A DISCUSSION ON THE RELATION BETWEEN QUALITY AND MANURING

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At the time of going to press the indications were that the 1957 exports of tea from Ceylon would be approximately 400 million pounds, as compared with 348 million in 1956, 298 million in 1950 and 287 million only ten years ago, in 1947.

It was also apparent that this latest record-breaking achievement was viewed with a rather jaundiced eye, since in the latter part of 1957 there had been a tendency for prices to fall below desirable levels. Fears were expressed that a continuation of the upwards trend of acreage yields of tea would be accompanied by a reverse trend of price levels. In recent years the industry in Ceylon has very generously given credit to the Institute for a proportion of the great expansion in crop production which has occurred and the Institute has been happy to think that its efforts have met with such success. Conversely, we should be prepared to face criticism, because if we had been guilty of building cardboard castles we should have much to answer for.

Since 1945, in particular, the industry and the Institute have worked together with a great unanimity of purpose, namely, to increase yields as rapidly as is consistent with good agricultural practice. We have no hesitation in saying that often the pace has been set by the Industry itself, and in one instance, to be related below, the Institute was virtually carried along in the slipstream. Nor has the Industry been at all reluctant to incur expenditure which may have been devoted very largely to building up reserves for the future, in the form of enhanced bush vigour and enriched soil fertility. We may say that, in general, tea plantations in Ceylon today present an encouraging picture with their potential crop producing capacity by no means reached. To this extent the Industry and the Institute can claim to have done their work well.

We do not want to take this discussion into the realms of world trade, although the agricultural scientist must make himself aware of what happens to the crop which he has helped on its way to the markets. We are concerned to answer two criticisms which have recently had considerable publicity and which have not always been kept as distinct as we might wish.

Do higher acreage yields of tea necessarily entail a lower standard of quality?

Do increased applications of inorganic fertilisers necessarily entail a lower standard of quality?

We are content to assume that recent depressions in market prices were in fact due to quality which was below average, and we will not attempt to define "standard of quality." We accept the statements of those experienced in these matters. The broader implications in these questions, however, certainly come within our purview, and we regret that circumstances beyond our control prevented a report from being published at the time when public discussion was actively concerned with this subject.

Do higher acreage yields of tea necessarily entail a lower standard of quality?

The frequency and intensity of plucking have for so long been recognised as factors of supreme importance governing the quality of the green leaf, and hence to

a large extent the quality of the made tea, that it may seem superfluous to head the discussion with these two points. Presumably it is recognised that if labour conditions on a given estate are such that an average yield of, say, 800 lbs. of made tea per acre can be plucked to a good standard, then an attempt to increase the yield to, say, 1,000 lbs. per acre will necessitate a lower standard of plucking. This latter figure has been quoted deliberately, and provides the scientist with a legitimate reason for commencing on a seemingly exclusively "practical" problem.

Thus, in recent years the scientists of the Institute have been faced with many queries regarding the yield potentialities of individual fields, and it is our considered opinion that the figure of 1,000 lbs. per acre has come to be regarded as a prestige target, and that no effort should be spared to reach and exceed the magic. While agreeing that this level of production is by no means high, and that our research projects are planned to cope with yields two or three times as great, we are quite emphatic in saying that some tea is not yet capable of giving 1,000 lbs. per acre without detriment to the bush. If such a yield is taken from, as opposed to being given by, such tea, the well-known cycle of deterioration sets in. Insistence on the extra hundred pounds before the soil and the bush are in a fit state of vigour can only lead to plucking for bulk to the detriment of quality. The answer is obvious, and is unfortunately a most unpopular one at times when market prices are low: money must be spent on building up the cropping capacity of the bush if it is desired to take high and increasing yields of good quality leaf.

The third aspect of the plucking problem concerns the rush periods, and although the scientists are not answerable for the weather conditions producing the surge of flush, they have a lively interest in the results. Apart from the almost certain lowering of plucking standards during these rush periods, it seems probable that such leaf could not produce tea of the highest quality, however carefully manufactured. And how carefully can it be manufactured on some estates, where the factory was designed for the crop levels which were normal many years ago? We are aware from our advisory contacts, that not all factories can be said to follow ideal manufacturing principles during the normal cropping months, owing to inadequate space and machinery. Many more will come to grief during the rush period, and the made tea which results from trying to "squeeze a quart into a pint pot" will suffer, in exactly the way predicted by scientists. We have expended and will continue to expend, much energy on our insistence that as long as the system of manufacture remains as it is at present there will be the necessity to increase factory facilities at a much greater rate than has been practised in recent years. We are aware that this answer is obvious enough, and as likely to be as unpopular as our remarks on cropping capacity.

Here, however, there may in time be an alternative solution. It is conceivable that different manufacturing systems may be evolved, based on a full biochemical knowledge of the processes involved. This would require very little expenditure by the industry, in the form of increased research facilities at the Institute, but even with the best working conditions which money could provide, the scientists could only hope for a profitable revolution in manufacture after many years of intensive work.

The conclusions under this heading would seem to be that the scientists cannot offer appreciable assistance to the Industry on the general problems associated with crop increase, unless the industry is able to help itself in certain ways which are outside the scope of science. One exception to this statement should be given due publicity: in those areas where blister blight occurs it is no longer necessary to avoid pruning so that recovery takes place during the monsoon, as the Institute's recommendations will afford perfectly satisfactory protection, and we may claim to have helped a little by offering one way to thin out rush crops.

Do increased applications of inorganic fertilisers necessarily entail a lower standard of plucking?

