

# THE USE OF NITROGENOUS MANURES IN CEYLON.

T. EDEN

The use of nitrogenous manures in tropical and sub-tropical countries is always of particular interest because they are the most expensive of all fertilizers and, soil conditions being what they are, they can be relied upon to give a steady yield response under almost all climatic conditions.

In Ceylon tea circles discussion on the use of nitrogenous manures has always provided a lively exchange of opinion. A questionnaire originally issued by *The Ceylon Observer* in 1896 and reviewed in *The Tropical Agriculturist* for that year asks, among other questions, what is the effect of the increasing use of manures (then predominantly nitrogenous) and the diversity of opinion then manifested has survived until now.

It is notoriously hard to get any relevant and reliable data on manuring from which to put into its proper perspective the history of nitrogenous manuring during the present century. The details of imports provided by H.M. Customs are almost the only source. Since almost all agricultural fertilizers are imported, these figures are especially valuable, but they necessarily relate to the whole agricultural industry of the Island. With some knowledge of the trend of production and cultural practice these figures can be made to give highly interesting details of the progress of manuring as it affects tea.

The crude returns from 1898-1924 have been gathered together, and supplemented with notes on the individual manures by Bruce in the Department of Agriculture, Bulletin No. 73 and in preparing this article this source has been used and supplemented by the more recent returns supplied by H.M. Customs. The amount of information obtainable directly from these figures is strictly limited because the varieties of manure are so many, and their analytical composition so varied. A better indication of progress in manuring can be had

by choosing a manurial constituent such as nitrogen and calculating the amount of nitrogen imported under each of the several headings relating to the nitrogenous manures. In this form all the calculated quantities are directly comparable.

For the sake of convenience the period 1898-1931 has been dealt with in triennial sections and the appended table shows the triennial totals of nitrogen in tons; the figure for 1932 has been added on the same basis, i.e., it has been multiplied threefold so as to compare efficiently with the rest of the data.

**IMPORTS OF NITROGEN IN TONS.**  
(Triennial Totals).

	1898-1900	1903	1906	1910	1913	1916	1919	1922	1925	1928	1931	1932 calculated.
<b>Organic.</b>												
Castor cake.	1,076	696	1,632	2,025	1,395	1,433	582	237	229	421	251	283
Ground nut cake.	—	—	309	986	2,441	5,280	4,248	2,677	3,897	6,568	5,083	3,683
Rape cake.	—	59	220	152	681	177	16	10	36	15	5	—
Fish manure	7	187	631	1,532	2,945	710	1,685	1,006	1,093	890	554	534
Fish guano.	3	—	4	10	278	307	1,339	1,564	2,490	2,155	1,437	540
Bicodmeal.	—	352	206	431	625	1,108	391	233	666	1,198	825	715
<b>Inorganic.</b>												
<b>Sulphate</b>												
of Ammonia.	185	189	235	505	1,200	2,116	391	480	2,617	7,078	9,039	8,055
Nitrate of Soda.	—	6	6	34	94	691	472	628	1,946	2,230	1,587	—
Nitrate of Potash.	134	109	155	231	465	527	271	307	939	1,235	966	592
Cyanamide.	—	—	—	—	—	—	—	142	331	1,612	1,815	394
Total Organic.	1,086	1,294	3,227	5,186	8,565	9,015	8,260	5,776	8,410	11,247	8,155	5,735
Total Inorganic.	269	316	396	770	1,769	3,334	1,184	2,055	4,833	12,158	13,101	9,041
Total N.	1,355	1,610	3,623	5,956	10,324	12,349	9,394	7,831	13,243	23,402	21,256	14,776
Ratio Organic Inorganic	4.04	4.09	8.15	6.87	4.87	2.70	7.23	2.81	1.74	0.92	0.62	0.63

The first point that emerges from a study of the table is the variable fashions in the use of particular manures. In the early part of the period castor cake was the favourite fertilizer but it soon found rivals in the groundnut cake and fish manure. From 1916

