

INFORMATION AND NEW CONCLUSIONS FROM THE DISSERTATION

Dissertation title: Exploitation of the initial materials for research and breeding of brown planthopper resistant rice varieties

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Ph.D student: Pham Thi Kim Vang

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Supervisors: (1) Prof. Dr. Nguyen Thi Lang

(2) Dr. Luong Minh Chau

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Main contents of the dissertation:

- Sets of rice varieties were collected and evaluated for resistance to BPH populations: (i) The BPH virulence was evaluated in Mekong River Delta. (ii) The phenotypic evaluation were performed: The different sets of rice varieties were assembled (high-yield rice varieties and local rice varieties) including some rice lines/rice varieties carried BPH resistance genes (donor) and some pure rice varieties have both high-quality and -yield potential but susceptible to BPH; The BPH susceptible/resistance potential of sets of rice varieties was evaluated on four BPH populations; Phylogenetic of sets of rice varieties (high-yield and local rice varieties). (iii) The phenotypic evaluation was performed: The current study rice varieties were analyzed by SSR markers-based method.

- The selective populations were developed in greenhouses: The BPH resistance gene-carried hybrid populations were generated *via* backcross hybridization method.

- Molecular markers were used to evaluate the BPH resistance genes-converged rice lines: Several individuals of BC₁, BC₂, BC₃ population were evaluated and selected based on hybrid combinants hybridized the efficiency BPH resistance genes-carried rice varieties; There were many individuals were detected carrying BPH resistance target genes from BC populations through molecular markers method; Efficiency of the resistance to BPH of rice lines were achieved in the greenhouse from checking of the BPH resistant of the BPH resistance gene-carried rice lines.

- The BPH resistance genes-carried rice lines were observed and compared in the field. The BPH resistance genes-converged rice lines generated in the current study were multiplied and checked under field trials.

New conclusions from the dissertation:

- The BPH resistance genes-carried rice varieties such as *O. officinalis*, *O. rufipogon*, Ptb33, Rathu Heennati, and Sinna Sivapu, and further these rice varieties showed the large-scale BPH resistance (100% resistance) to the four BPH populations that represented in four ecological regions of Mekong River Delta. The virulence of four BPH populations was similar as compared to each other, but the virulence increased in all four BPH populations.

- Among a set of high-yield rice varieties were found 17 completely BPH resistance rice varieties to four BPH populations, and these rice varieties were OM5954, OM6830, TLR594, OM6075, OM6683, TLR493, TLR1.030, TLR201, OM7262, TLR606, OM10040, OM6610, OM7268, OM7364, OM10041, TLR601, and OM3673.

- Out of a set of local rice varieties were found only one Chet Cut (Acc.20) rice variety was completely resistant to four BPH populations. Addition, four rice varieties showed resistance to three BPH populations, these rice varieties were Chom Bok Khmum (Acc.7), Nang Tay Dum (Acc.3), Nang Trich Trang (Acc.53), Hai Bong (Acc.100). Other eight rice varieties showed resistance to two BPH populations.

- Genotypic analysis was selected out for multigenic resistance-carried rice varieties (four rice varieties) like OM6683 (*Bph1*, *Bph3*, and *Bph13*), OM7364 (*Bph1*, *bph4*, and *Bph13*), OM5954 (*Bph1* and *Bph13*), and Chom Bok Khmum (*Bph3* and *Bph17*). Tau Huong (*Bph1*, *Bph3*, and *Bph13*) and OM6162 rice varieties were selected as the donor and recipient material sources, respectively.

- The four hybrid combinants were developed.

- The BPH resistance genes-converged hybrid generations of rice lines were bred *via* the phenotypic assessment combined with using of molecular markers, out of which 14 potential rice lines were selected in the present investigation.

- The eight potential rice lines with high-yield were selected.

New contributions of the dissertation:

- The current study provided the important genetic information on the initial material sources serve as the parent materials in the breeding strategy of new BPH resistance rice varieties.

- The evaluation of efficiency of the BPH resistance genes showed maintained in Mekong River Delta regions.

- Out of the breeding objective for BPH resistance genes-carried rice varieties, the current investigation also studied on the high-yield rice varieties and appropriate duration rice varieties. This is a decisive requirement for the bred rice varieties products to be widely used and developed after the study is completed.

- Suggestion of traditional breeding and hybridization method combined with using of molecular markers-based methods for reducing of timing research in the breeding program of BPH resistance rice varieties and the converging of BPH resistance genes.

Supervisors

Ph.D student


Prof. Dr. Nguyen Thi Lang


Pham Thi Kim Vang