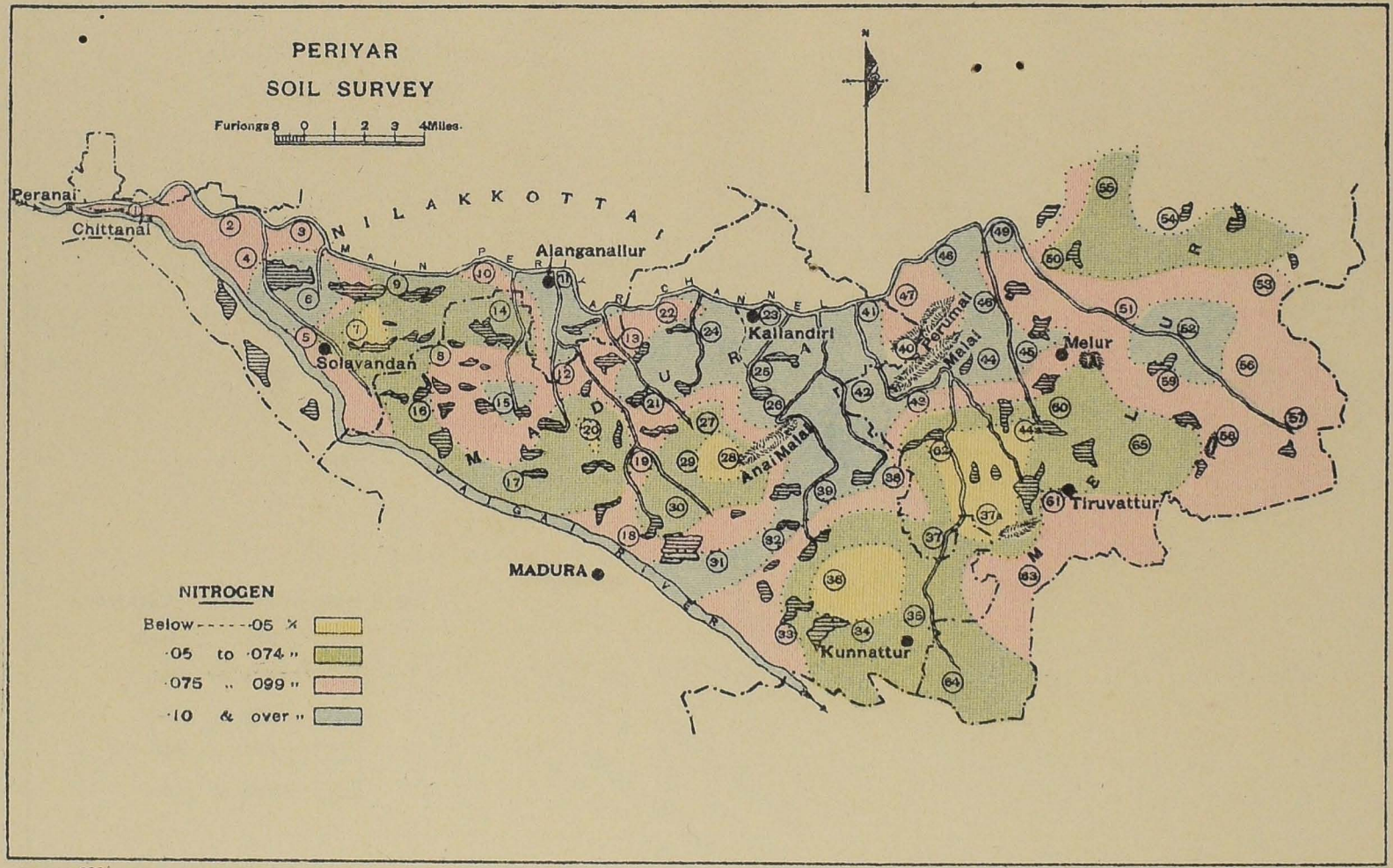
MAP No. 1



Reg. No. 292/1
Copies 400

Helio-Zinco., Survey Office, Madras.
1923.

