



Proteomics of Sago Palm Towards Identifying Contributory Proteins in Stress-Tolerant Cultivar

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Abstract

Metroxylon sago Rottb. or locally known as sago palm is a tropical starch crop grown for starch production in commercial plantations in Malaysia, especially in Sarawak, East Malaysia. This plant species accumulate the highest amount of edible starch compared to other starch-producing crops. However, the non-trunking phenomenon has been observed to be one of the major issues restricting the yield of sago palm starch. In this study, proteomics approach was utilised to discover differences between trunking and non-trunking proteomes in sago palm leaf tissues. Total protein from 16 years old trunking and non-trunking sago palm leaves from deep peat area were extracted with PEG fractionation extraction method and subjected to two-dimensional gel electrophoresis (2D PAGE). Differential protein spots were subjected to MALDI-ToF/ToF MS/MS. Proteomic analysis has identified 34 differentially expressed proteins between trunking and non-trunking sago samples. From these protein spots, all 19 proteins representing different enzymes and proteins have significantly increased in abundance in non-trunking sago plant when subjected to mass spectrometry. The identified proteins mostly function in metabolic pathways including photosynthesis, tricarboxylic acid cycle, glycolysis, carbon utilization and oxidative stress. The current study indicated that the several proteins identified through differentially expressed proteome contributed to physical differences in trunking and non-trunking sago palm.

Keywords *Metroxylon sago* · Trunking · Sago palm · Differential expression

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1 Introduction

Metroxylon sago Rottboell, known as the true sago palm, has the highest starch yields among sago species [19]. During the flowering stage, the trunks of the sago plant accumulate the highest amount of edible starch at about 150–300 kg of dry starch per tree [35]. The productivity of sago plant was calculated to be approximately three to four times of rice, corn or wheat. Compared to cassava, the productivity of sago is about 17 times higher [33]. Therefore, sago remains among the highest yielding starchy crops in the world [24, 55].

This species can be found across Southeast Asia (Thailand, Malaysia, Brunei, Indonesia, Philippines) as well as major regions in the Solomon Islands and Papua New Guinea [17, 20]. The tree's trunk or bole contains a large quantity of starch which is used to produce food-based products such as bread, cakes, vermicelli and noodles [32, 33, 43, 47]. The different parts of the plant can also be used as walling materials and hut building, animal feeds, production