

Department of Agriculture

Vol. III—Bulletin No. 60

A SOIL SURVEY

OF THE

TANJORE DELTA

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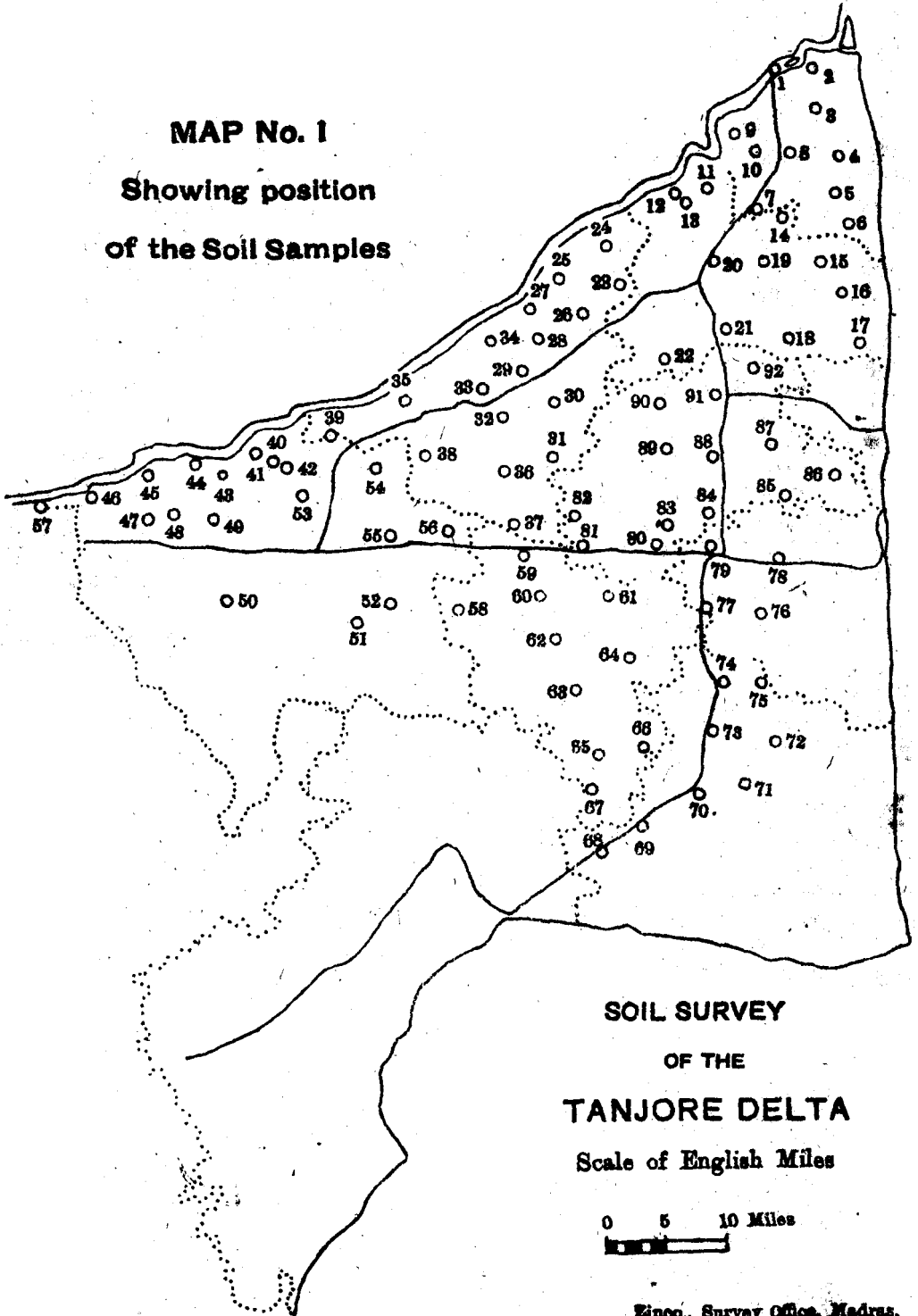
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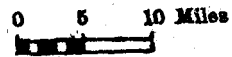
NOTE.—Nos. 3, 5, 7, 12 to 18 and 20 dealt with matter of temporary interest. The
apply of all other numbers omitted has been exhausted.

MAP No. 1
Showing position
of the Soil Samples



SOIL SURVEY
OF THE
TANJORE DELTA

Scale of English Miles



Zinco, Survey Office, Madras.
1921.

A SOIL SURVEY OF THE TANJORE DELTA.

For the purpose of making a soil survey of the Tanjore Delta extended tours were made from 28th April to 28th June 1912 and from 4th April to 25th April 1913 during which over 134 samples of soil were collected.

At head-quarters the number of samples selected for analyses were reduced to 91 as many of the field samples were taken at places too near together, or were representative of very small isolated areas of soil differing greatly from the general character of the Delta soils; for the object of the survey was to obtain some knowledge of the general manurial requirements of the Delta. The positions of the soils sampled are shown in Map No. I.

The analyses of the selected soils were confined to the estimation of the total and available phosphoric acid, and potash and nitrogen, lime and magnesia. Consequently the survey must not be taken as determining the relative value of the soils in various parts of the Delta as the fertility of a soil is not merely determined by its manurial requirements. It depends also on many other factors.

The tables given at the end of this bulletin show the analytical results in extenso.

The manurial requirements of the Delta with respect to phosphoric acid and potash.

A.—The distribution of available phosphoric acid and potash.

With regard to the chemical composition of soil it is necessary to draw a sharp line of demarcation between that portion of the plant food which is in a condition to be readily utilized by the crop and that portion which is in an insoluble condition and which is of no value so far as the immediate needs of the crop are concerned. The former is spoken of as the available food and its determination is of the greatest importance in deciding the particular requirements of a soil with respect to the application of manures.

The laboratory determination of the available phosphate and potash is based upon the extraction of the soil with dilute solutions of acids and the estimation of the phosphoric acid and potash dissolved by the process. For the purpose of this survey the particular method adopted was that of Dyer in which the solvent is a 1 per cent solution of citric acid and the bases of comparison is that a soil which contains less than .01 per cent available phosphoric acid, i.e., phosphoric acid soluble in a 1 per cent citric acid solution, is in need of a phosphatic manure.