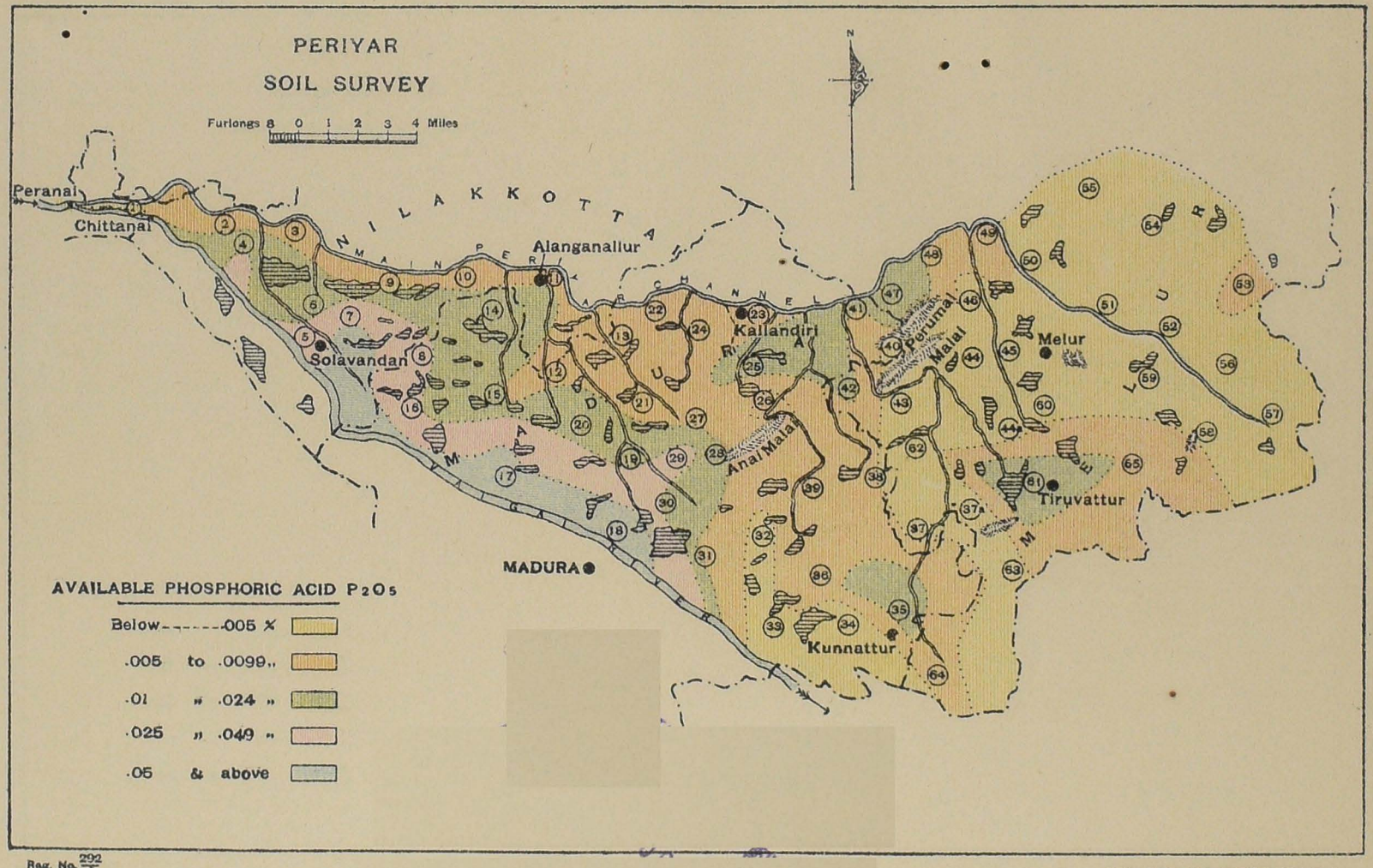
MAP No. 2



Reg. No. 292/2
Copies 400

Helio-Zinco., Survey Office, Madras.
1923.

