

MANURING OF RUBBER.

1.—GENERAL ASPECTS OF THE PROBLEM.*

[Note.—It is of interest to recall the fact that manurial experiments with rubber in Ceylon which were regarded as more or less inconclusive in their results have been shown by further examination (vide this journal for November 1928, pages 263-271) to provide strong presumptive evidence that nitrogen gave significant increases of yield. It will be seen from the paper by the Economic Botanist in the present number of *The Tropical Agriculturist* that further examination of the same figures has confirmed the usefulness of nitrogen. Manurial experiments are being conducted by the Rubber Research Scheme at Arapolakande and an experiment designed on lines of modern field experimentation will be begun at Peradeniya in 1930.—Ed. T. A.]

RECENT years have seen a very marked growth of interest in the possibilities of applying artificial fertilisers to rubber. The turning of attention in this direction is the inevitable outcome of the increasing age of estates, revealing ever more clearly those planting sites which have unsatisfactory features, but it is possible that the main impetus to interest has been the reports of remarkable results from manuring in particular cases. That these are rather exceptional has already been shown by more disappointing results in many other cases, but the balance of opinion among those of experience seems to be rather in favour of manuring than against it. Only a small proportion of the trials made have been conducted on a satisfactory comparative basis and, until this is done, the belief in the efficacy of manuring cannot rest on a scientific basis. This state of the subject leaves a good deal of confusion due to basing arguments upon experience with other crops, so that it is necessary to point out at the outset the sharp contrasts which exist between the case of rubber and that of the other crops for which experience of manuring is extensive and exact.

Comparing the cycle of plant nutrition and growth of an ordinary arable crop and that of a rubber estate it becomes at once evident that the differences are fundamental. In the first case the growth cycle is usually completed within the year, and a very large proportion of the total growth made is removed entirely from the farm. Hence there is a continual extraction and removal of plant nutrients from the soil, and an inevitable tendency towards soil exhaustion. This is offset by the yearly opportunity when the land is clear to effect amelioration by means of cultivation and manuring. In the case of rubber the plant growth is a slow cumulative one with such a small amount of plant nutrients removed in the latex crop as to be almost negligible. Under proper conditions the leaf-fall goes back into the soil, so that the cycle of changes takes place without any great loss. By neglect of conservation the losses on rubber estates have, of course, often

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been serious, but it is apparent that there is no such inevitability about the approach to soil exhaustion as there is in the case of arable cultivation. This would lead one to expect that the application of manuring practice to rubber would have a more limited scope.

Another consideration which would tend to instil a cautious approach to the subject is the much less direct connection which exists between nutrition and yield. The aim usually pursued in manuring is a heavier production of fruit or of vegetative growth and more is understood regarding these than regarding the responses involved in increased latex secretion. By far the largest differences to be observed in yield are to be attributed to inherent character. Hence the most promising methods for increasing the acreage yield are those which will provide trees of high yielding character. The fulfilment of such methods, however, must take much time, so that manuring must be examined in all its possibilities as a method of improving the existing stands of rubber. While general improvement can usually be effected (as regards appearance or tonnage for example) we as yet know little regarding specific effects upon latex production. With the advancement of knowledge, however, the possibility is not to be overlooked that a connection will be found between some phase of nutrition and the quantity of latex produced. At present nitrogenous manuring (as being productive generally of sappy vegetative growth), is the most promising, but evidence is not wanting of more specific effects upon latex production of the kind indicated.

There is a third consideration which must qualify the expectation of great improvements from manuring in some cases. In cases where the site has always been poor and the trees have been stunted for many years it may well be asked whether a sufficiently favourable response to manuring may be looked for. There must always be some hope for a tree not actually diseased, but successful manuring must look for vigor in the tree and satisfactory conditions as regards moisture supply and similar matters. Too often a piece of rubber has been selected for a manuring trial on the assumption that the worse the rubber the more the room for improvement. To select the best opportunity for improvement would often lead to more encouraging results. Even on comparatively good sites the fertility of the soil may lag far behind the other abundant conditions of light, heat and moisture. In such a case manuring improves the one limiting factor and produces a benefit, while in more adverse cases other limiting factors may be present to prevent any response. The above considerations are applied to the general prospect of increasing estate yields by extensive use of fertilisers. The value of manures for special purposes should need no emphasising. Much may be done towards the improvement of nurseries and the establishment of cover crops by judicious use of fertilisers on the lines of well-established practice. By applications made at the time of planting out rubber a healthy and uniform growth can often be ensured and the young trees pulled through their more critical early stages when adverse conditions of weather may catch them at a disadvantage. The cost of manuring in such a case is very small since only the planting holes need to be treated.

The economic valuation of results from manuring rubber will present considerable difficulties. Apart from those attending the fluctuating market values of rubber it will take long periods to assess properly the full effect of a single application of manures, whether as regards increased yields or increased capital value in growth of the trees and in bark renewal. Experiments with annual crops give their end and result within the season, but effects on rubber are likely to take many such cycles to work themselves out. Further, there is the probable lengthening of the economic life of the trees to be taken into account. Until we are in a position to estimate the benefit on all these points the economics of the problem must remain somewhat indefinite. In some cases the immediate return from manuring has repaid the cost, but it is obviously inadequate to pass judgment on the basis of returns over a short time.

The long periods during which experiments must run call special attention to the necessity of laying them down with great care and foresight. In recent years the subject of field experimentation has been much developed and the guiding principles laid down. The potential value of the results from test plots may often be increased many times by changes in the layout which involve no extra expense and very little extra demands upon time and trouble. The questions involved will form the subject of the next article. Since all types of soil and situation need to be covered in order to provide full data, the desired end can only be attained by experiments scattered over many estates, and all those who have rubber likely to be benefited by manuring should be encouraged to make trials. The management is then sure of getting such results as are applicable to the particular conditions of the estate, while at the same time contributing to the common stock of knowledge.