

MANURING OF NURSERIES:

1. EXPERIMENTS ON THE FREQUENCY AND METHODS OF APPLICATION OF INORGANIC AND ORGANIC MIXTURES

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Experimental

Two manuring trials were planned by us in 1959 at the suggestion of Mr Phimister, Colombo Commercial Company, and carried out by the Superintendents of Spring Valley and Dickwella estates.

The main purpose of the experiments was to compare the efficiency of partially soluble inorganic mixtures with that of a mainly organic mixture (animal meal) of the same composition. A soluble mixture has the advantage that it can be watered on the plants, whereas an organic mixture has to be dibbled in, which takes more time and labour.

The mixtures and the rates applied were:

- (a) *Organic mixture plus Epsom Salts*, containing 5.83% N, 8.33% P_2O_5 , 4.17% K_2O and 2.67% MgO , dibbled in at four ounces per two square yards of bed (about 100 plants).
- (b) *Inorganic mixture*, made up from ammonium sulphate, superphosphate, potassium sulphate and magnesium sulphate, containing 5.83% N, 8.40% P_2O_5 , 4.00% K_2O and 2.67% MgO ; four ounces dissolved in one gallon of water and applied to two square yards of bed.
- (c) *Inorganic mixture*, made up of the same fertilisers as in (b); containing 8.75% N, 6.30% P_2O_5 , 8.40% K_2O and 4.00% MgO ; 2.66 ounces dissolved in one gallon of water and applied to two square yards of bed.

Mixtures (a) and (b) give equivalent amounts of plant food, mixture (c) gives an equivalent rate of N and MgO but less P_2O_5 , and more K_2O than (a) and (b). Each mixture was tried out on three different lots of plants at three frequencies of manuring—two, four and six week intervals between manuring. Plots of control plants received the same amounts of water as used for applying the inorganic mixtures. During dry days the inorganic solution was washed from the leaves and stems of the plants with some extra water, in order to prevent scorch.

Cuttings of Clone TRI 204 were planted directly in baskets at Spring Valley in December 1959; at Dickwella, cuttings of the Dickwella Clone L.D. 9/1 were callused in beds and then transferred into baskets in April 1960. At Spring Valley, the mixtures were applied (between March and October) 14, 7 and 5 times and at Dickwella Estate (between May and November) 15, 9 and 6 times for plants manured every 2, 4 and 6 weeks respectively. On both estates the twelve treatments (including controls) were duplicated and randomized with 100 plants per plot. The results of leaf counts are summarised in Table 1.

TABLE 1.—Average number of leaves per plant of 12–16 month-old plants manured with different mixtures and at various intervals (different rates over the period) on Spring Valley (SV) and Dickwella Estate (DW) (2×100 plants per treatment)

Manurial Treatment	APPLICATION EVERY						Average	
	6 weeks		4 weeks		2 weeks		SV	DW
	SV	DW	SV	DW	SV	DW		
Water (control) ...	12.9	5.3	13.7	4.6	11.3	7.2	12.6	5.7
Organic (a) ...	17.8	5.6	20.3	10.3	23.0	16.0	20.4	10.6
Inorganic (b) ...	23.7	6.5	23.8	13.5	26.7	18.9	24.7	13.0
Inorganic (c) ...	20.9	4.1	22.8	7.5	29.2	19.7	24.3	10.4
Treatment average ... (without control)	20.8	5.4	22.3	10.4	26.3	18.2		

The following results can be seen from Table 1:

1. Manuring over a period of six to seven months about doubled the number of leaves in comparison with the unmanured control.
2. Plants manured every two weeks received three times more manure over the period than plants treated every 6 weeks and responded with an increase in leaf number of 26% at Spring Valley and of as much as 237% at Dickwella. Additional observations at Dickwella also showed the effect of frequent manuring on the number of plants with active shoot growth which amounted to 89, 80 and 58% of the plants manured every 2, 4 and 6 weeks respectively.
3. Judging by the number of leaves per plant, the inorganic mixtures were equally effective and at least as effective as the organic mixture (animal meal).