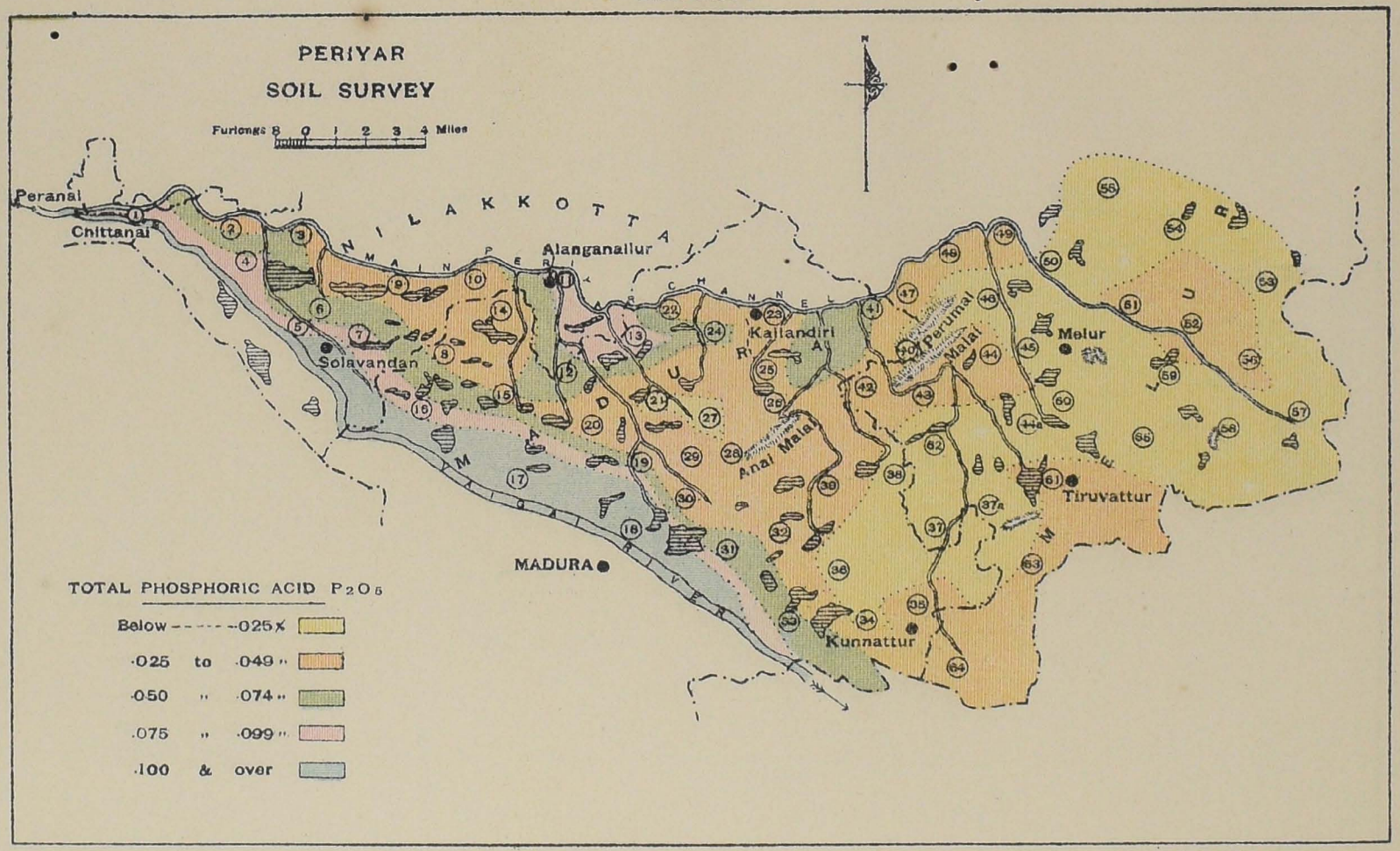
MAP No. 3



Reg. No. 292/3
Copies 400

Helio-Zinco., Survey Office. Madras.
1923.

