Do Tea Plants Physiologically Benefit from The Shade Cast by Shade Trees? A Case Study from the Mid-Country Wet Zone in Sri Lanka

Makuloluwa M.W.L.B., Hitinayake G.S.B. and Benaragama C.K.*
Department of Crop Science,
Faculty of Agriculture, University of Peradeniya, Sri Lanka

Shade trees in tea lands are expected to provide required shade levels to tea plants. Shade cast by shade trees supports several physiological processes that help tea maintaining its health, yield, and quality of the finished product. The effect of shade on changes in physiological processes in various plants is well documented. Therefore, in the present study, we hypothesized that shade alters the physiological process of tea plants. To test the hypothesis, two tea fields from an estate in the mid-country wet zone with high- and medium-shade trees were selected for the study. On bright sunny days, the shade-cast area was measured and modeled in the East-West direction in the morning, noon, and evening. Four points in the shade-cast area and two points from the un-shaded area were selected, and the light intensity and the spectrum in the range of 320-850 nm were measured using a spectroradiometer. At each point, the chlorophyll content (Ch. A, Ch. B., and Total chlorophyll) was also measured spectrophotometrically and soil nutrients were measured. The shade-casted area was significantly different ($P<0.05$) depending on the shade tree and the time of the day. The soil nutrients in all fields measured were also different ($P<0.05$), especially higher in medium-shade trees. The light spectrum at each point measured was also different ($P<0.05$), especially with high-shade trees. Although there were differences in shade-casted area and light spectrum (red: blue and red: far-red ratios), there was no significant difference ($P>0.05$) in the leaf chlorophyll content and yield in all the points measured under the selected shade-casted area, compared to that of the leaves in un-shaded areas. These findings alarm us to revisit the real purpose of having shade trees in tea fields. However, further studies along an altitudinal gradient are also suggested.

Keywords: Chlorophyll content, Light intensity, Photosynthesis, Shade trees, Soil nutrients, Yield

*chalindab.agri.pdn.ac.lk