APPLICATIONS OF GENOMICS TO PLANTATION FORESTRY WITH KELAMPAYAN IN SARAWAK

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Abstract

Wood-based industries in Sarawak are increasingly encouraged to adapt to "new wood" from planted forests composed of fast-growing species such as Kelampayan with short rotation cycle (6-8 years). The rationale is that natural forests at the most produce about 3m^3/ha/yr of commercial timber, whereas plantations can produce annually from 10m^3/ha to 30m^3/ha of commercial timber. It is estimated at least 30 million seedlings are required for annual planting or reforestation programmes to meet the increasing global demand for raw materials. To date, several molecular genetics studies have been completed for Kelampayan. These include genetic diversity of Kelampayan, genetic marker (SSRs) development, 'Touch-incubate-PCR' approach for preparing plant tissues for high throughput genotyping, and transcriptomics and bioinformatics on wood formation of Kelampayan. This information provides a useful resource for genomic selection of Kelampayan aiming at the production of high value forests for maximum returns.

Keywords: genomics, genetic diversity, plantation forestry, *Neolamarckia cadamba*, genomic selection

INTRODUCTION

Rapid socio-economic changes in the world are having profound impacts on all sectors, including forestry. While wood products demand is increasing, so is the demand for environmental services of forests. However, these slow growing trees from natural forests with long generation intervals are unable to meet current global demand for wood, resulting in the loss and degradation of natural forests by logging. Wood-based industries are increasingly encouraged to adapt to "new wood" from planted forests composed of fast-growing species with short rotation cycle (6-8 years). Planted forests are more efficient in producing commercial timber needs on a long-term basis than natural forests. For instance, natural forests at the most produce about 3 m^3/ha/yr of commercial timber, whereas planted forests can produce annually from 10 m^3/ha of hardwoods to 30 m^3/ha of softwoods (Krishnapillay and Razak, 2001). Furthermore, planted forests are easier to manage due to the mono or double species mix compared to very diverse natural forest stands. Hence, plantations development will serve as a strategy for maintaining a sustainable supply of timber and at the same time, reducing the logging pressure on natural forests for wood production to an acceptable level.

The global demand for wood products is projected to increase from 3.5 billion m^3 in 1990 to 6.4 billion m^3 in 2020. Apart from that, the demand for environmental services of forest is also increasing whereby more natural forests will be excluded from wood production, and recently the bioenergy policy, the use of biomass, including wood is increasingly encouraged. Therefore, there is a need to invest more in the research and development (R&D) of high-yielding, faster growth and short-rotation planted forests to