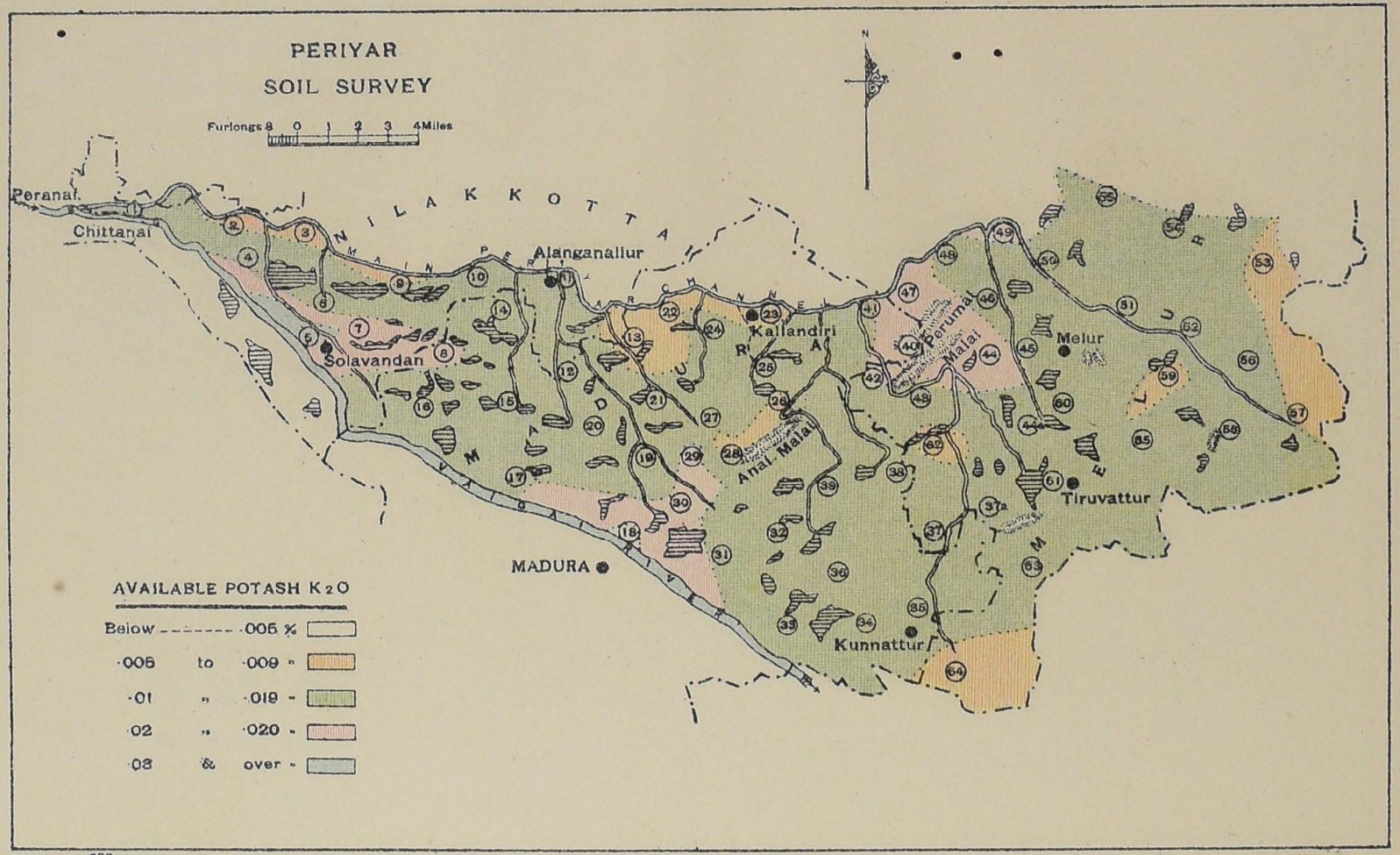
MAP No. 4



Reg. No. 222/4
Copies 400

Helio-Zinco., Survey Office, Madras.
1923.

