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Development and Characteristics of Leaf Primordia of Tea

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ABSTRACT. *The quantity and quality of manufactured tea depend to a large extent on the growth of tea shoots. A tea bud consists of several leaf initials or primordia to be unfurled as leaves. They are formed around the meristem of the bud simultaneously, with the unfurling of leaves. The time taken for the initial stages of bud growth has a great influence on tea yield. Hence, a study was undertaken at the Tea Research Institute in collaboration with Wye College, to investigate the development and characteristics of primordia in tea buds. Leaf primordia were observed by taking transverse sections from tea buds and direct dissection under a microscope. Their characteristics were studied using a Scanning Electron Microscope (SEM).*

Counting revealed that the number of primordia vary from 4 in dormant apical buds to about 6 in actively growing apical buds. The number of leaf primordia in axillary buds depends to a considerable extent on the age of bud or their location on a shoot. The formation of a dormant apical bud has been initiated within an actively growing apical bud, well before it emerges as a dormant bud i.e. before about 2 phyllochrons or leaf periods. These results indicate that the maturity of axillary buds left after plucking have a great influence on the time taken for shoot regeneration. Importance of adopting proper plucking policies is therefore emphasized in order to enhance the productivity of tea plantations.

INTRODUCTION

The yield and quality of manufactured tea depend to a large extent on the rate of growth of tea shoots from axillary buds. A tea bud consists of several leaf initials or primordia to be unfurled as leaves. As many other crop species, tea leaf primordia are also formed around the meristem, simultaneously with the unfurling of leaves. Although some observations have been made on

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the number of primordia in tea buds (Bond, 1942; 1945; Goodchild, 1968; Barua and Das, 1979), no detailed studies have been carried out to investigate the characteristics and influence of primordia on shoot regeneration after plucking. Herd (1975) observed that the initial stage of bud growth has a great influence on the yield of tea, as the thermal time requirement for bud swelling and elongation is about 2/3 of the total. Hence, the physiology of both terminal and axillary bud formation can have an important bearing on the changes in shoot population density which is the major yield component of tea.

MATERIALS AND METHODS

A study was undertaken at the Tea Research Institute of Sri Lanka, Low Country Station, Ratnapura in collaboration with the Wye College, UK, to investigate the development and characteristics of primordia in tea buds. Leaf primordia were examined by taking transverse sections and direct dissection of tea buds under a microscope. Their characteristics were studied using a Scanning Electron Microscope (SEM).

RESULTS AND DISCUSSION

Counting of primordia revealed that the number of primordia in apical buds can vary from 4 in dormant buds to about 6 in actively growing buds. The number of leaf primordia in axillary buds depends to a considerable extent on the age of buds or their location on a shoot. The number of buds increased towards the base of the shoot until it reached 5 in the 3rd axillary bud from the apex, *i.e.* the top most axillary bud of a tea shoot can have about 3 leaf primordia while that of a third leaf (from the apical bud) or any leaf below can have a maximum of 5 leaf primordia. The number of leaf primordia in the second axillary bud from the apex varied from 4 - 5 and the size or maturity of leaf primordia increased in axillary buds towards the base of the shoot. Further, the formation of the dormant apical bud had been initiated within an actively growing apical bud well before it emerged as a dormant bud *i.e.* before about 2 phyllochrons or leaf periods.

These results show that the severity of plucking greatly influences shoot production from harvested shoots. The breaking of immature shoots leading to removal of the apical dominance of axillary buds having less than 5 primordia can delay the shoot regeneration, thus, extending the shoot replacement cycle resulting in a low yield due to low shoot population density. Such a situation can be expected under mechanical harvesting and harder plucking systems such as "black plucking" where all shoots, irrespective of their size, are harvested at different levels, and also with finer plucking systems

where more tender shoots are harvested to give a higher % of two leaves and a bud. The experiments conducted at the TRI have shown that the continuous use of machines for harvesting tea and hard plucking systems could result in a yield reduction of as much as 50% which is in conformity with the above concept.

These findings, therefore, emphasize the importance of adopting proper plucking policies in order to enhance the productivity of our tea plantations.

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