These experiments show the importance of manuring of nursery plants once they are rooted, and confirm the results from previous trials (Visser, Kehl & Tillekeratne, 1959), in which the same total amount of manure was given at different frequencies. These latter results are reported in detail below.

The following two manures were used on basket plants of Clones TRI 2024 and TRI 2026:

- (a) an organic mixture (Sterameal A), containing 6.4% N, 9.2% P_2O_5 , and 9.4% K_2O , used at 4 oz per 100 plants and applied every 2 weeks;
- (b) an inorganic mixture (T. 175) made up from ammonium sulphate, superphosphate and muriate of potash, containing 11.8% N, 8.4% P_2O_5 and 8.6% K_2O , used at $2\frac{1}{2}$ oz per 100 plants and applied every 2 weeks.

The above rates gave about the same quantity of nitrogen for the two mixtures.

The two mixtures were applied to different lots of plants, randomized and replicated, over a period of 24 weeks, as follows:

- (a) every 2 weeks at the above rates (11 times);
- (b) every 4 weeks at twice the rates (6 times) applied in (a);
- (c) every 6 weeks at three times the rates (4 times) applied in (a);
- (d) every 12 weeks at six times the rates (2 times) applied in (a).

The plants, which were 3½ months old to begin with (May 1957), were assessed 5½ to 6 months later (Oct./Nov. 1957). The results are given in Table 2.

TABLE 2.—*The effect of manuring with an organic (org.) and an inorganic mixture (inorg.) at various intervals (but equal total amounts over the 24 weeks) on the growth of clonal plants in baskets (2 clones: 24 plants per clone)*

Treatments	Average height in cm.		Average no. of leaves		Average dry wt in gm*	
	org.	inorg.	org.	inorg.	org.	inorg.
Unmanured	22.7		11.7		1.10	
<i>Manured every</i>						
2 weeks	48.9	43.8	18.8	16.3	4.41	3.76
4 weeks	46.8	41.8	18.7	16.4	4.10	3.45
6 weeks	42.6	44.0	17.7	19.0	3.11	3.20
12 weeks	48.2	30.9	19.7	17.1	2.68	1.93
Average for manured plants	46.6	40.2	18.7	17.2	3.83	3.09

*Weight of stem + leaves cut 3" above ground level

The results given in Table 2 show that manuring nearly doubled the height and the number of leaves of the plants and more than trebled the weight of leaf + stem. The inorganic mixture was only slightly less effective than the organic one, mainly when manuring was infrequent. The frequency of manuring had little effect on plant height and on the number of leaves but a favourable effect on the weights of stem plus leaves. Apparently plants given small amounts of fertiliser at short intervals produce either longer or thicker stems or both and bigger leaves, than do plants given correspondingly larger amounts of fertiliser at correspondingly longer intervals.

Conclusions

The trials make it clear that the application of fertiliser mixtures to nursery plants is favourable; manuring can roughly double the size of plants in 6-7 months.

The use of a (partially) soluble inorganic fertiliser mixture is preferable to that of an insoluble organic mixture of comparable composition. It is not only equally effective, but it is also easier and thus more economical to apply, *viz.* with a watering can instead of dibbling in for each plant.

As regards the composition of the fertiliser mixture this should evidently depend on soil fertility. However, the several mixtures used successfully under different conditions indicate that a mixture in which N, P₂O₅, K₂O, and MgO are in a ratio of 11: 11: 11: 4 is likely to give satisfactory results.

Reference

VISSER, T., KEHL, F. H. & TILLEKERATNE, L. M. DE W. (1959). Propagation of Tea Cuttings. I. Soil and Nutrient Requirements. *Bull. Tea Res. Inst. Ceylon* N.S. no. 1: 1-15.