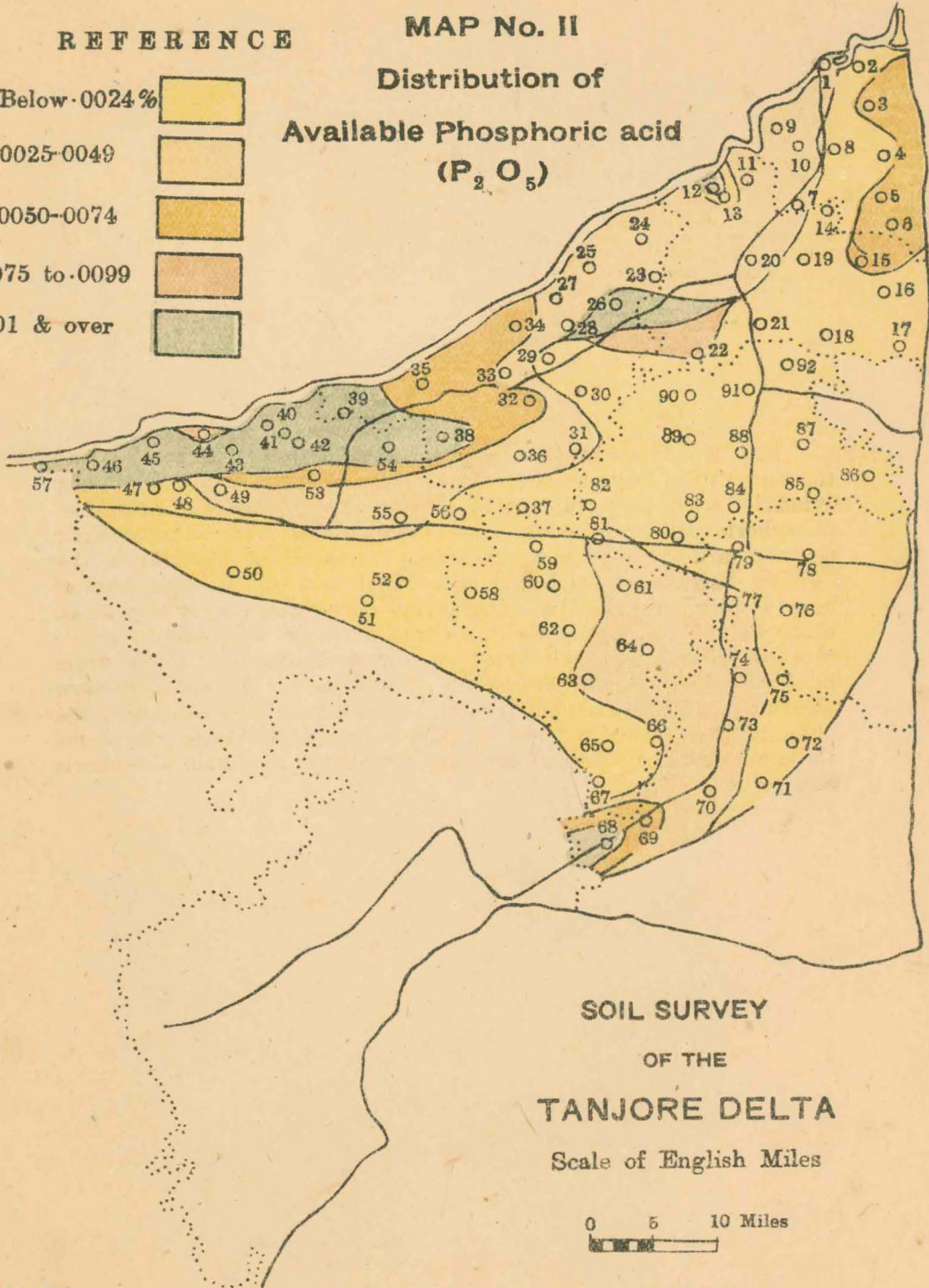
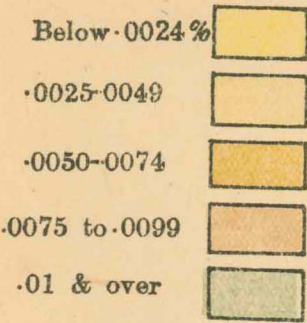
The corresponding value for potash is not so clearly marked. Dyer originally stated that soils containing less than .005 per cent available potash required applications of potash manures but later he raised this value to .01 per cent. When, however, the results of the manurial experiments with paddy at Coimbatore and in the Krishna Delta are considered, it is evident that the requirements of paddy with respect to potash are comparatively small and consequently, for the purposes of this survey the figure of .005 per cent available potash has been taken and only soils having a value lower than this have been looked upon as requiring potassic manures.

Map No. II shows the distribution of available phosphoric acid throughout the Delta contoured between certain limits. It is at once evident that the only soils which contain over 0.1 per cent available phosphoric acid and which consequently do not require phosphatic manures are those in close proximity to the Coleroon river in the Tanjore district and extending into Papanasam taluk. This tract of land is very circumscribed in area and constitutes only a very small proportion of the Delta. Small isolated areas of soil rich in available phosphoric acid are found on the western side of Mayavaram taluk and there is another small area towards the south-western extremity of Tirutturaippundi taluk. Apart from these and with the possible exception of the two isolated red areas the remainder of the Delta consists of soils which are very deficient in available phosphoric acid.

REFERENCE

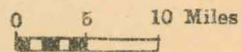
MAP No. II

Distribution of
Available Phosphoric acid
(P_2O_5)



SOIL SURVEY
OF THE
TANJORE DELTA

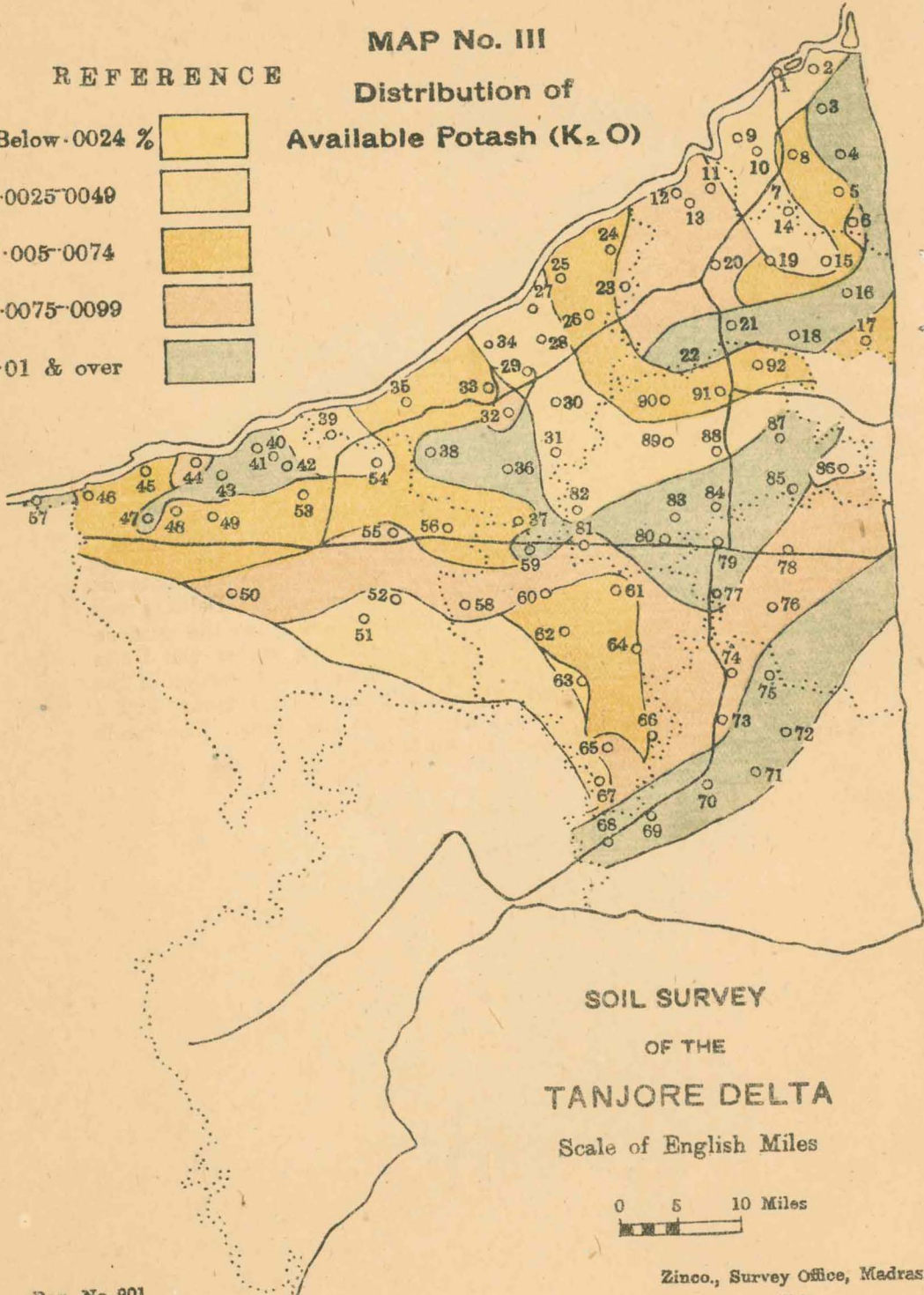
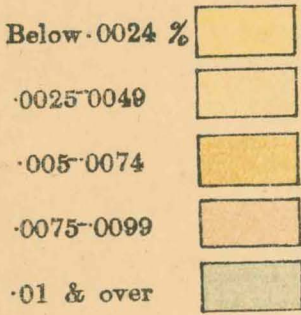
Scale of English Miles



MAP No. III

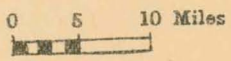
Distribution of Available Potash (K_2O)

REFERENCE



SOIL SURVEY OF THE TANJORE DELTA

Scale of English Miles



Zinco., Survey Office, Madras. 1921.

