

2014

April

## Omics: Mesocarp Biochemistry Provides Insight into Increased Oil Palm Yield

APPLETON, DR, TEH, HF, NEOH, BK, OOI, EK, WONG, Y C, KWONG, QB, H M YUSOF, CHEW, F T AND HARIKRISHNAK

*Biotechnology and Breeding, Sime Darby Research Sdn Bhd, 1st Floor, Block B, UPM-MTDC  
Technology Centre III Lebuhr Silikon, UPM, Serdang, Selangor 43400, Malaysia*

*Research into the identification of genetic markers for yield and other traits in oil palm has attracted significant effort in recent years and is now reaching maturity. However, associations between yield and genetic markers can be complicated by epistasis, environmental effects, or not hold true across pedigrees. In addition, development of higher throughput marker platforms such as Single Nucleotide Polymorphisms (SNPs) can yield a larger number of potential markers than can be reasonably screened. Biochemical "omics" technologies can provide a complementary approach to identify important gene regions and variants for traits such as oil yield - bridging the gap between genome sequence information and traits. In many cases the biochemical information obtained also provides insights into the regulation of key biological processes involved in fruit lipid biosynthesis. Using multi-platform omics, oil palm mesocarp was studied during six critical stages of fruit development in comparatively high and low yielding oil palm trees. The results led to the identification of gene regions that are associated with higher oil yield and thereafter were prioritised for genetic marker discovery and screening. More than 100 specific genes were identified as being important to increased oil biosynthesis in mesocarp and may explain higher oil/dry mesocarp ratios. In addition, significant differences in several important biochemical processes that may be related to mesocarp development were also identified. In future, focused biochemical studies will be able to probe the many other physiological processes contributing to yield and increase our understanding of how these can be optimised to increase productivity of oil palm through marker assisted breeding.*

*Keywords: Oil palm, oil yield, lipid biosynthesis, metabolomics, proteomics, transcriptomics.*