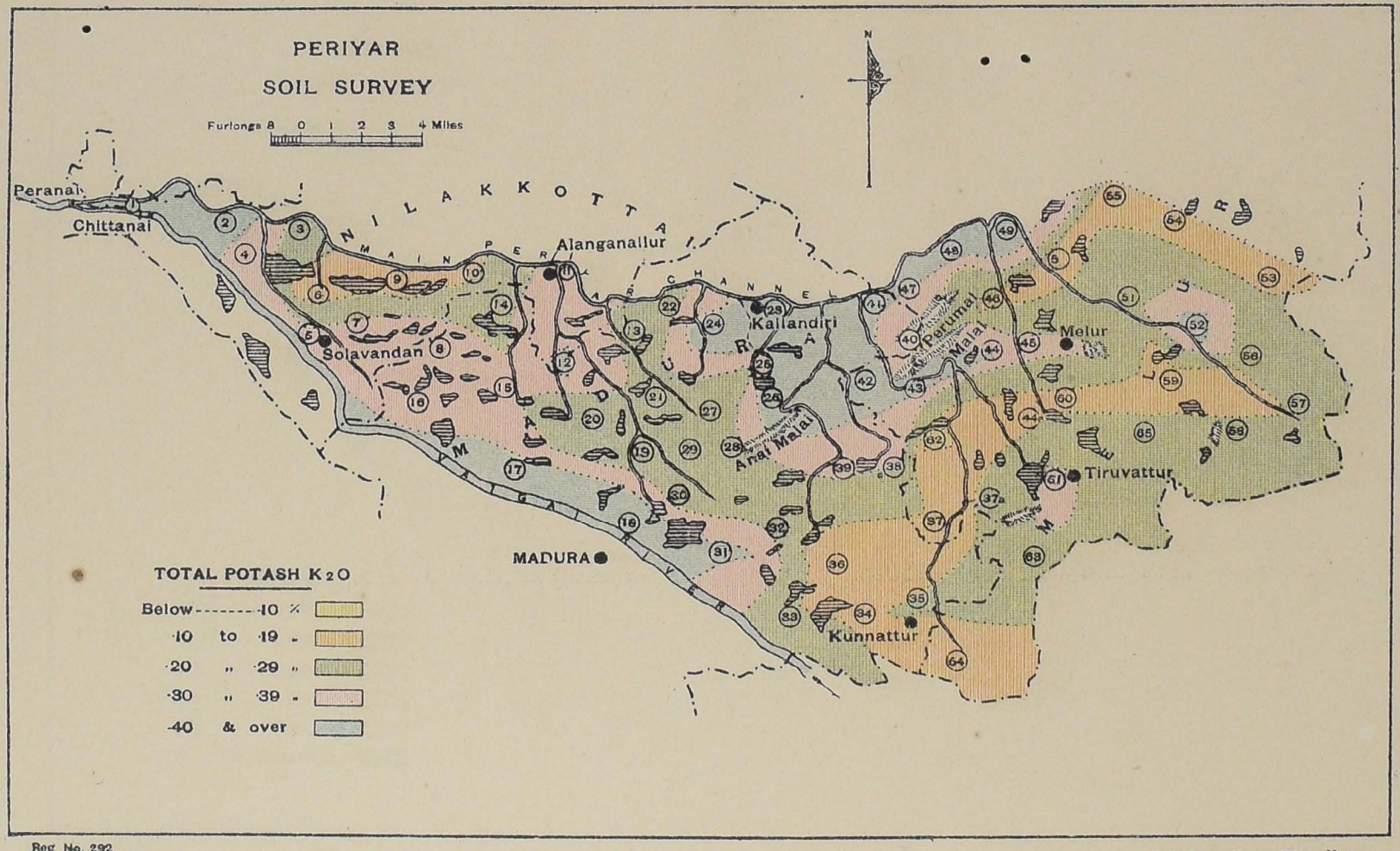
MAP No. 5



Reg. No. 292/5
Copies 400

Helio-Zinco., Survey Office, Madras
1923.

