

2017

April

Biotechnology for Diversification and Improved Resilience of the Oil Palm

MOHAMAD ARIF ABD MANAF, DAYANG IZAWATI ABANG MASLI, ZUBAIDAH RAMLI, ABDUL MASANI MAT YUNUS, SAFIZA MOHAMMED, LIM FOOK HWA, NURNIWALIS ABDUL WAHAB, OMAR ABDUL RASID, RAVIGADEVI SAMBANTHAMURTHI AND GHULAM KADIR AHMAD PARVEEZ

Advanced Biotechnology and Breeding Centre, Malaysian Palm Oil Board, No 6, Persiaran Institusi, Bandar Baru Bangi, 43000 Kajang, Selangor Darul Ehsan, Malaysia

Oil palm is one of the most important crops in Malaysia and has brought about significant economic and social development to the country. Nevertheless, there are major drawbacks and challenges faced by the industry such as shrinking availability of arable land, labour issues, and pest and disease. This has forced the industry to be more proactive by increasing yield and venturing into synthesis of higher value products. Besides conventional breeding which has made a lot of contributions, biotechnology has been identified as one of the tools to overcome the mentioned challenges. Oil palm biotechnology, especially genetic modification, began more than three decades ago leveraging multidisciplinary research including biochemistry of lipid biosynthesis, isolation of useful genes and promoters and finally genetic transformation. The main target of MPOB's oil palm genetic modification effort is to produce palms with higher oleic acid content. Other targets are synthesising palmitoleic acid and ricinoleic acid, increasing stearic acid and lycopene (carotenoid) content and production of biodegradable plastics. Biotechnological research also targets towards better understanding the pathogen biology and disease epidemiology for implementing disease management programmes. In the area of disease management, especially for Ganoderma species, study on plant pathogenesis and plant-microbe interaction is also being carried out. Significant achievements have resulted from biochemical studies, isolation and characterisation of important oil palm genes and promoters. Furthermore, transformation of constructs with various targeted products into oil palm embryogenic calli was successfully carried out while the regeneration of transgenic oil palm harbouring the useful genes is in progress. Towards developing oil palm with pest and disease tolerance, efforts have been initiated to understand the oil palm defence mechanisms. Several differentially expressed defence-related genes governing the interaction of the plant pathogen and oil palm have been identified. Besides understanding the oil palm system, research into the pathogen Ganoderma including identification of pathogen strains, developing various markers and data mining of fungal genome sequences have been conducted.

Keywords: Genetic modification, promoters, lipid biosynthesis, carotenoid, Ganoderma.

