

TEA RESEARCH INSTITUTE OF SRI LANKA

Issued in: May 2008

Guideline No: 01/08

SITE-SPECIFIC FERTILISER RECOMMENDATIONS (SSFR) FOR MATURE TEA LANDS

The objective of the Site-Specific Fertiliser Recommendation (SSFR) is to provide fertiliser in required amounts more precisely by soil testing, while taking into consideration potential yield of the field and the corresponding nitrogen (N) fertiliser requirement. This will not only provide balanced nutrition to the plant but also save cost of fertiliser. In the SSFR protocol, testing the soil for certain nutrients is a prerequisite for proper nutrient management of tea lands. The objective of soil testing is to estimate the amount of nutrients already available in the soil, such as potassium (K), phosphorous (P), magnesium (Mg) and sulphur (S), prior to fertiliser application. The necessary quantities of fertilisers can then be mixed and applied to ensure optimal nutritional requirements for the tea crop.

Soil sampling procedure

Time of sampling

Soil sampling should be carried out when soil is relatively moist. Sampling should be avoided during severe drought and in heavy rainfall seasons. A minimum period of 06 weeks is necessary between the last ground fertiliser application and soil sampling, if sampling is to be done close to a ground fertiliser application.

Selecting and blocking of land areas

One of the most important aspects of soil testing is to obtain representative samples for testing from selected fields. In general, a field may be divided into blocks depending on topography, slope and drainage (see Fig. 1). However, areas that vary greatly in appearance and soil type should be sampled separately. The extent of the area from which one sample may be taken could vary greatly, but should usually be in the range of 2 - 10 hectares.

Number of sampling points per block

The number of sampling points in a field depends largely on the size of the area from which the composite soil sample is to be obtained. When sampling large fields, they should be divided into blocks, as shown in Fig. 1 and as explained above. From a block of about 2 hectares, 15 - 20 sampling points are necessary in order to obtain a representative sample (Fig. 2). The number of sampling points per block may be adjusted proportionately depending on the size of block. Each soil sample is a composite consisting of cores taken at several places in the field. The soil from all the cores should be thoroughly mixed and any lumps broken up, before a representative sample for the block, weighing about half a kilogram, is removed for analysis. In the case of small blocks, about 10 cores or less is sufficient.

Sampling procedure

Soil cores should be collected randomly along zigzag lines, from each block in the field, using either an auger or an *alavangoe*, to a depth of 15 cm (6 inches) (see Fig. 2). It is essential to take soil cores from points close to the plants, where root activity would be high, rather than from the middle of the rows. Sampling should not be done near roads, paths, drains, or any other non-representative areas.

Sampling tools

The ordinary post-hole auger has proved to be the most suitable sampling tool. Its combined cutting and digging edge makes it easier to use, even on hard ground. The stem of the auger should be marked at intervals of 15 cm (6 inches), so that the depth of sampling can be ascertained at a glance. As an alternative, *alavangoes* normally used for digging planting holes can also be used satisfactorily.

Depth of sampling

To test soils for SSFR, sampling to a depth of 15 cm (6 inches) is sufficient.

Frequency of soil testing

It is necessary to undertake soil testing every 12 months when the available nutrient content of the soil in fields is being estimated.

Handling and dispatching of samples

The representative sample of a block should be transferred into a clean polythene bag. The bag should be closed immediately by tying, and labeled with a waterproof marking pen, giving details of estate, field, block, date, etc. The sample should be dispatched to the laboratory without any undue delay.

Nitrogen recommendation

The calculation of the annual N-fertiliser requirement for a given tea field is based on "potential yield". Annual potential yield for a particular field could be worked out by tabulating annual yield data for the immediate past two cycles (Table 1; 10 years, if the cycle has 05 years). The highest yield achieved in a particular year of any of the cycle is defined as the annual potential yield.