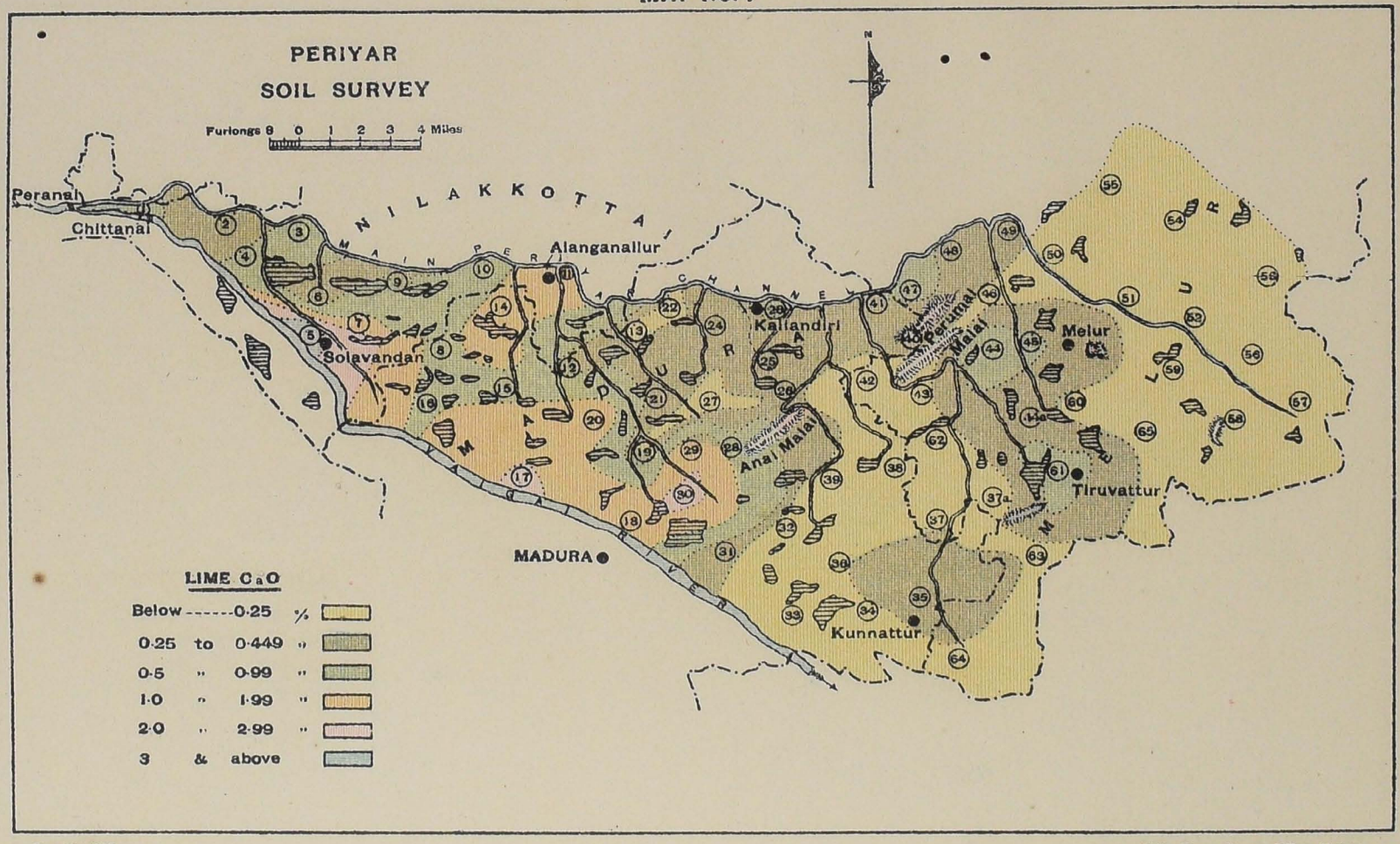
MAP No. 6



Reg. No. 292/6
Copies 400

Helio-Zinco., Survey Office, Madras.
1923

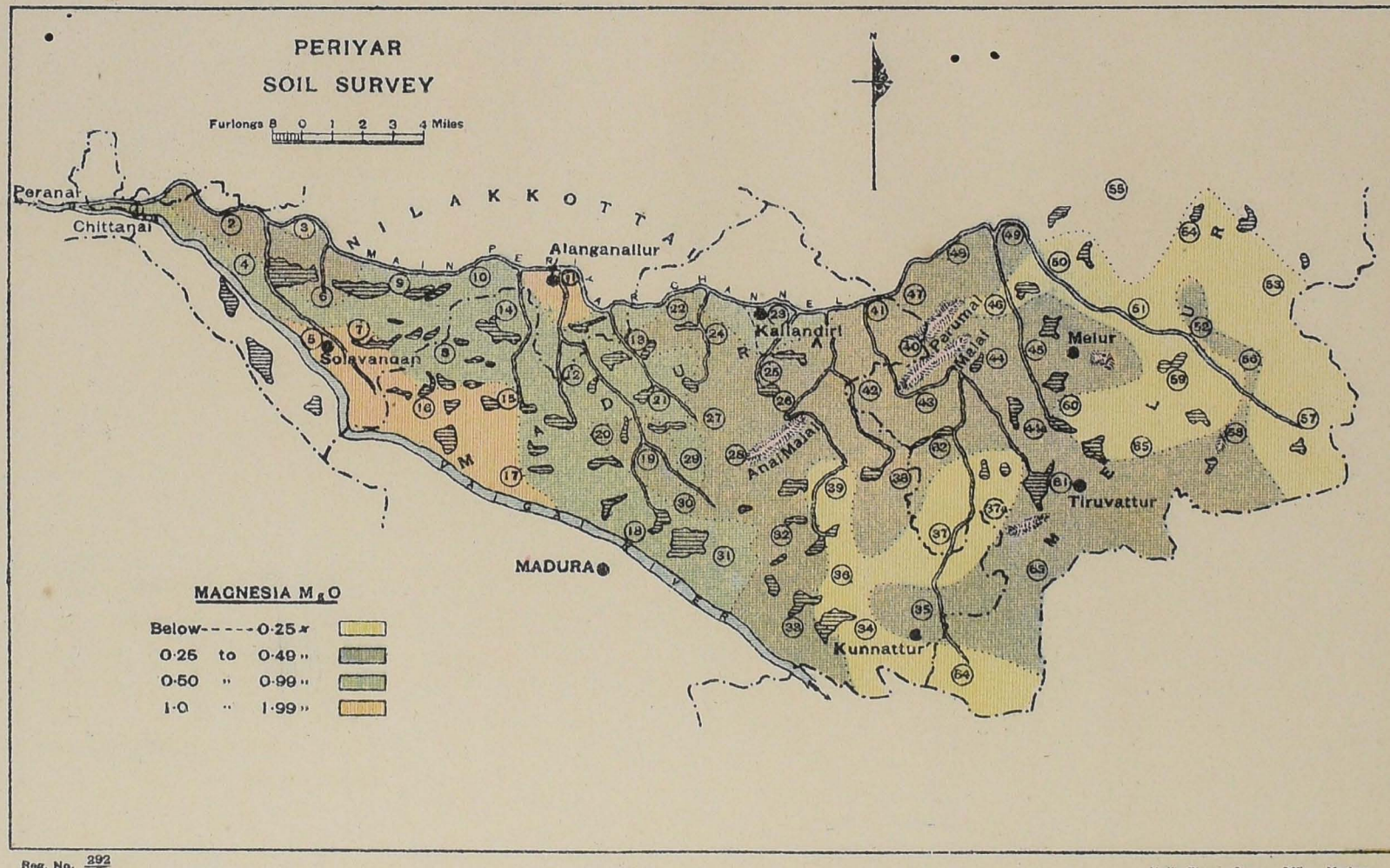
MAP No. 7



Reg. No. 292/7
