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EFFECT OF MANURIAL TREATMENTS ON MADE TEA CHARACTERISTICS OF BLACK TEA

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The effect of type, level and method of application of fertilizers on made tea characteristics of black tea was investigated in three experiments.

Brightness of infused leaf of CAN was better than SA and Urea at 168 kg N per ha per annum and CAN at 336 kg N per ha per annum. The two levels of N as CAN and Urea did not influence quality but SA at the lower level improved it. Foliar application of Urea produced coloury teas compared to soil injection or broadcasting.

INTRODUCTION

The formulation of a manurial policy for tea has hitherto been governed largely by the yields obtained or expected, although other factors such as climate, elevation *etc.* have also been considered. In order to optimise returns it is necessary that the characteristics of the made tea should also be weighted along with the yield. Information relating to the effect of type and/or level of fertilizer on the made tea characteristics is scanty, or when available, contradictory. The first attempt to determine the effect of manurial treatments on made tea characteristics of Sri Lanka teas was by Evans (1932). He reported that there was no significant difference between teas that received no nitrogen and 45 kg N per ha per annum. Eden (1954) confirmed this by analysis of the made teas. He later (1935), in a review, observed that different levels of phosphate, applied as rock phosphate, at 24 and 67 kg P_2O_5 per ha per annum had no effect while at the end a four year cycle potash had a favourable influence. The latter was confirmed by Lamb (1936). Keegel (1958) however reported that colour, strength and quality of tea liquors were slightly affected at 90 compared to 45 kg N per ha per annum. He (1958, 1962) also reported that colour was improved at 45 compared to 22 kg K_2O per ha per annum while quality was improved at 67 compared to 34 kg P_2O per ha per annum. Kirtisinghe (1966) reported no significant difference in quality and valuations of teas receiving 135, 168 or 202 kg N per ha per annum; 0, 34 or 67 kg P_2O_5 per ha per annum and 0, 67 or 101 kg K_2O per ha per annum.

This paper reports the results of three experiments, conducted at the Tea Research Institute of Sri Lanka, to investigate the effect of different types, levels and methods of application of fertilizers on the characteristics of made tea.

MATERIALS AND METHODS

Experiment 1

Flush samples for manufacture were obtained from a fertilizer experiment — A 4 (Tolhurst, 1961). The experiment tested the effect of 3 types of nitrogenous

fertilizers *viz* Sulphate of Ammonia (SA), Urea and Calcium Ammonium Nitrate (CAN) at 2 levels (168 and 336 kg N per ha per annum) at a constant level of potash (144 kg K_2O per ha per annum) on the yield of tea. The treatments were applied in April, 1969 and the flush from 4 plots receiving the same treatments was bulked and manufactured separately from those of the other treatments on a miniature scale, at weekly intervals, commencing from May, 1969 over a period of 11 weeks. Samples of BOP grade, extracted using hand sieves, were evaluated by 5 tasters in Colombo on the basis given by Keegel (1959). This experiment was repeated during another season commencing from February, 1970 over a period of 12 weeks. Samples of the BOP grade were evaluated by a panel of 2 tasters in Colombo.

Experiment 2

Experiment A 31 of the Agricultural Chemistry Division which tested the effect of 3 levels of nitrogen (269, 538 and 807 kg per ha per annum) applied as SA and 2 levels of potash (135 and 269 kg K_2O per ha per annum) on yield was utilized to collect flush samples for miniature manufacture. Clones DT 1 and TRI 2025, known to differ in their quality potential (Kirtisinghe *et al.*, 1968) were included. To ensure that soil variations did not affect treatments, flush from pre-treatment plucks from 24 plots for each clone were manufactured on a miniature scale from October, 1970 over a period of 12 weeks, at weekly intervals. Tasters evaluation of BOP grades revealed no variations which was reflected in made tea characteristics. The differential fertilizer treatments were applied in February, 1971. The flush from the 4 plots receiving the same treatment was bulked and manufactured separately from those of the other treatments, at weekly intervals commencing in February, 1971 over a period of 12 weeks. Samples of BOP grade were sent in duplicate for evaluation by 2 tasters in Colombo.

Experiment 3

Experiment A 17 (Bhavanandan, 1969) of the Agricultural Chemistry Division which tested the effect of 3 levels of nitrogen (135, 269 and 400 kg per ha per annum) applied as Urea by 3 methods of application (foliar, broadcasting and soil injection) using 3 clones (DT 1, 95 and TRI 2024) on yield was used for manufacture of the flush samples. Flush was collected only from clones DT 1 and TRI 2024, for manufacture. The flush from 3 plots receiving the same treatment was bulked and manufactured separately from those of the other treatments, at weekly intervals, commencing from June, 1971 over 12 weeks. Samples of the BOP grade were submitted in duplicate for evaluation by 2 tasters in Colombo.

RESULTS AND DISCUSSION

The results of experiment 1 indicated that there was no effect of nitrogen on the colour of liquor, strength of liquor and valuation but the brightness of infused leaf and quality of liquor were significantly affected as shown in Table 1. The manufactured tea from plots receiving 168 kg N per ha per annum as CAN gave a brighter infusion than that obtained from any of the other treatments. The level of nitrogen as Urea or CAN did not influence quality but SA at 168 kg N per ha per annum improved quality of liquor.

TABLE 1 — *The effect of type and level of nitrogenous fertilizers on brightness of infused leaf and quality of liquor* of the BOP grade tea*

Type of Nitrogen	*Level of Nitrogen (kg per ha per annum)*	*Brightness of Infused Leaf*	*Quality of Liquor*
Calcium ammonium nitrate	168	5.30	4.80
Calcium ammonium nitrate	336	4.91	4.58
Sulphate of ammonia	168	4.83	4.49
Sulphate of ammonia	336	4.48	4.12
Urea	168	4.73	4.52
Urea	336	4.73	4.47
LSD — (P = 0.05)		0.32	0.33

* Assessed on the basis recommended by Keegel (1959)

The results of experiment 2 indicated that irrespective of the clone the colour of liquor, quality of liquor and valuation of the BOP grade were not affected by the levels of N, K or their interactions. As regards brightness of infusion, SA at 538 kg N per ha per annum was better than 269 or 807 kg N per ha per annum for the quality clone DT 1 but not for TRI 2025 (Table 2). There was no effect of level of N, K, or their interactions on strength of liquor for DT 1 but there was a strong indication of an effect for TRI 2025 (P = 0.10).

TABLE 2 — *The effect of level nitrogen on the brightness of infused leaf (see Keegel, 1959) of the BOP grade tea of clone DT 1*

Level of Nitrogen (kg per ha per annum)	*Brightness of infused leaf*
269	5.45
538	5.90
807	5.59
LSD (P = 0.05)	0.30

In experiment 3, tasters evaluations were carried out separately for each clone. There was no difference between the clones for brightness of infused leaf, strength, quality of liquor and valuation of the BOP grade tea. In both clones, colour of liquor was better when the nitrogen was given as a foliar spray than when applied by broadcasting or soil injection (Table 3).

TABLE 3 — *The effect of method of application of Urea on the colour of liquor (see Keegel, 1959) of the BOP grade tea*

Method of application	*Colour of liquor*
Foliar	6.27
Broadcast	6.01
Soil injection	6.06
LSD (P = 0.05)	0.18

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