

## THE CHLOROPHYLL CONTENT OF TEA CLONES IN RELATION TO THEIR YIELD CLASSIFICATION AND GEOGRAPHICAL LOCATION

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A survey of the chlorophyll status of a selected number of clones was undertaken to determine the relationship of chlorophyll content of tea shoots, to the yield classification and geographical location of the clone. Fortnightly analyses were carried out for a 7-month period. The results showed that geographical locations had no consistent effect on the chlorophyll content. There was no direct correlation between chlorophyll content and yield classification.

### INTRODUCTION

Chlorophyll is undoubtedly the most important of plant pigments since it determines the photosynthetic efficiency and productivity of the plant. Tea clones have been classified on the basis of their yield among other characteristics, and therefore it was of interest to examine whether chlorophyll content could be related to yield potential. This information would be useful in selection programmes.

In tea, chlorophyll content is further implicated in the development of 'blackness', an important criterion in the commercial evaluation of tea. Wickremasinghe and Perera (1966) suggested that 'blackness' of tea depends on the content of chlorophyll and its transformation products. The extreme blackness of low country teas was believed to be due to their higher content of chlorophyll compared to up country teas. But experimental evidence to support this contention is not available. A survey of the chlorophyll status of a selected number of clones was therefore undertaken with the objectives of determining,

- (1) The effect of shade on chlorophyll content of clones
- (2) The variation of chlorophyll content with season
- (3) The correlation of chlorophyll content and yield classification, and
- (4) Effect of geographical location on chlorophyll content.

### EXPERIMENTAL

#### Choice of plant part for routine analysis

Freshly harvested tea shoots were brought to the laboratory and separated into (a) bud (b) 1st leaf (c) 2nd leaf (d) 3rd leaf and (e) stem.

25 g of each plant part were used for analysis as described below:

### Extraction procedure

25 g fresh leaf material was macerated in a homogenizer with 200 ml acetone (80% v/v) for 3 min, transferred to a volumetric flask (250 ml) and made to volume with acetone (80%). After mixing thoroughly, the solution was filtered through Whatman No. 4 filter paper. 5 ml of the filtrate was transferred to a volumetric flask (25 ml), and made to volume with acetone (80% v/v) and used for the quantitative estimation of chlorophylls. Chlorophylls were estimated by measuring absorption at 645 nm and 663 nm in a spectrophotometer using standard procedures.

## RESULTS AND DISCUSSION

### Experiment (1) Total chlorophyll content of different parts of a tea shoot

It was evident that as the shoot develops its chlorophyll content increases (Table 1). The 2nd leaf was chosen for the analyses of chlorophyll content in the main investigation.

TABLE 1 — Total chlorophyll content of different parts of a tea shoot (mg/g fresh weight basis)

Clone	2025	2023	KEN16/3
Bud	0.537	0.582	0.487
1st leaf	0.621	0.964	0.750
2nd leaf	0.960	1.776	0.932
3rd leaf	1.041	1.826	1.162
Stem	0.224	0.269	0.259

### Experiment (2) Total chlorophyll content of clones — shaded vs unshaded

Fortnightly analysis was carried out for the 5-month period of January - May 1980 and the average of the results are reported. The results show that shade consistently increased the chlorophyll content of tea leaves. (Table 2). A closer examination of the results show that, in a few instances, namely clones CY 9, 2025 and DT 1, shade tea has hardly any effect. It appears therefore that shade has a differential effect on the chlorophyll content of clones.

TABLE 2 — Total chlorophyll content of clones - shaded vs unshaded (mg/g) (January 1980 - May 1980)

Clones	(Shaded) Mean	(Unshaded) Mean
2025	.570	.558
2024	.602	.490
2026	.627	.525
777	.545	.509
DT1	.386	.366
T5/3	.614	.542
TK48	.588	.475
CY9	.566	.567
2027	.671	.542
2023	.632	.562
DN	.569	.514

### Experiment (3) Survey of total chlorophyll content (St. Coombs)

Fortnightly analysis was carried out for the 7-month period July 1980 - January 1981 and the results are reported in Table 3.

TABLE 3 — Survey of total chlorophyll content (St. Coombs) (July 1980 - January 1981) mg/g

Clones	Mean chlorophyll content	Maximum chlorophyll content	Minimum chlorophyll content	Yield classification
2026	0.871	1.006	0.690	A
DT1	0.555	0.705	0.438	A
777	0.892	1.058	0.665	B
KEN16/3	0.800	1.019	0.589	A
2025	0.989	1.171	0.765	A
2022	1.000	1.241	0.788	B
CY9	0.861	1.055	0.700	B
2023	0.891	1.066	0.671	A
2043	1.000	1.368	0.824	A
2027	0.861	1.033	0.694	A

L.S.D. (P=0.05)      0.078

The chlorophyll content of each clone showed considerable variation between each fortnightly analysis. This was probably associated with the climatic variation between analysis, since the statistical data shows that the interaction between clones and period was significant. The maximum and minimum values of the chlorophyll contents recorded in Table 3, give an indication of the variability.

It is seen that DT 1 is consistently low in chlorophyll content. The yield classification do not appear to be related to chlorophyll content. Wickremasinghe and Perera (1966) reported that chlorophyll content increases with rainfall, but our results showed that it was difficult to correlate chlorophyll with either season or yield.

### Experiment (4) Location effect on total chlorophyll content

Wickremasinghe and Perera (1966) suggested that tea plants growing in dull rainy weather or at low elevations produce more chlorophyll than those growing in sunny weather at high elevations.

The estimation of chlorophyll in tea grown at low elevation was carried out for nine months. Out of the ten clones analysed at St. Coombs five clones were analysed simultaneously at low elevation. The elevation at which tea was cultivated did not significantly affect the chlorophyll content of any clone. (Table 4).

TABLE 4 — Location effect on total chlorophyll content (Oct. 1980 - July 1981)

Clones	(St. Joachim) Ratnapura Mean	(St. Coombs) Talawakelle Mean
2023	0.994	0.953
2025	0.948	1.084
2026	0.845	0.936
KEN16/3	0.808	0.850
CW21	0.692	0.613

L.S.D. (P=0.05) = 0.0545

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