

ECONOMISING ON PHOSPHATE AND POTASH FOR MATURE TEA - 1965

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Economic considerations recently compelled a number of estates to scrutinize their fertilizer costs and the Institute was asked to advise on possible methods of effecting savings. It is now decided to elaborate on the advice which was given and to publish it in a form which could have a general application. Wherever experimental results or trends seem to offer support, these are quoted but, as would be evident on perusal of our recent Annual Reports, we are still suffering from an acute shortage of experiments, particularly over the range of planting districts. This defect is being remedied and our present suggestions may be modified for various districts as soon as sufficient experimental evidence is obtained.

1 Phosphate

An N P K experiment on St Coombs, No 3 Field, in being since 1931, soon showed that some phosphate was necessary, at least for that type of soil. It has also shown that increasing the phosphate above 30 lb P_2O_5 per acre per annum has given no yield increase. These results have been quite consistent during various changes in management, levels of other nutrients, and vigour of the tea over 34 years.

A younger experiment on St Coombs, No 13 Field, (Tolhurst, 1963) showed rather less evidence of the need for phosphate. Plots which had no phosphate for thirteen years showed no benefits when 30 lb P_2O_5 per annum was applied for three years. The comparison was with plots which had received slightly variable rates of phosphate over the thirteen years, roughly equal to 15 or 30 lb P_2O_5 for the two additional treatments.

More recently, and on more vigorous tea than in either of the previous areas, an experiment on St Coombs No 9 Field was started with no phosphate in the first two years of its first cycle. Previous recent applications had been estimated at between 40 and 50 lb P_2O_5 per annum. Yield response to nitrogen up to 225 lb N per annum, was good, especially in the second year. Phosphate has now been introduced as a treatment at three levels, 0, 25, 75 lb P_2O_5 . To-date, after 6 months there has been no apparent effect on yield from the restoration of phosphate.

No reliable information is yet available on the possibility of a relation between phosphate fertilizer levels and manufacturing properties. Preliminary experiments, using leaf from the 1931 plots, suggest that even extreme phosphate deficiency does not have an appreciable effect on "quality". Several estates, a few years ago, omitted all phosphate for periods from 6 to 18 months. Most were in the Dimbulla-Dickoya districts and with two exceptions prices were maintained or improved. Among them were estates which had usually been, and remained, among the price leaders for these districts. Bearing in mind the obvious importance of many factors in this respect, we feel that manufacturing properties are not likely to be affected by quite wide variations in phosphate applications.

Again, bearing in mind the likelihood of variation in phosphate availability to tea roots between different soil types, and the fact that St Coombs soils tend to be among the more highly organic types, we can put the following suggestions for a desired reduction in phosphate.

1.1 Short term

It might be safe to omit all phosphate for one or two years. Soil reserves of phosphate can build up with little loss by leaching and a generous fertilizer programme in the past could probably be relied upon to carry the tea through at least two years.

1.2 Long term

An application of about 20 lb P_2O_5 per acre per annum ; approx 75 lb of saphosphate.

2 Potash

Our attitude to this nutrient is bound to be coloured by memories of deficiency symptoms in much tea following war-time shortage of fertilizer, and by the persistence of symptoms in several areas to-day. In recent years more generous use has been made of potash, sometimes with marked improvement in the appearance of the bushes. It may not be necessary to continue routine applications at the same high levels as were used to correct visible deficiency symptoms. Soil retention of potash, at least in most of the tea-growing areas, may not be good but there is a reasonably efficient temporary storage in the maintenance foliage. Potash is released rapidly and completely once leaves fall from the bush, and is freely available to the roots.

Experimental evidence to support suggestions for economies is variable. Low-country experiments, on different types of tea, have yet shown no yield response to potash although a zero level is among the treatments under comparison. On St Coombs, again in the No 3 Field 1931 experiment, the damaging effect of withholding all potash was first seen 11 years after treatments began. Of more relevance to the present discussion is the fact that the higher potash levels in that experiment, recently stepped up to 60 and 90 lb K_2O per acre per annum, are beginning to show effects on yield which appear to be related to levels of N. For the first three years of the present cycle, under increased N, there has been a trend which shows more benefit from the 90 lb K_2O level as N increases from 120 to 180 lb. The end of the cycle will have to be awaited before we can decide if the yield differences are great enough to be statistically significant.

Suggestions for a desired reduction in potash may be summarized. A range from 60-90 lb K_2O per acre per annum may be considered adequate for high-yielding tea. Reduction for low-yielding tea may be governed to a great extent by finance but a lower limit of 40 lb K_2O would seem to be prudent if possible.

3 Fertilizer mixtures

Implementing the above suggestions would have to be based on an assessment of the average need for a convenient unit, *eg* a Division. Over a period of time, temporary excess or shortfall in individual fields will be smoothed out, and no special effort need be made to complicate matters by juggling with a variety of NPK mixtures in any one year. This would mean that the Industry would be using an even greater variety of mixtures than at present, and to avoid confusion we shall have to abandon the habit of referring to a fertilizer programme in terms of "T 700" *etc.* The Institute would have no regrets over this change.

Summary

1 In the interests of economy it is suggested that phosphate could be reduced to approximately 20 lb P_2O_5 per acre per annum on a long-term basis, or omitted

altogether for one to two years. Potash might be limited to a range 60–90 lb K_2O for high-yielding tea, and where decreased for lower yields a figure of 40 lb is quoted as a prudent minimum. From information available it is possible to hazard only a rough guess as to the potential savings which could result. If estates on average were to reduce P_2O_5 to the 20 lb level, a saving of Rs 6/- might be effected per acre per annum. If K_2O , were similarly reduced to the 60 lb level the annual saving might approximate Rs 8/- per acre.

2 The question of effects on manufacturing quality has perforce been left open.

Reference may be made to the recent Annual Reports of the Agricultural Chemist and the Low Country Scientific Officer for details of experiment quoted.

Reference

TOLHURST, J. A. H. 1963 Concluding report on a phosphate manurial trial, St Coombs. *Tea Quart* **34**: p 144—147.