Tee Yei Kheng et al., J Plant Pathol Microbiol 2018, Volume 9
DOI: 10.4172/2157-7471-C1-008

Rapid and non-destructive evaluation on cacao pigments, flavonoids and nitrogen contents during pod development and maturity using a fluorescence sensor

Tee Yei Kheng, Siva Kumar Balasundram, Phebe Ding and Ahmad Husni Mohd Haniff
University Putra Malaysia, Malaysia

The detection of pigments in cacao pods together with colorless flavonoids serves as a useful indicator for pod maturity using a fast and non-destructive multi-parametric fluorescence sensor. In this study, the contents of anthocyanin, flavonol, chlorophyll and nitrogen balance of five cacao genotypes (DESA1, KKM22, KKM25, MCBC1 and PBC221) were determined monthly (1-5 months) after flower pollination. There were significant differences ($P \leq 0.05$) observed between the interaction of five different cacao clones and pod development periods in flavonol, chlorophyll and nitrogen balance contents. As pods developed, anthocyanin and flavonol accumulated while the content of chlorophyll decreased only when pod matured with nitrogen balance showed a decreasing trend in cacao pods. Among these clones, as expected, natural red appearance in cacao pods of DESA1 showed significantly highest index of anthocyanin (0.637), following by KKM22 (0.255). In addition, there was no significant difference observed in KKM25, MCBC1 and PBC221 for anthocyanin content. During pod development, MCBC1 showed the least content in flavonol ($P \leq 0.05$) and the chlorophyll contents in KKM22 and MCBC1 were lower compared to other clones. UPLC-QTOF analysis showed that major components found at the cacao peel extracts of the pods consisted of flavonoid and procyanidin which are commonly found in cacao beans. Besides phenolic compounds, the presence of methyl xanthine (theobromine and caffeine) was found in cacao peel. As a conclusion, non-destructive fluorescence-based indices can be used to measure the pigments and flavonoids in cacao which can provide valuable non-destructive indicators for cacao pod maturity across different cacao cultivars.

Biography

Tee Yei Kheng is a Research Officer in Malaysian Cocoa Board since 2013 and currently she is pursuing her PhD candidate in Universiti Putra Malaysia. She has the research interests in plant physiology and precision agriculture. She is also the Head of Project for a research funding under 11th Malaysian Plan (2016-2020) with 10 research projects have been carried out to study the effects of climate changes on cocoa productivity. Despite that, she has the interests in applying Geographical Information System (GIS) and spectral reflectance of cocoa in response to nutrient deficiency and plant stress through precision cocoa management which grant her another research funding under 11th Malaysian Plan for 5 years (2016-2020).

teeyeikheng@gmail.com