MANURING MATURE TEA: THE NEW T. 700 SERIES; 1961

J. A. H. Tolhurst

In 1955 the Institute published "A Guide to the Manuring of Ceylon Tea" (Lamb, Portsmouth and Tolhurst, 1955). This pamphlet was intended to be superseded whenever scientific research produced sufficient evidence to warrant a change. In 1961 we can safely say that the T. 500 series of manure mixtures will no longer satisfy the changing conditions which are resulting from ever-increasing levels of yield and of manuring. T. 500, therefore, is to be replaced by the T. 700 series in our present manurial recommendations for mature tea, and reasons will be given for suggesting the adoption of the new series of mixtures for low-yielding tea as well. Young tea manuring has its own problems and is dealt with in another paper (Tolhurst, 1961).

NPK ratios in the T. 700 series

PHOSPHATE, P_2O_5 OR P.—When T. 500 was first brought into being, in 1952, it was felt that fixation of phosphate in insoluble forms might be a serious problem in some soils. As a measure of prudence, therefore, a proportion of saphosphosphate in the mixture was decided upon which provided more than twice the amount of P_2O_5 likely to be removed in crop and pruning wood. We have since learned that our tea soils are generally high in organic matter with correspondingly active microbial populations. It does not now seem that phosphate fixation can be serious under such conditions.

Long-term field trials, using soluble superphosphate in place of saphosphosphate, have offered some evidence that too high a rate per acre may even be detrimental to yield (Pearce, 1959).

Linked with this observation is the finding that tea is able to accumulate ample calcium from either superphosphate or saphosphosphate at quite low rates of use.

All these data have prompted us to reduce the proportion of saphosphosphate in the T. 700 series, to a level which is still above the likely replacement level for P_2O_5 in crop and pruning wood, but much lower than was provided in T. 500.

POTASH, K_2O, OR K.—Within recent years symptoms of potash deficiency have been noticed quite commonly, both on tea which has been highly manured with T. 500 or similar mixtures and on low-yielding tea with correspondingly low manuring levels. While the latter cases may be attributable to straight-forward undermanuring with potash, the occurrence of the deficiency on high-yielding tea may have a more complex origin (Tolhurst, 1961a, 1961b). Over-generous nitrogen application may be the main culprit.

Potash deficiency in high-yielding tea is apparently more probable at lower elevations, although the related symptoms of manganese toxicity are present on some highly-manured clones on St Coombs. It is the complexity of this particular

problem which leads us to offer three new mixtures varying solely in their potash content, with recommendations for selection in relation to climatic conditions and to yield level.

The future trend will doubtless be towards the richer potash mixtures. Any experimenting by individual estates in this respect would be encouraged, as, indeed, it would be in respect of other aspects of manuring. No hard and fast rule could ever be drawn up to cover all the varied conditions under which tea is grown.

Nomenclature in the T. 700 Series

It was found that the desired changes in phosphate could be represented perfectly well by the practical and euphonious basic formula—T. 700. Changes in potash content, the only further changes likely to be made, can thus be represented by a number such as 725, which shows at a glance that there is 25% additional potash in this mixture. There is no magic in the figures 700, etc., but there is great practical convenience.

The formulae are based on the three most commonly used fertilisers, but there is no reason why alternatives should not be used. For example, 50% muriate of potash, ammonium sulphate/nitrate (26% N), etc. Urea may be tried, with a warning that its effectiveness may be reduced, especially in very wet conditions. Nor, of course, do we wish to exclude compound inorganic manures with perhaps slightly different NPK ratios, or purely organic manures.

It is suggested that T. 700, etc. be retained as names, even if alternative components alter the formulae. The distinction could be made by quoting the percentage of nitrogen in brackets, *e.g.* where 50% muriate of potash is used, T. 700 would be re-written 'T. 700 (14.3% N)'.

T. 700

500 parts by weight—Sulphate of ammonia (20.6% N)
100 parts by weight—Saphosphosphate (27–28% P_2O_5)
100 parts by weight—60% muriate of potash.

At 14.71% N, 6.79 lb. contain 1 lb. N.

T. 700 is recommended as the basic mixture for up-country mature tea.

T. 725

The above formula is altered to read

125 parts by weight—60% muriate of potash.

At 14.20% N, 7.04 lb. contain 1 lb. N.