Map No. III shows the distribution of available potash. Taking .005 per cent as the minimum value for soil requiring no potassic manures, it is at once evident that the greater part of the Delta is well supplied with this plant food. The deficient areas are the western portion of Shiyali taluk, a strip of land running across the Delta through the Kumbakonam and Nannilam taluks, that portion of the Tanjore and Mannargudi taluks bordering on the dry lands, and a small portion of Papanasam taluk adjacent to the river. The lands very rich in available potash are shown blue.

Map No. IV is a combination of Maps Nos. II and III. There is a narrow strip of land adjacent to the river in the Tanjore and Papanasam taluks which is rich in both available phosphoric acid and potash and which requires no special manuring. There are three other very small areas of a similar type.

Land poor in both available phosphoric acid and potash is shown yellow and consists of two narrow strips of land, one in the Shiyali taluk and extending into the Mayavaram taluk, and the other stretching across the central part of the Delta. In the extreme south the land is also of a similar type.


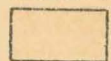
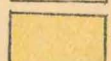
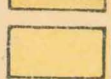
Land which requires potash manures only is practically non-existent being confined to a small area in the Papanasam taluk adjacent to the river. The greater portion of the soil of this Delta is fairly well supplied with available potash and it requires only special manuring with respect to phosphoric acid.

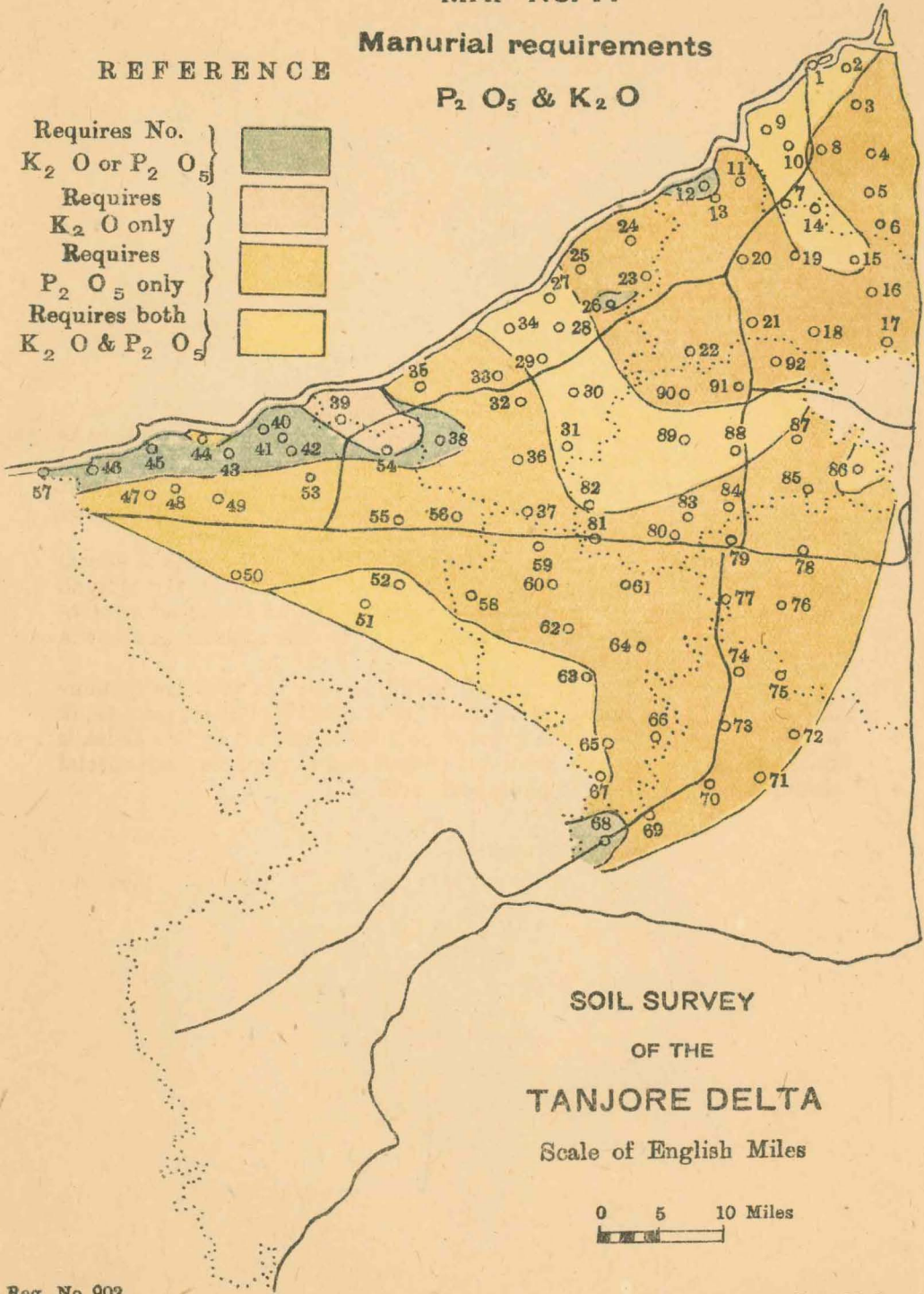
MAP No. IV

Manurial requirements

$P_2 O_5$ & $K_2 O$

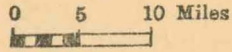
REFERENCE

Requires No. $K_2 O$ or $P_2 O_5$	
Requires $K_2 O$ only	
Requires $P_2 O_5$ only	
Requires both $K_2 O$ & $P_2 O_5$	



SOIL SURVEY
OF THE
TANJORE DELTA

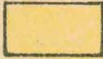
Scale of English Miles



MAP No. V
Distribution of
Total Phosphoric acid (P_2O_5)

