MANURING PROGRAMMES WITH RATIONED MANURES

T. EDEN

Since the publication of the note in the August, 1942, (Vol. XV, Part II) *Tea Quarterly* the fertilizer position has changed materially. Though, in general, supplies are more precarious, equitable distribution and regular delivery are assured by the voluntary rationing scheme and it is possible to plan programmes with a reasonable expectation of carrying them out.

Because supplies are greatly reduced, the first question that arises is whether to manure the whole acreage, or to concentrate on better yielding fields and thus give a higher dressing on these by sacrificing fields low in production This is not a question that can be answered by a formula for all circumstances but a few pointers may be of use in making decisions relevant to individual cases. The Institute's experiments have shown clearly the close connection between crop and wood growth so long as pruning and plucking systems are kept unchanged. With less manure both crop and wood must be expected to suffer deterioration and at a time when crop assumes temporarily a position of first importance, the decline in health of wood may be accentuated

The accumulated results of the Institute's manurial experiments which will be published in greater detail later, show that regularly manured fields giving steady improvement in yield owe some of that improvement to more efficient utilization of manures. At the present time therefore there appears at first sight to be a valid argument for concentrating on the best fields at the expense of others not so good, but the extent to which this can be done is limited. In the case of very poor fields it might lead to damage that would be very hard to rectify without throwing these fields out of plucking. The fact remains that to follow a resting policy and sacrifice the basic yield of even poor fields would lead to a crop loss which could not be counterbalanced by the enhanced efficiency of manures on the best fields. To give an example based on actual data, 25 lb. of nitrogen is unlikely to contribute more than 200 lb. of immediate crop on the best fields. The circumstances are such that it is equally unlikely that by a policy of favouring good fields a margin of 25 lb. of nitrogen above the average could be assigned to them on the present scale of rationing. But it would be a very poor field indeed that did not give, unmanured, a basic yield of 200 lb. of tea per acre In general therefore the usual policy will be to use the manure available fairly uniformly over either the whole acreage or over all but a small part of it.

Of recent years the Institute has recommended an incremental series of doses as the pruning cycle has progressed The basis for this recommendation has lain in the fact that early in the cycle the bushes do not make efficient use of large doses. With the drastic reduction in quantities now obtaining, there is very little danger of overdosing even in the early stages, and as a matter of practical convenience incremental doses will be hard to fit in with the delivery of approximately equal quantities of manure at specified regular

intervals. It will be better therefore to revert to a flat rate on the reasonable assumption that at all stages except immediately after pruning, the nutrients will be efficiently used. The proviso made in the previous article that on the longer cycles (3 years and over) the first dose can be delayed for about 12 months still holds.

The only divergence from a flat rate that seems worth while adopting is one associated with fields with different lengths of pruning cycle. We have no precise data on the point and dogmatism would be uncalled for, but it is probable that a reduction in dose will lead in due course to a corresponding reduction in the length of pruning cycle to which fields will effectively run. The longer dated fields may reasonably therefore be given rather more manure. The sort of difference envisaged is 5 lb. of nitrogen for every 12 months' difference in cycle. This figure is quite empiric and is based more on the general level of manuring that the present ration affords than on any conception of the factual needs of longer pruning cycles. By way of illustration we may take an 800 acre estate yielding an average of 750 lb. per acre. Such an estate would receive a nitrogen ration of 25 lb. of nitrogen per acre. Assuming that 500 acres of the estate were on a 3-year and 300 acres on a 4-year cycle, this scheme would give 23 lb. per acre on 3-year fields and 28 lb. of nitrogen per acre on 4-year fields. The method of calculation is shown in full below.

Acreage	
3-year 500	Yield 750 lb. per acre
4-year 300	N. allowance 25 lb. per acre.
Total 800	Total $N = 800 \times 25$
	$= 20{,}000$ lb.

The 4-year fields are to receive 5 lb. more than the 3-year fields : 5 is the 'incremental difference.'

The general formula is :—

$$\text{Lower dose} = \frac{\text{Total N.} - \text{incremental diff.} \times \text{acreage on higher dose}}{\text{Total acreage}}$$

Inserting the illustrative figures

$$\text{Lower dose} = \frac{20{,}000 - 5 \times 300}{800}$$

$$= \frac{18{,}500}{800} = 23.125$$

$\therefore$ Higher dose = Lower dose + 5 = 28.125

In terms of 500 lb. standard mixture containing 30 lb. N.

3-year cycle needs $\frac{500 \times 23.125}{30} = 385$ lb.

4-year cycle needs $\frac{500 \times 28.125}{30} = 470$ lb.

These are to the nearest 5 lb.

If there were three pruning cycle lengths, each differing from the next by equal time intervals, the appropriate formula for N. level would be

$$\text{Middle dose} = \frac{\text{Total N.—incremental diff. (acreage on highest} - \text{acreage of lowest dose)}}{\text{Total acreage}}$$

The results of the application of this formula to an actual example are as follows :—

Acreage	
2-year 200	Yield 750 lb. per acre
3-year 100	N allowance 25 lb. per acre
4-year 500	Total N. 20,000 lb.

Incremental difference 5 lb.

	lb. N. per acre	lb. per acre of mixture
2-year fields	18.125	300
3-year ,,	23.125	385
4-year ,,	28.125	470

With pruning cycles differing by only 6 months a difference of 3 lb. of nitrogen might be suitable. These formulae would be applicable, substituting the factor 3 for that of 5 in the examples chosen.

In order to maintain any regular programme of manuring it will be necessary to store manure from time to time. At a particular season of the year, delivery will be in excess of requirements and *vice versa*. Superintendents have not had any difficult weather conditions to contend with for storage since rationing started. Even in the coming months no deterioration of the manures need be anticipated. In normal times when mixtures were largely made up of inorganic salts a conditioner was added to prevent caking. The large amount of groundnut cake now in use is a much more adequate safeguard than is actually needed.

In conclusion, reference may be made to the use of fertilizer mixtures for food production areas. For all crops the best time to apply is when preparing the ground for sowing or planting of setts (in the case of root crops). For paddy lands this corresponds to the time of mudding and levelling after ploughing and green manuring.