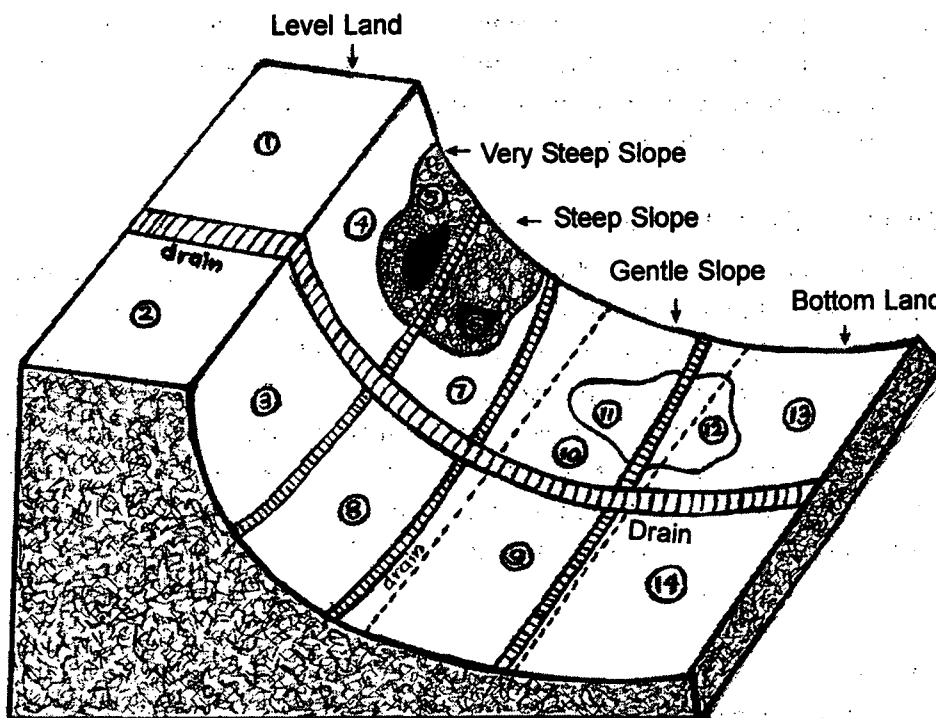


Figure 1. Demarcation of an area into blocks to obtain representative soil samples for the area. (Numbers within circles are blocks).

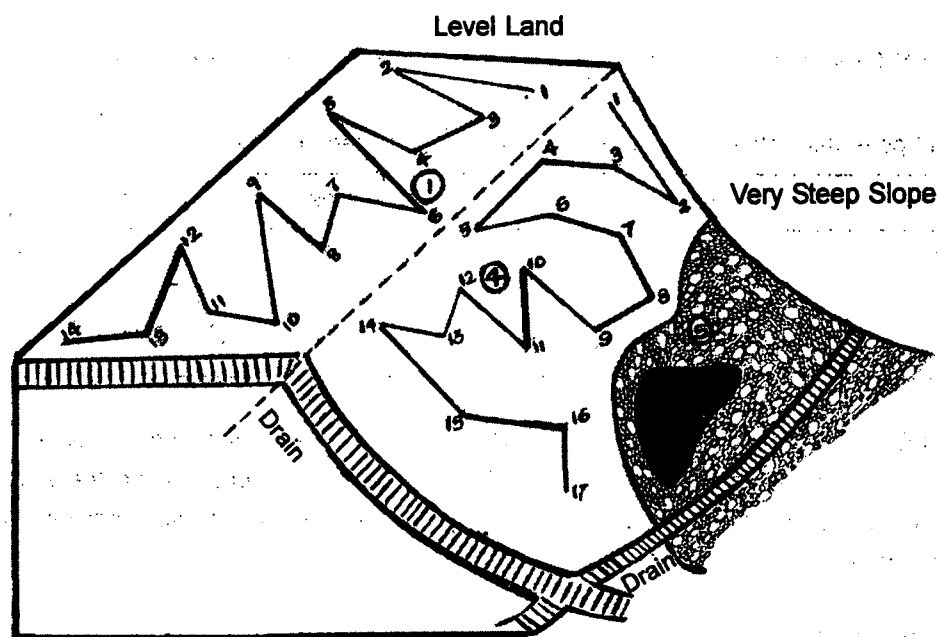


Figure 2. Soil sampling in a zigzag, random manner to obtain a composite sample from demarcated blocks