REFERENCE

Under .024



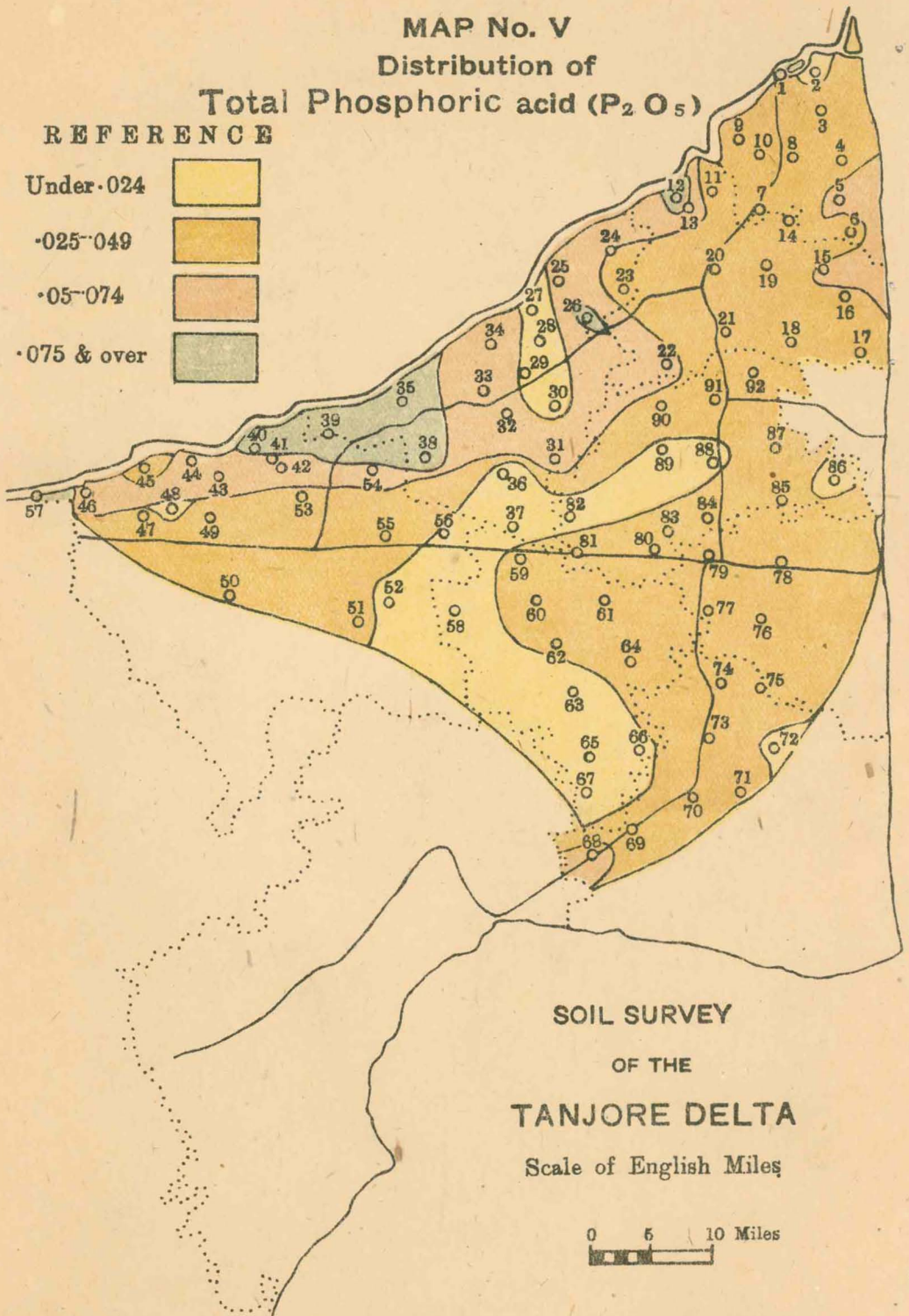
.025-.049



.05-.074

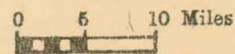


.075 & over



SOIL SURVEY
OF THE
TANJORE DELTA

Scale of English Miles



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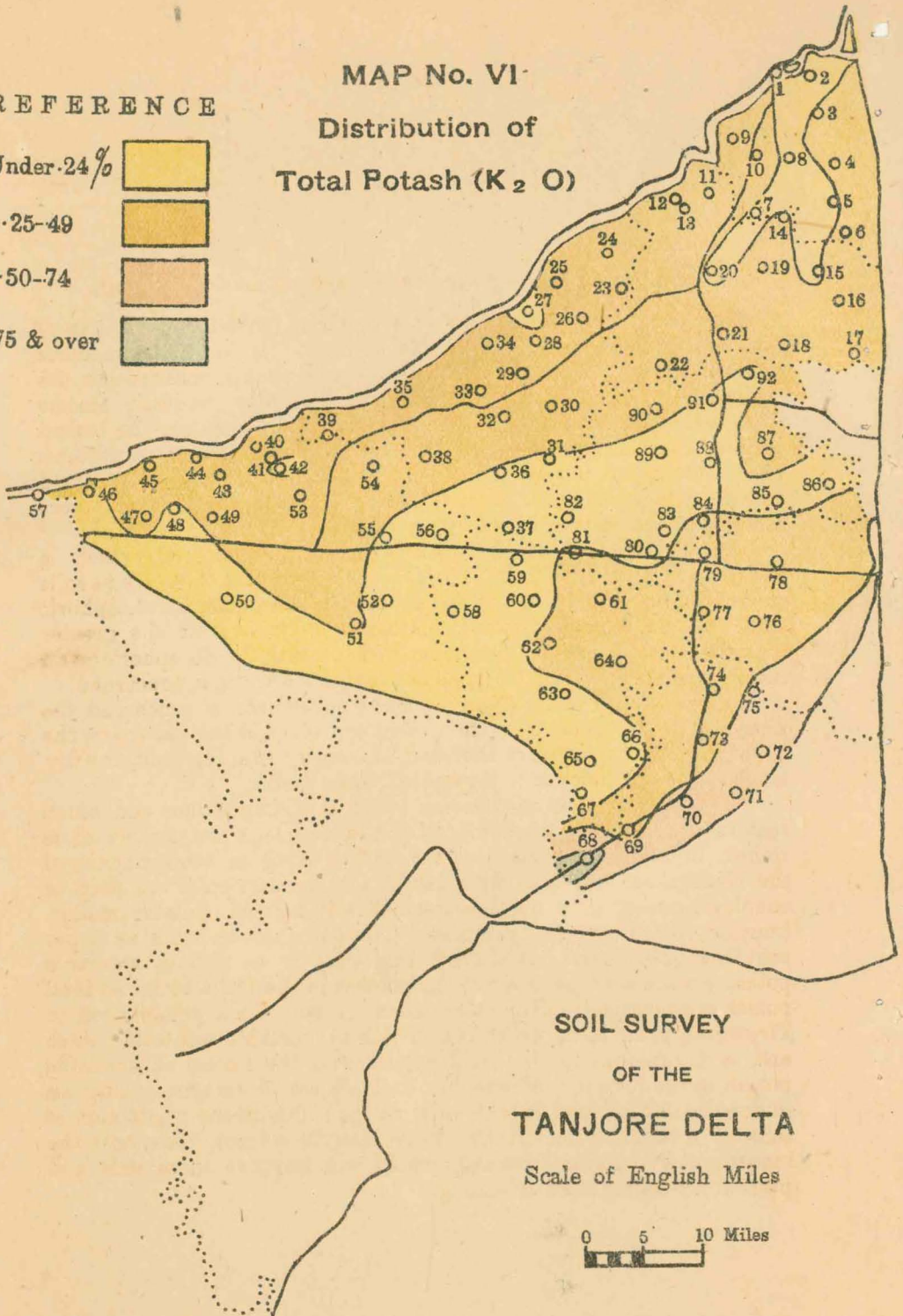
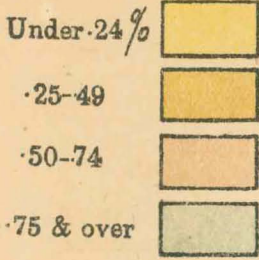
Zinco., Survey Office, Madras.

1921.

MAP No. VI

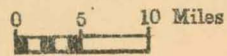
Distribution of
Total Potash (K_2O)

REFERENCE



SOIL SURVEY
OF THE
TANJORE DELTA

Scale of English Miles



B.—The distribution of the total phosphoric acid and potash.

The total amount of phosphoric acid and potash in a soil is of less importance than the available value so far as the immediate needs of a crop are concerned but the non-available constituents are of importance from another point of view as they gradually become "available" as time goes on and thus constitute what may be looked upon as the dormant plant food in a soil. Under cultural conditions where manuring is not practised the amount of total plant food and the rate at which it is made available are two important factors relating to the comparative fertility of different soils.

The distribution of the total phosphoric acid and potash is shown in Maps Nos. V and VI and it is evident that these Delta soils contain on the average nearly ten times as much potash as phosphoric acid. This is another point distinctly in favour of the greater importance attached to manuring with respect to phosphoric acid rather than with respect to potash so far as the Delta is concerned.