Copies 400

Helio-Zinco., Survey Office, Madras.
1923.

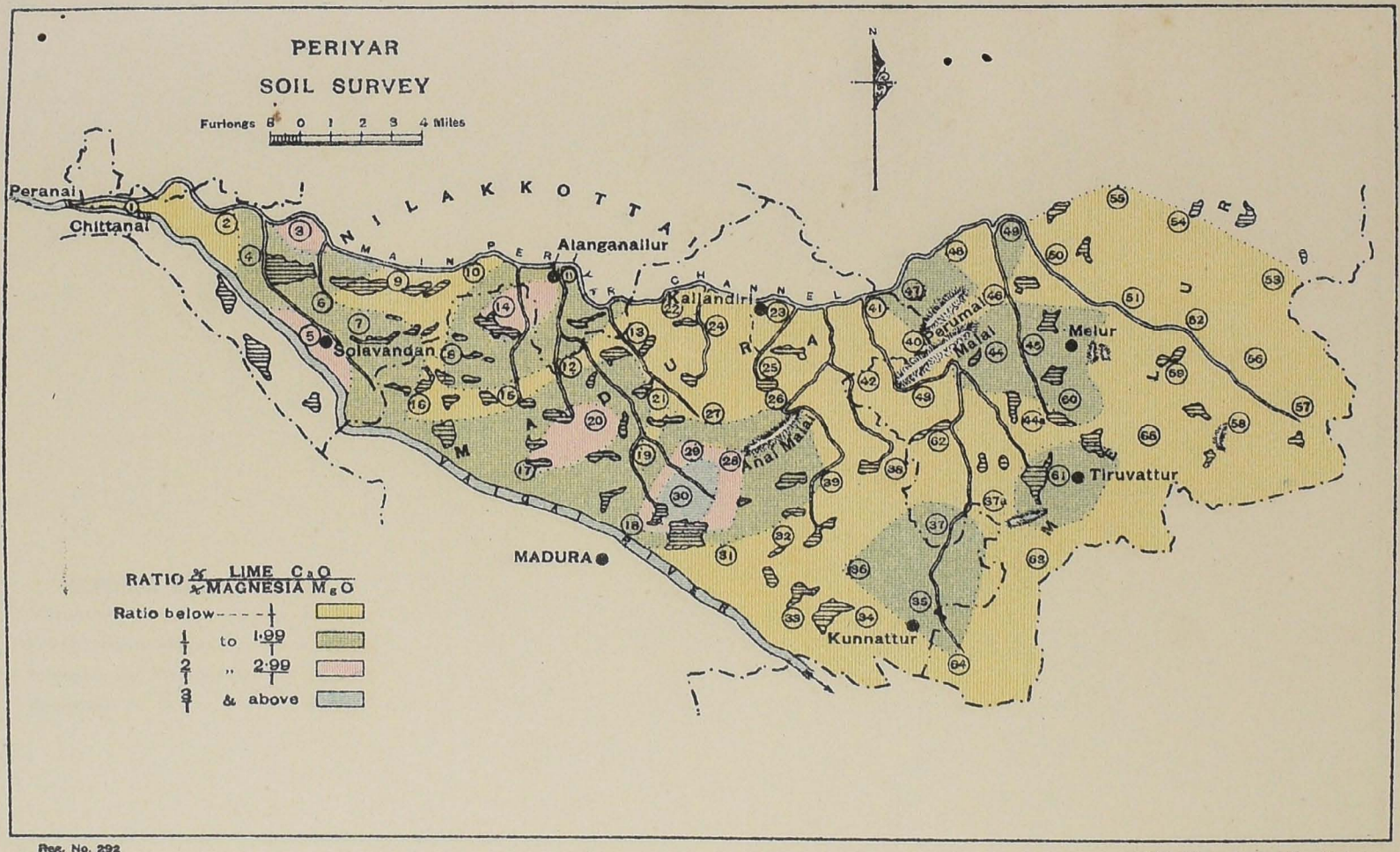
MAP No. 8



Reg. No. 292/8
Copies 400

Helio-Zinco., Survey Office, Madras.
1923.