Table 1. Yield record of 12-month periods from pruning (kg made tea/ha/yr)

Cycle	Year after prune				
	1 st	2 nd	3 rd	4 th	5 th
1 st	<u>1037</u>	2053	1941	<u>1708</u>	<u>926</u>
2 nd	990	<u>2140</u>	<u>2090</u>	1650	895

The highest yield achieved (potential yield) for a given year in a cycle is underlined. These are 1037, 2140, 2090, 1708 and 926, and represent 1st, 2nd, 3rd, 4th and 5th year respectively.

The application of N- fertiliser to mature seedling or VP fields should be based on these calculated potential yields as given in Table 2.

Table 2. Annual requirement of nitrogen for achieving the potential yield

Potential yield(kg made tea/ha/year)	Requirement of nitrogen(kg N/ha/year)
Less than 900	90
900-1300	140
1300-1500	160
1500-1700	180
1700-1900	200
1900-2000	220
2000-2500	270
2500-3000	320
3000-3500	360
above 3500	400

The quantity of N-fertiliser to be applied in the respective years is therefore given in Table 3.

Table 3. Annual potential yields and corresponding N fertiliser requirements

	1 st 12 months	2 nd 12 months	3 rd 12 months	4 th 12 months	5 th 12 months
Potential yield	1037	2140	2090	1708	926
N to be applied (kg/ha/year)	140	270	270	200	140

Once the quantity of nitrogen/ha/year is determined for each field, the quantity per application should be calculated according to the number of applications (i.e. 2 - 5), depending on the agro-climatic region. The number of applications should be determined on the basis of climatic conditions, as well as on the cropping pattern in the particular region.

Phosphorus (P), Potassium (K), Magnesium (Mg) and Sulphur (S) recommendations

Available P, K, Mg and S in soil

Tables 4 to 7 give soil test values, with the corresponding quantities of Eppawela Rock Phosphate (ERP), Muriate of Potash (MOP), Kieserite and Micronised Sulphur, to be mixed with urea, and given to fields in 2 to 5 splits, based on monthly and seasonal variation in yields.

Table 4. Phosphorus recommendation as Eppawela Rock Phosphate (ERP)

Soil P* level (ppm)	P ₂ O ₅ application rate (kg/ha/year)					
	Up/Mid		Low		Uva	
	Seedling	VP	Seedling	VP	Seedling	VP
Below 20	25	35	25	35	25	35
Above 20	Nil	Nil	Nil	Nil	Nil	Nil

* Soil P – As per Borax method

Table 5. Potassium recommendation as Muriate of Potash (MOP)

Soil K* level (ppm)	K ₂ O application rate (kg/ha/year)					
	Up/Mid		Low		Uva	
	Seedling	VP	Seedling	VP	Seedling	VP
Below 200	70	120	50	100	90	140
200 - 250	60	100	40	80	80	120
250 - 300	50	80	30	60	70	100
Above 300	Nil	Nil	Nil	Nil	Nil	Nil

* Soil K – As per Ammonium Chloride method

Table 6. Magnesium recommendation as Kieserite

Soil Mg* level (ppm)	Kieserite application rate (kg/ha/year)					
	Up/Mid		Low		Uva	
	Seedling	VP	Seedling	VP	Seedling	VP
Below 60	125	125	125	125	125	125
Above 60	Nil	Nil	Nil	Nil	Nil	Nil

* Soil Mg - As per Ammonium Chloride method

Table 7. Sulphur recommendation as Micronised Sulphur

Soil S* level (ppm)	Micronised sulphur application rate (kg/ha/year)					
	Up/Mid		Low		Uva	
	Seedling	VP	Seedling	VP	Seedling	VP
Below 40	25	25	25	25	25	25
Above 40	Nil	Nil	Nil	Nil	Nil	Nil

* Soil S – As per Potassium Di-Hydrogen Phosphate method

COPYRIGHT

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording or information storage and retrieval, without permission in writing from the Director, Tea Research Institute of Sri Lanka.