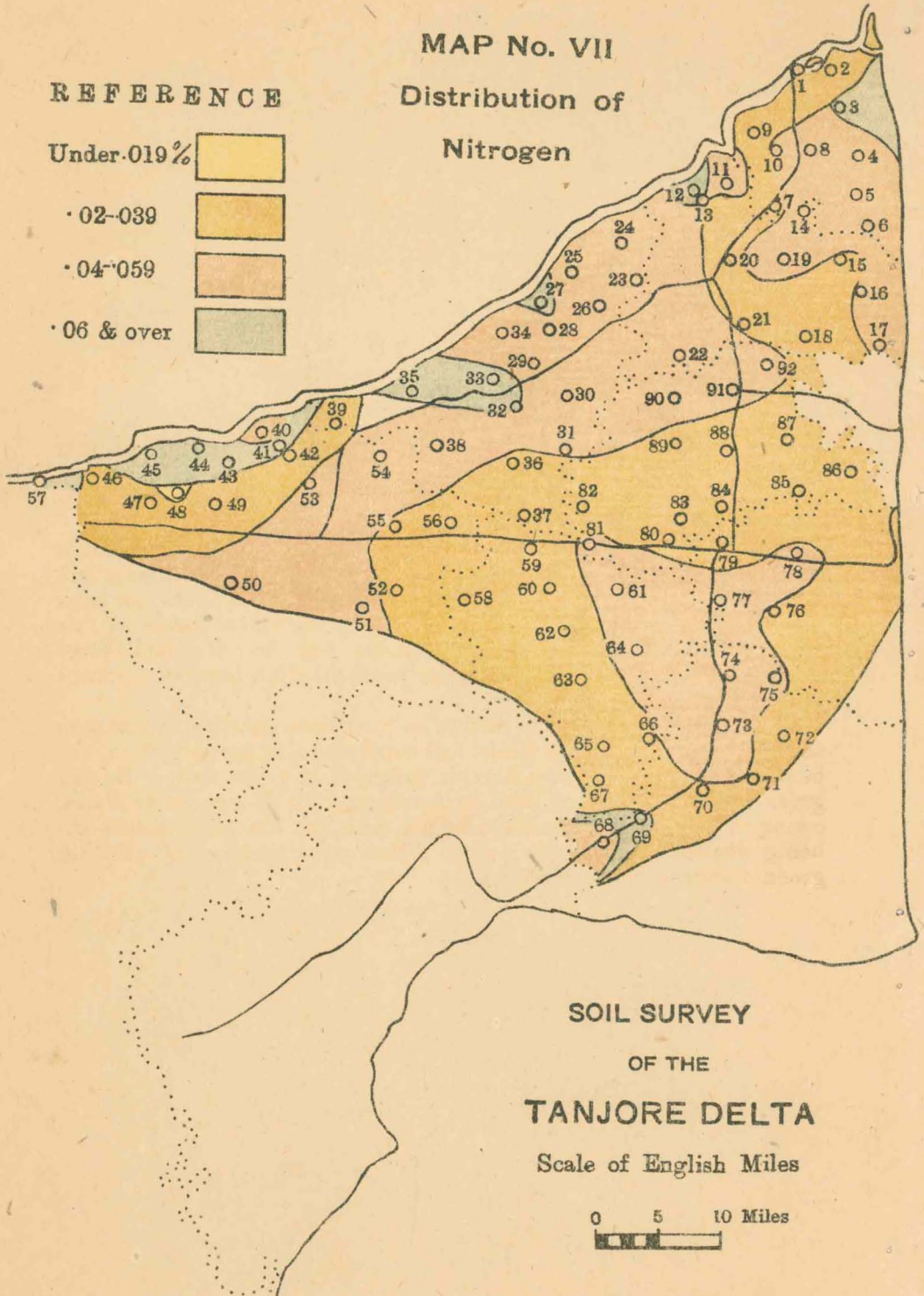
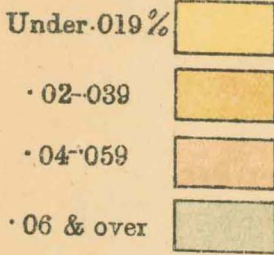
So far as the distribution of these substances is concerned the richest soils are those near the Coleroon river and the sea coast, the poorer soils being found in the tract of country running from the dry lands in the south towards the centre of the Delta.

There is one aspect of the case which is of importance and which requires careful consideration. Of the whole Delta the part which is richest in available potash is that portion lying on the boundary of the Negapatam and Nannilam taluks and in particular the strip of country running in a north-eastern direction from Melaterumadik-kunnam (No. 80) to Kanganalcheri (No. 84) where as much as .1 per cent has been found. Although this strip is so rich in available potash yet the soils are some of the poorest in the Delta so far as total potash is concerned. The same cannot be said of the potassic soil in Tirutturaippundi taluk which is rich both in available and total potash and as a consequence it would appear that the excess of available potash in the former case was due to inefficient drainage causing an undue accumulation of soluble salts in the soil with the production of soils of a saline type. If this proves to be correct, then only the institution of efficient drainage works will improve these soils and prevent the saline area extending.

MAP No. VII

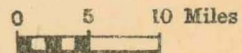
Distribution of Nitrogen

REFERENCE



SOIL SURVEY OF THE TANJORE DELTA

Scale of English Miles



Distribution of nitrogen.

The fertility of a soil depends greatly upon the amount of this most important plant food it contains and consequently a knowledge of the distribution of nitrogen in the Tanjore Delta is necessary in order to determine its manurial requirements.

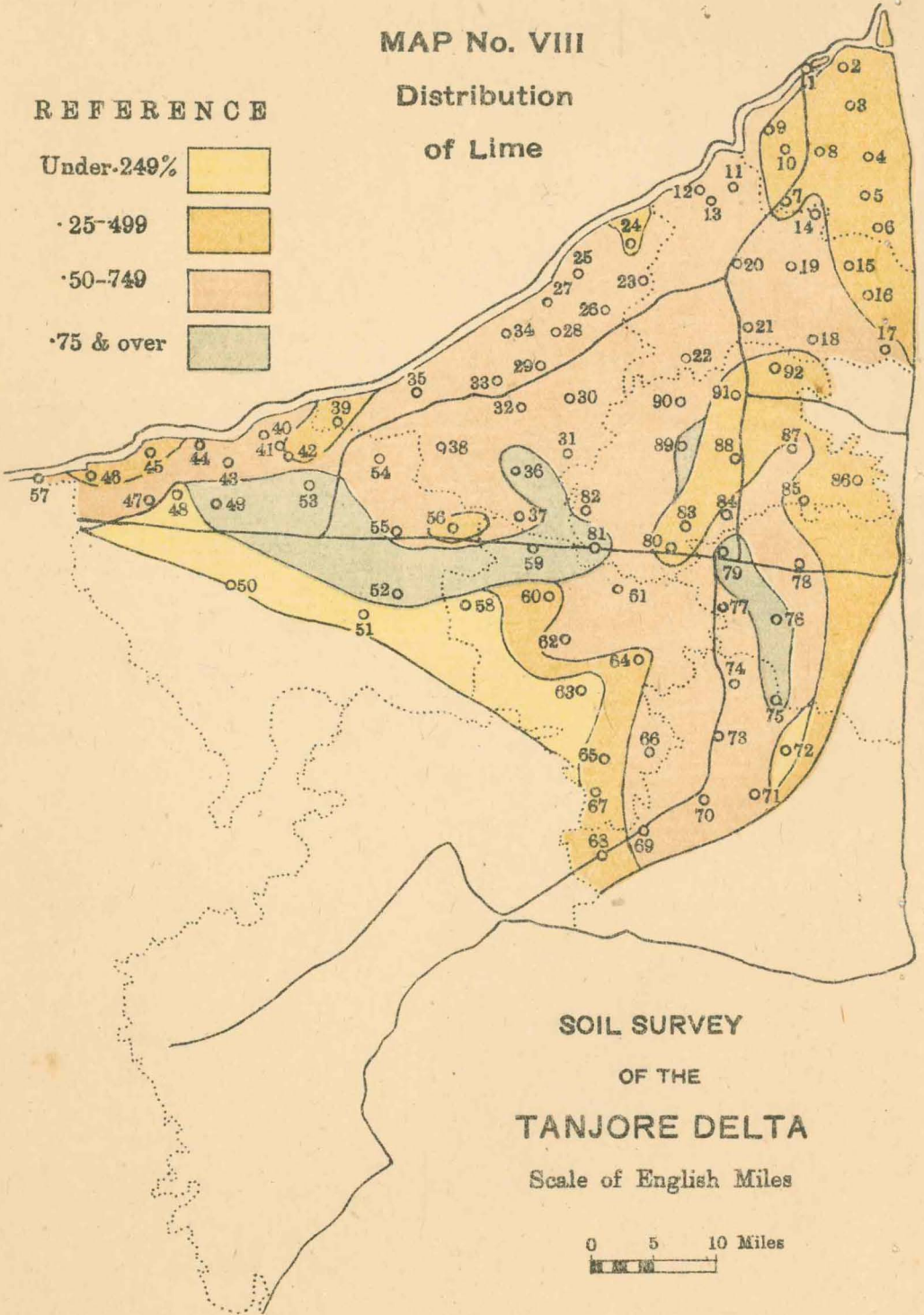
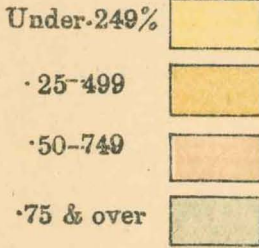
The distribution of the nitrogen is shown in Map No. VII where it will be seen that practically the whole of the Delta soil contains less than .06 per cent of nitrogen and that about half the Delta contains less than .04 per cent. Generally speaking the richer lands in this respect lie along the bank of the Coleroon river and it would therefore appear as if the irrigation water constituted an important source of the nitrogen.