The previous discussion was intended to clarify serveral points which had no necessary association with the question of manuring, and to ensure that this question, complex enough in itself, could be investigated on its own. Inorganic fertilisers constitute virtually all the manure used in Ceylon tea, and unless otherwise stated the word "manure" will refer to this group of compounds, some of them made by man, others of natural origin, but all of them of a dry, powdery nature and lacking the dark colour combined with a moist or even adhesive consistency which characterises the majority of the organic manures. It is perhaps natural to assume that a bulky organic substance will be more acceptable to a growing plant than a desiccated mixture from a bag, but without delving into this favourite argument we may say that we were alarmed at the readiness with which inorganic manure was attacked by certain quarters, as soon as a marked fall in tea prices occurred.

Ceylon tea soils are not inherently rich in nutrients, and the only economic means of making good the deficit is to use balanced inorganic manures. Over the last ten years it has been proved on estate after estate, that the response to manuring is extremely high, and that bush vigour can be improved at the same time that yields can be increased. Soil deficiencies of specific nutrients have appeared in recent years, and the warnings which the Institute has given in regard to these should never be forgotten. Once such deficiencies have made themselves felt, then there is no alternative but to manure against them. It may be tempting to assume that the soil in one particular district is richer than elsewhere, and that the prospect of a nutrient deficiency occurring there is remote. We suggest that any tendency to think along these lines, which fortunately has not so far appeared, should be resisted. It is not good agricultural practice to wait for a deficiency to show itself, as the remedy is often more expensive than routine prevention.

We have deliberately avoided naming individual nutrients, because we wish to emphasise the general principle that manuring must be done with a balanced mixture. Any decrease or increase must affect all nutrients similarly. The balanced manures which we recommend, for mature tea, remain as:

T. 500, with slight variations

Dolomite.

IN ANY PUBLICATION FROM THE INSTITUTE A REFERENCE TO, SAY, 43 LBS. OF NITROGEN (N) MUST BE TAKEN TO MEAN "THAT WEIGHT OF T. 500 MANURE (OR VARIATIONS) WHICH WILL CONTAIN 43 LBS. OF NITROGEN."

The empirical arrangement whereby manure is applied according to yield has served the Industry very well, and the Industry itself must take credit and responsibility for fostering what is generally known as "the 10 lb. ratio". That is, manure at the rate of 10 lb. of nitrogen per 100 lb. of made tea. The Institute encouraged this ratio, because practice showed that it was capable of allowing the improvements in bush vigour and yield which, in recent years, were demanded by all who had an interest in Ceylon tea production. We had no statistically designed experiment to give a more precise evaluation of the effects of this 10 lb. ratio; such an experiment would have required at least fifteen years to give an answer. Nor do we feel the need of such proof at this stage. An intelligent appraisal of the actual results, which have come from the use of the 10 lb. ratio under every conceivable variation of cultural conditions, can surely be taken as sufficient evidence that the 10 LB. RATIO OF MANURING OF MATURE TEA IS, UNDER THE MAJORITY OF CONDITIONS, AN EXPANSION RATIO.

The 8 lbs. ratio as given in the Institute's Pamphlet No. 1, remains as A MAINTENANCE RATIO under most conditions. The difference between these ratios has not always been appreciated, but there should be no difficulty in adjusting a manuring programme to suit requirements, under average conditions, and for mature tea. It is hoped that the origin of the 10 lb. ratio has now been explained, and that it will no longer be suggested that this ratio is the normal one recommended by the Institute.

Our interest here lies in the possibility of an effect on quality of the made tea, arising from the 25% difference in bulk of manure used under these two ratios. Again we must turn to the findings of a large number of estates. Provided that the conditions mentioned in the first section of this article have been met, *i.e.* that harvesting and manufacture have been of a high standard, there has been no evidence that the higher ratio of manuring has affected quality.

Yet another possibility arises as yields increase, and which need not be associated with the question of ratios of manuring. The total quantity of manure applied per acre per annum also increases with the yield. We would suggest that, to date, there has been no relation between the intensity of manuring and quality of the made tea, and we believe that there are sufficient estates which produce tea of the very highest quality under such conditions of manuring to support our contention. We have qualified this remark because we are not happy about the future effects of high intensity manuring on soil conditions. This is not the place to go into details, except to say that, with the future target of 2,000 to 3,000 lbs. of made tea per acre from selected clones, our energies must be devoted to the maintenance of proper soil conditions and high quality of the tea, regardless of the manuring intensity. This is an immediate problem for the scientist, but we see no reason for the industry to worry for many years to come. If research is able to proceed unhindered there should, of course, be no need for concern at any time.

One final point from among the many which need to be investigated concerns the frequency of application of manure. This will presumably affect the efficiency of utilization of manure, and this will be a most important consideration in the future. The relevance here lies in the fact that if a very heavy annual dose of manure were to be applied in one application, the effect on the flush for a few plucks afterwards might be to produce something similar to tipping leaf in quality. The overall effect on an estate's manufacturing reputation would be negligible, but there is the possibility that high intensity manuring may be criticised on this basis. We maintain that this would be unjustified. There is sufficient physiological reason to encourage the division of the annual manure dose into two or three applications, and possibly four, and there should be no necessity for the artificial production of rush crops.

Conclusion.

Very briefly, we may say that there is no evidence to show that manure, used according to the above suggestions, has an adverse effect on the quality of tea, provided that estate conditions are such that crops can be harvested and manufactured properly.

Manure applications should *not* be timed to increase seasonal rush crops.

Recovery from pruning should not be handicapped by lack of manure, even though this may mean that the tipping leaf is increased in bulk.

An appreciation of the 8 and 10 lb. ratios, so-called, could lead to a useful flexibility in manuring programmes.

We see no reason to reduce manure applications, as long as an estate can produce good quality tea at a profit. A 10 lb. ratio is perfectly acceptable and no fears should be entertained in its use. The scientists have the long term effects under study.