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BIOCHEMICAL AND TRANSCRIPTOMIC ANALYSIS OF DISEASE RESISTANCE AND EARLY-MATURITY RELATED GENES IN NMR-191 AND NMR-192 RICE MUTANT LINES

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ABSTRACT

Malaysia's rice industry has revealed that the rice production was unable to supply the food demand where nearly 30% was imported from other countries. This is due to the fact that rice cultivation in Malaysia faces concerns about rice blast disease, *Magnaporthe oryzae* attack, and having a long maturation period. As such, generation of new rice mutant lines that possess improved disease resistance and early maturity characteristics through mutation breeding techniques are of great importance. This study aimed to analyze the biochemical characteristics as well as to validate the presence of disease resistance and early maturity-related genes in rice mutant lines. After the rice seeds of the parent line Pongsu Seribu 2 (PS2) and mutant lines (NMR191 and NMR192) were grown for 14 days, the plant samples underwent biochemical tests including total soluble protein content, specific activity of peroxidase, chlorophyll content and proline content. The RNA extraction and sequencing were also conducted for the purpose of transcriptomic profiling analysis to determine the presence of disease resistance and early maturity genes in the samples. The biochemical analyses showed a significant increase in the total soluble protein content, chlorophyll content, and proline content in the mutant line NMR191 and NMR192 compared to the parent line, while the specific activity of peroxidase in the mutant lines was significantly lower compared to the parent line. The transcriptomic profiling analysis revealed that *Os07g0129300*, *Os12g0270300*, and *Os03g0235000* were the disease-resistance genes whereas *Os03g0195300*, *Os01g0704100*, *Os11g0143200*, *Os06g0569900*, and *Os06g0568600*

were the early maturity genes found in NMR191 and NMR192. This study validates that NMR191 and NMR192 could be better varieties than the parent line due to the presence of their early maturity and disease resistance traits.

Keywords:

Chlorophyll Content, Mutation Breeding, *Oryza Sativa*, Proline Content, Total Soluble Protein Content