The Delta soils cannot be said to be too well supplied with nitrogen and it is necessary that a method of supplying this ingredient should be worked out, if any considerable progress is to be made. So far green-manuring has not been successful at the Manganallur Farm, owing to the deficient drainage of the soil, but the experiments are being continued and it is probable that some method of utilizing green manures will be obtained.

MAP No. VIII

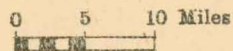
Distribution of Lime

REFERENCE



SOIL SURVEY OF THE TANJORE DELTA

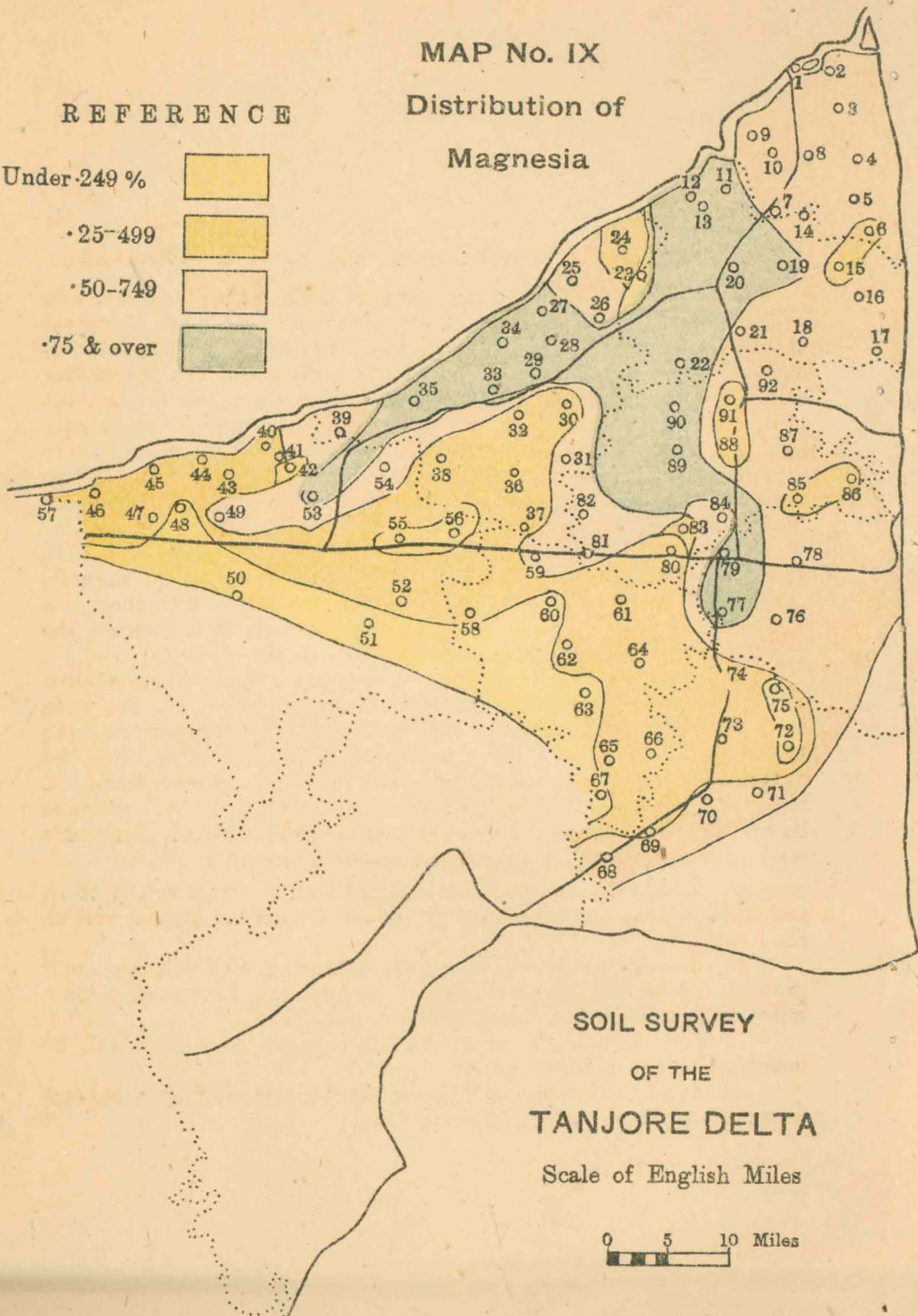
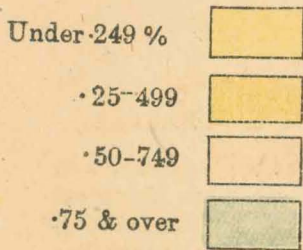
Scale of English Miles



MAP No. IX

Distribution of Magnesia

REFERENCE



The distribution of lime and magnesia and the magnesia-lime ratio.

The amount of lime and magnesia in a soil is of importance in dry cultivation from the beneficial action they have on those biological changes such as nitrification which occur under dry conditions. In wet lands, however, so long as the land is under water the probability of nitrification occurring is infinitesimal and consequently the amount of lime and magnesia in paddy soils is not so important in this respect as in dry soils. None the less the presence of a considerable proportion of these ingredients is desirable for the purpose of preventing the formation of acidity in the soil and it is probable that this aspect of the case is of primary importance in these Delta soils.

The distribution of lime and magnesia is shown in Maps Nos. VIII and IX. Generally speaking with the possible exception of the soils in the southern portion of the Delta it may be taken that there is a sufficiency of either lime and magnesia in the soils to counteract the effect of fermentations under anaerobic conditions.