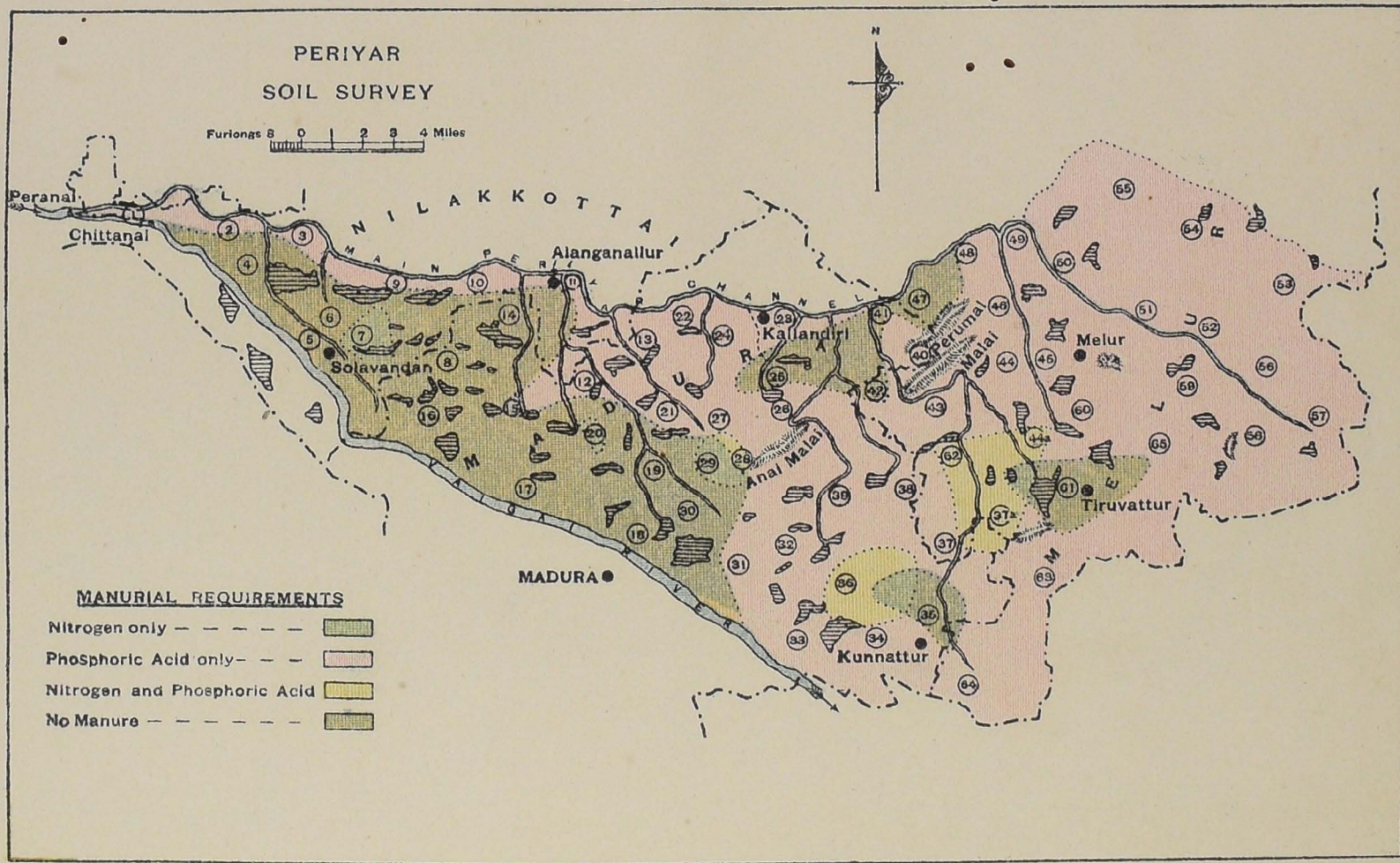
MAP No. 9



Reg. No. 292/9
Copies 400

Helio-Zinco., Survey Office, Madras.
1923.

. MAP No. 10



Reg. No. 292/10
Copies 400

Hollo-Zinco., Survey Office, Madras.
1923.