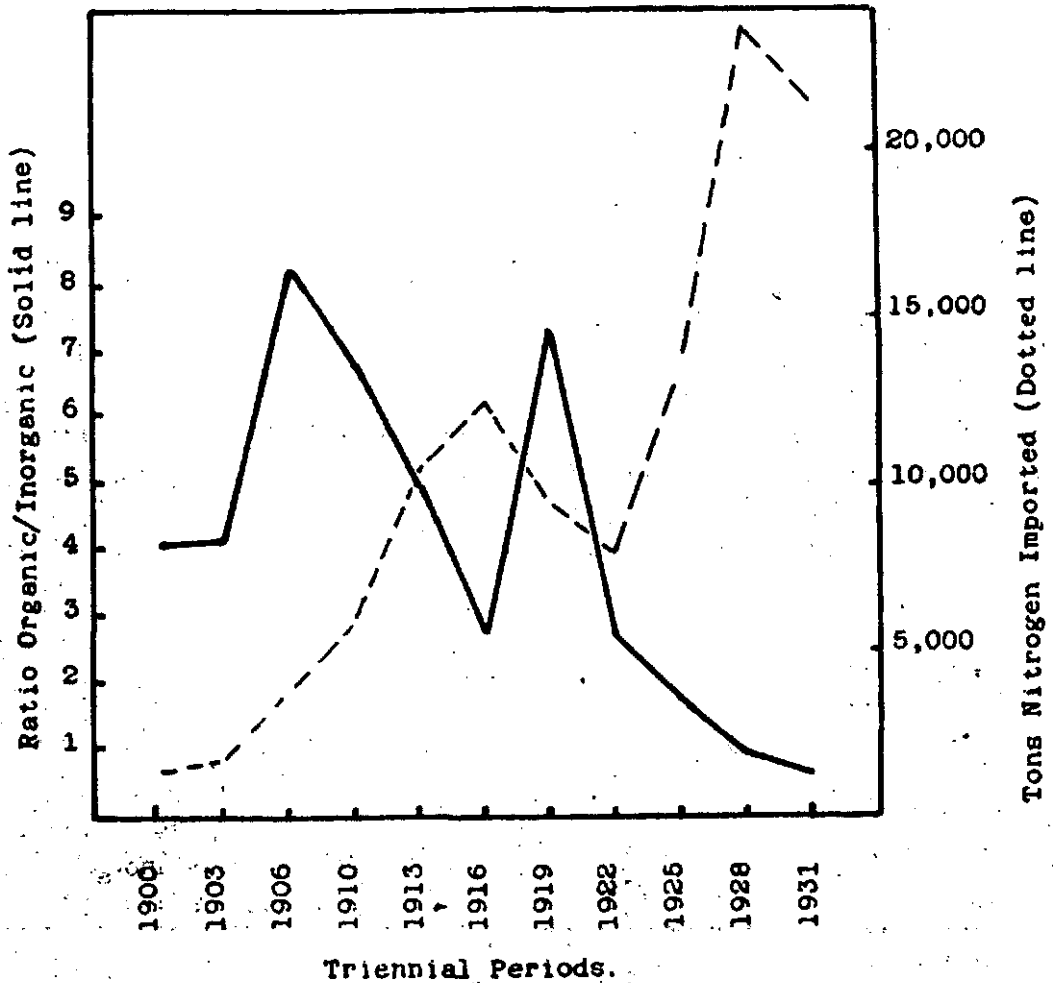
castor cake has been in decline and amongst organic artificials ground-nut cake has the predominance. It is evident also that fish manure has given place to fish guano; rape cake has been virtually abandoned whilst bloodmeal provides a substantial though only moderately popular source of manurial nitrogen. These fluctuations are doubtless largely determined by corresponding changes in price per unit of nitrogen and by the ease with which supplies can be maintained.

Of the inorganic fertilizers, sulphate of ammonia stands in a class by itself. The cheapest of all sources of nitrogen, its use has progressed by leaps and bounds till now it is not only the largest individual source, but has suffered less decline than other important fertilizers and is supplying more nitrogen than all the organic sources put together. Nitrate of soda comes second, but both this fertilizer and cyanamide have entered a very chequered stage in their history.

Equally interesting are the figures for total nitrogen employed. In general they show a steady increase checked by circumstances of a non-agricultural nature. The war years and the 1920-1921 slump had an appreciable effect on imports but recovery was rapid and mounted to quite astounding figures for the period 1925-31, notwithstanding the uncertainty of the rubber situation towards the end of this period. At the time of maximum prosperity the consumption of nitrogenous fertilizers was almost double that reached in the undisturbed period immediately prior to the war.

No account of nitrogenous fertilizers would be complete without some more particular reference to the organic versus inorganic manure situation which can be conveniently studied in the ratio figures at the foot of the table. In the early days inorganic nitrogen was negligible in quantity. This was naturally so because supplies were far distant. Till after the war sulphate of ammonia was obtainable solely as a by-product of the gas works industry whilst nitrate of soda is a South American product. Oil cakes on the other hand lay near at hand in India. The sudden increase in ratio in the period ending 1906 is perhaps at first surprising. It coincides with an important increase in total consumption for which probably the late

Mr. Joseph Fraser's advocacy was largely responsible. Under conditions of sudden expansion, and supplies of inorganics being less mobile, the brunt of the demand would naturally fall on readily obtain-



able organic manures. The graph shows that from this period the ~~increase~~ <sup>decrease</sup> in use of organic nitrogen has been steady except for the exceptional circumstances of the war years. This is an even more positive and striking instance of the effect of supply and demand.

Lack of tonnage cut out inorganic fertilizers imported from a distance and the highest ratio but one was attained. By the time the next triennium was complete the normal figure had been regained.

In assessing to what extent the tea industry has participated in these remarkable changes some reference to the growth and practice of other agricultural enterprise is necessary. Taking the figures up to 1917 it is fair to represent them as largely reflecting conditions of tea manuring. At that time for every acre of rubber in bearing there were two acres of tea; moreover a young industry exploiting fresh natural resources seldom if ever manures as intensively as its older counterparts. During the last two periods rubber manuring has been diminished for other recognisable reasons, so that over a large portion of the total period the conditions obtaining on tea estates have been the predominant factor. In the light of these figures it is apparent that both the highest and the lowest prices for tea that have been experienced during the last twenty years have coincided with periods when the ratio of organic to inorganic nitrogen had fallen to a value less than unity. It would appear to be premature therefore to place all the onus for the vicissitudes of the industry on soluble artificials. Time and detailed experiments will alone give the answer. Finally, unless conditions deteriorate markedly, it would appear that the present restricted use of manures is still likely to equal that of the years before the boom and with rational treatment, the fear that estates will rapidly decline, may well prove an exaggerated one.