Apart from the amount of these ingredients in a soil their relative proportions have assumed importance in recent years. It has been stated by several investigators that the magnesia-lime ratio, i.e., the proportion of MgO to CaO in a soil has a decided effect upon the cropping power. The actual value of the most suitable ratio is, however, greatly in dispute and for present purposes it will perhaps be best to use as a basis the recently published results of Voelcker's work in which the following conclusions were arrived at:—

(a) Magnesia may with advantage be added to a soil poor in magnesia so long as the amount of the latter does not exceed that of the lime.

(b) So long as lime is in excess manuring with magnesia will produce a beneficial result whereas if magnesia is in excess a toxic influence is exerted and the crop is diminished.

(c) Soils containing an excess of magnesia over lime will be benefited by the addition of lime.

(d) Lime used in excess does not exert a toxic influence whereas magnesia under the same condition does.

In Map No. X the Delta has been divided into two clearly marked areas, the northern one having an excess of magnesia overlime and the southern area an excess of lime over magnesia. In view of the opinions just quoted it would therefore appear very probable that the northern half of the delta and also those lands running along the sea coast would materially benefit by applications of lime.

Summary.


1. Generally speaking the Delta is in very great need of phosphatic manures whereas the need for potassic ones is very limited.
2. The nitrogen content of the Delta soil is generally low and the crops would benefit greatly if some cheap system of manuring for this ingredient could be discovered.
3. The soils of the northern and eastern portions of the Delta show an excess of magnesia over lime and would probably benefit from dressings of lime.
4. There is evidence to show that certain portions of the Delta are badly drained and are tending to become saline.


COIMBATORE,
October 1913.

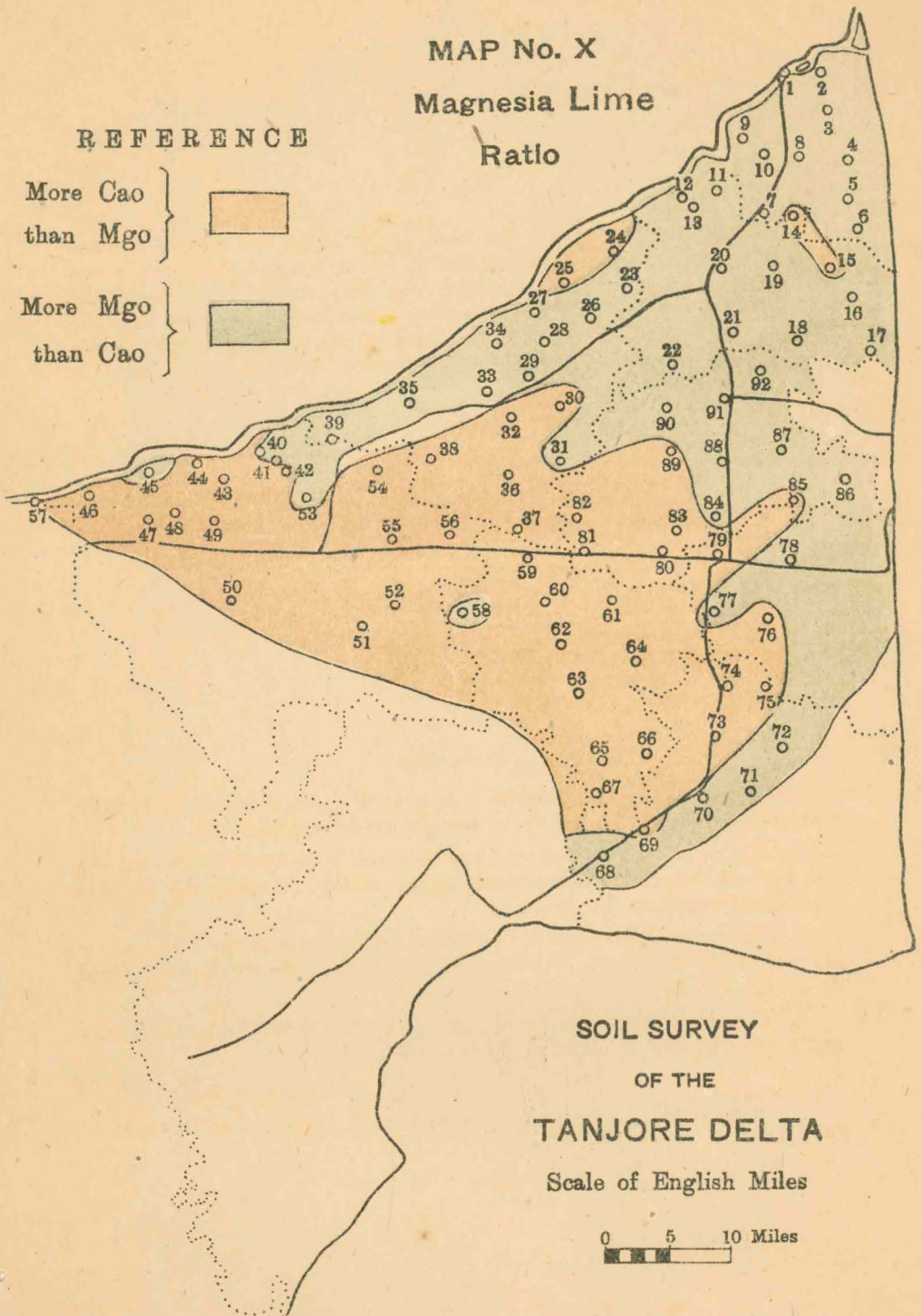
W. H. HARRISON,
Government Agricultural Chemist.

MAP No. X
Magnesia Lime
Ratio

REFERENCE

More Cao }
than Mgo } 

More Mgo }
than Cao } 



SOIL SURVEY
OF THE
TANJORE DELTA

Scale of English Miles

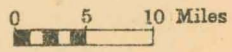


TABLE.