T. 725 is recommended as the basic mixture for mid- and low-country tea, probably for the drier parts of Uva, and probably for the highest-yielding tea up-country (see the paper on manuring young tea).

The above formulae are altered to read

150 parts by weight—60% muriate of potash.

At 13.73% N, 7.28 lb. contain 1 lb. N.

T. 750 is recommended for the highest-yielding tea at the lower elevations, and for tea which is known to show potash deficiency or severe manganese-toxicity symptoms.

Rates of Application

LOW-YIELDING TEA.—Tea which persistently gives low yields, say 600 lb. average or less, may be expected to have a less active root system to absorb manurial nutrients, particularly the soluble nitrogen and potash. Where economics permit, there is much to be said for manuring with the appropriate new mixture at a 12 lb. ratio (N to 100 lb. made tea). Where economics do not permit this, it is suggested that any saving on phosphate be used to increase the manure dose. A larger dose may also be expected to give better response by virtue of the fact that it could be distributed more evenly and more frequently, but the effects of changing dosages should be carefully analysed (*see* Dr Joachim's paper in this issue).

We have no record of phosphate-deficiency symptoms, recently identified as a very dark purplish discoloration on the mature foliage, in low-manured tea, but symptoms of nitrogen, potash, and magnesium deficiencies are common enough.

TEA IN THE MIDDLE RANGES.—Experience suggests that a 10 lb. ratio of N per 100 lb. made tea is ample, under varied conditions, to support an increase in cropping capacity. Continuance of this level after the yield has obviously reached its maximum may do more harm than good. A reduction to the suggested maintenance ratio of 8 lb. N is then advised. With better distribution of manure it may be found that a lower maintenance ratio would suit some conditions; only by experiment on the estate itself could this be decided.

HIGH-YIELDING TEA.—Seedling tea which shows signs of passing the 1,200 or 1,500 lb. average appears to present special problems. T. 725 and T. 750 are recommended for high and lower elevations respectively, with possible experiment with even higher potash ratios. At the same time it is strongly suggested that the rate of manuring be kept as low as possible. Too high a rate of nitrogen per acre may nullify the effects of the increased potash, especially if sulphate of ammonia is used.

The efficiency of these root systems may be expected to be high, and an 8 lb. N ratio may in these circumstances be sufficient to allow expansion of cropping capacity, with a further reduction once the yield levels off at its maximum.

Details of rational methods of application of manure in relation to certain soil conditions have been given elsewhere (Tolhurst,1959).

General

MAGNESIUM.—The above recommendations are given on the assumption that dolomite will be used as a routine manure, at the following rates:

Average Annual yield of tea lb. per acre	Dolomite at a rate equivalent to:
Up to 750	70
750 to 1,200	100
Over 1,200	130
	lb. per acre/annum

Details of application per cycle are given elsewhere (Tolhurst, 1959a). There is no reason to fear that dolomite would aggravate potash deficiency.

Specific manurial recommendations

This paper covers general manurial recommendations as far as we can judge them in 1961. For specific purposes, and for the furtherance of our knowledge, we shall doubtless issue advice or promote experiments which deviate from the above pattern.

References

LAMB, J., PORTSMOUTH, G. B., & TOLHURST, J. A. H. (1955). A guide to the manuring of Ceylon tea, 1955. *Tea Res. Inst. Ceylon,* Pamphlet no. 1, 8 pp.

PEARCE, S. C. (1959). A recent study of the results of some Ceylon tea fertiliser trials. *Tea Quart.* **30**: 93–95.

TOLHURST, J. A. H. (1959). General principles of soil cultivation and of methods of manure application to tea. *Tea Quart.* **30**: 19–29.

TOLHURST, J. A. H. (1959a). Revised suggestions for dolomite and magnesium application to tea. *Tea Quart.* **30**: 48–49.

TOLHURST, J. A. H. (1961). Manuring young tea: 1961. *Tea Quart.* **32**: 151-153.

TOLHURST, J. A. H. (1961a). Report of the agricultural chemist (for 1960). *Rep. Tea Res. Inst. Ceylon:* 45-51.

TOLHURST, J. A. H. (1961b). In answer to planters' questions, *Proc. T.R.I. Biennial Conference, January* 1961. *Tea Quart.* **32**: 19–21.