Serial number of soil.	% N. (Nitrogen.)	% CaO. Lime.)	% MgO. (Magnesia.)	Ratio MgO/CaO.	% P ₂ O ₅ . (Phosphoric acid)		% K ₂ O. (Potash.)		Name of village.
					Total.	Available.	Total.	Available.	
<i>Shiyali taluk.</i>									
1	.052	.68	.62	1/93	.078	.0113	.38	.0088	Hunnamthapuram.
2	.088	.46	.51	1/90	.021	.0011	.22	.0046	Mudalaimadu.
3	.074	.41	.66	1/62	.040	.0070	.47	.0820	Villyanallur.
4	.043	.46	.72	1/64	.028	.0013	.32	.0180	Edamnal.
5	.051	.34	.58	1/58	.063	.0069	.20	.0050	Mangamadam.
6	.058	.27	.49	1/55	.032	.0069	.25	.0084	Melaiyur.
7	.034	.46	.62	1/79	.032	.0038	.24	.0038	Kadiramangalam.
8	.045	.44	.64	1/68	.032	.0015	.20	.0058	Padirikudi.
9	.029	.49	.69	1/82	.037	.0029	.25	.0038	Perambur.
10	.047	.43	.52	1/82	.030	.0044	.23	.0042	Nemmeli.
<i>Mayavaram taluk.</i>									
11	.044	.67	.83	1/80	.044	.0028	.31	.0097	Elantoppu.
12	.062	.70	.96	1/72	.078	.0134	.33	.0077	Manamodu.
13	.038	.75	.95	1/78	.055	.0022	.33	.0081	Kilai.
14	.040	.55	.51	1/108	.041	.0017	.29	.0046	Pagasalai.
15	.032	.45	.38	1/115	.054	.0040	.22	.0039	Mudikondanallur.
16	.041	.43	.59	1/71	.032	.0002	.44	.0100	Tirukkadaiyur.
17	.055	.53	.73	1/71	.048	.0021	.33	.0050	Kattcheri.
18	.033	.65	.66	1/98	.038	.0020	.31	.0120	Tiruvilaiyattam.
19	.051	.68	.92	1/73	.046	.0011	.28	.0050	Kanjanagaram.
20	.039	.58	.86	1/66	.040	.0030	.24	.0089	Tiruvilandur.
21	.031	.55	.60	1/91	.027	.0011	.28	.0143	Nakkambadi.
22	.052	.68	.85	1/77	.054	.0080	.27	.0128	Perunjeri.
<i>Kumbakonam taluk.</i>									
23	.049	.50	.25	1/2	.044	.004	.28	.0097	Kadiramangalam.
24	.052	.45	.43	1/101	.049	.004	.26	.0066	Pandanallur.
25	.042	.65	.57	1/103	.060	.0034	.31	.0070	Tiruppanandal.
26	.046	.65	.78	1/89	.032	.0104	.37	.0066	Kanjanur.
27	.084	.65	.94	1/69	.044	.0034	.24	.0039	Solapuram.
29	.045	.50	.76	1/65	.039	.0023	.26	.0023	Umamahesvaram.
30	.042	.50	.46	1/108	.045	.0022	.30	.0043	Pavundarigapuram.
31	.041	.68	.67	1/85	.031	.0036	.16	.0038	Tiruchirai.
32	.059	.60	.46	1/130	.072	.0068	.38	.0093	Melakkorukkai.
33	.066	.73	1.05	1/69	.057	.0043	.36	.0058	Baburajapuram.
34	.045	.63	.92	1/69	.062	.0054	.29	.0043	Kadihambadi
<i>Papanasam taluk.</i>									
35	.080	.70	.77	1/9	.084	.0062	.48	.0062	Vadasarukkai.
36	.024	.33	.48	1/171	.023	.0032	.23	.0120	Padagacheri.
37	.024	.50	.43	1/116	.016	.0014	.11	.0066	Narttanguadi.
38	.048	.55	.37	1/148	.089	.034	.32	.0120	Velur.
39	.086	.48	.50	1/96	.080	.032	.25	.0043	Iluppakkurai.
54	.047	.68	.58	1/116	.066	.0108	.31	.0031	Agaramangudi.
55	.028	.65	.23	1/282	.028	.0028	.19	.0081	Pundi.
56	.081	.30	.16	1/187	.017	.0004	.12	.0054	Kilakovilpattu.

Serial number of soil.	% N. (Nitrogen.)	% CaO. (Lime.)	% MgO. (Magnesia.)	Ratio MgO/CaO.	% P ₂ O ₅ . (Phosphoric acid)		% K ₂ O. (Potash.)		Name of village.
					Total.	Available.	Total.	Available.	

Tanjore taluk.

40	·052	·55	·41	1/1·34	·082	·0212	·45	·0155	Perumbiliyur.
41	·069	·50	·61	1/1·98	·060	·0110	·44	·0139	Tiruvadi.
42	·037	·33	·18	1/1·8	·071	·0303	·21	·0136	* Kaliyanapuram.
43	·060	·55	·36	1/1·53	·059	·0102	·43	·0155	Nadukkaveri.
44	·071	·50	·45	1/1·11	·056	·009	·35	·0097	Maruvur.
45	·069	·45	·37	1/1·22	·047	·0119	·28	·0077	Vishnampet.
46	·036	·28	·33	1/1·76	·072	·0185	·19	·0066	Koiladi.
47	·031	·50	·35	1/1·43	·029	·0021	·31	·0112	Arkadu.
48	·015	·18	·13	1/1·34	·012	·001	·16	·0066	Ammayagaram.
49	·027	·95	·70	1/1·35	·028	·0043	·31	·0070	Tenpirambur.
50	·043	·22	·17	1/1·29	·027	·0003	·19	·0078	Vallam.
51	·055	·15	·08		·030	·0004	·31	·0035	Madiyai.
52	·021	·86	·27	1/2·94	·01	·0007	·10	·0035	Sadayarkoil.
53	·042	·75	·82	1/1·91	·042	·0053	·35	·0070	Ramapuram.
57	·060	·55	·39	1/1·41	·078	·0104	·44	·0136	Togur.

Mannargudi taluk.

58	·036	·24	·38	1/1·63	·016	·0013	·12	·0081	Vaduvur.
59	·032	·92	·70	3/1·31	·028	·0020	·20	·0116	Nidamangalam.
60	·033	·29	·10	1/2·9	·027	·0013	·22	·0074	Vadakkarayal.
61	·041	·54	·38	1/1·42	·042	·0027	·27	·0066	Letchamangudi.
62	·037	·55	·32	1/1·72	·035	·0013	·31	·0070	Mannargudi.
63	·021	·075	·015		·014	·0031	·097	·0012	Solapandi.
64	·051	·49	·35	1/1·40	·028	·0039	·26	·0074	Adichapuram.
65	·032	·35	·29		·015	·0013	·19	·0082	Palaiyar.
66	·025	·60	·33		·20	·0012	·20	·0074	Kurichimulai.
67	·022	·33	·22		·012	·0012	·14	·0043	Peruvalndan.

Tirutturaippundi taluk.

68	·045	·45	·62		·054	·0130	·78	·0291	Muttupet.
69	·060	·60	·37		·045	·0062	·34	·0167	Udavamarthandapuram.
70	·039	·53	·74		·035	·0031	·55	·0252	Kunnalur.
71	·039	·53	·66		·030	·0023	·59	·0314	Pichangottagam.
72	·037	·19	·24		·022	·0022	·54	·0264	Tulasapuram.
73	·041	·53	·40	1/1·32	·038	·0047	·30	·0078	Tirutturaippundi.
74	·041	·68	·31	1/2·23	·033	·0030	·31	·0078	Alattambadi.
75	·057	·75	·21		·045	·0027	·60	·0190	Sittayamar.

Negapatam taluk.

76	·033	·75	·70	1/1·08	·029	·0021	·32	·0089	Koilkannapur.
77	·044	·63	·77	1/1·81	·034	·0027	·28	·0100	Radanallur.
78	·050	·74	·74	1/1·94	·037	·0021	·33	·0093	Kuttur.
79	·032	·82	·82	1/1·03	·039	·0019	·42	·0100	Tiruvalur.

* Dry land soil.

Serial number of soil.	% N. (Nitrogen.)	% CaO. (Lime.)	% MgO. (Magnesia.)	Ratio MgO/CaO.	% P ₂ O ₅ . (Phosphoric acid)		% K ₂ O. (Potash.)		Name of village.
					Total.	Available.	Total.	Available.	

Nannilam taluk.

80	·036	·47	·44	1/1·06	·021	·0009	·20	·1150	Melaterumadikkunnam.
81	·032	·87	·61	1/1·42	·032	·0034	·37	·0098	Koradacheri.
82	·026	·70	·58	1/1·2	·022	·0008	·16	·0035	Sellur.
83	·039	·45	·35	1/1·28	·026	·0017	·17	·0890	Oadakandam.
84	·035	·70	·71	1/1·99	·04	·0017	·27	·0330	Kangalancheri.
85	·035	·48	·43	1/1·1	·028	·0003	·20	·0110	Periyakannamangalam.
86	·033	·86	·89	1/1·02	·019	·0013	·23	·0089	Tittacheri.
87	·037	·62	·66	1/1·04	·027	·0006	·26	·0350	Polagam.
88	·034	·41	·45	1/1·01	·018	·0009	·20	·0048	Sannanallur.
89	·027	·75	·75	1/1	·021	·0004	·21	·0042	Vaikkal.
90	·047	·56	·83	1/1·67	·034	·0012	·28	·0054	Vishnuparam.
91	·034	·33	·47	1/1·70	·028	·0007	·14	·0054	Paralam-Injikudi.
92	·044	·47	·56	1/1·83	·035	·003	·28	·0077	Nedungulam.

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