

QTL Analysis with Optical Coherence Tomography Data to Bacterial Leaf Blight in Rice (*Oryza sativa* L.)

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[Introduction]

Traditional phytopathological analysis requires the destructive sampling of samples because most plant diseases are based on microbial pathogens. So when we find that plants are infected, especially when crop plants are infected, the yield loss is already doomed. So if we can conduct non-destructive monitoring of plants without cutting them, we may be able to prevent plant diseases in advance. And also we can more accurately identify the changes in lesions of various types of plant diseases and conduct targeted studies on different lesion areas by the molecular biological science.

[Materials and Methods]

In this study, Bacterial leaf blight (BLB) is one of the most serious biotic stress of rice. The earlier the disease occurs, the higher the yield loss. Yield loss due to bacterial blight can be as much as 70% when susceptible varieties are grown. Then we used optical coherence tomography(OCT) technique to check the leaf morphology and by comparing the data of physiological structure changes before and after inoculation of leaf surface to determine the pathological features in the interior of the rice leaf. And use QTL program to directly identify the target gene region for lesion site by genetic map. Then using plant molecular breeding techniques to make a new rice population can improve the resistance to BLB disease. Also these defense genes can be used for some other areas of molecular biology.

[Results and Discussions]

Contrary to traditional histology methods of two-dimensional and three-dimensional images of the plants tissues obtained. Because in the traditional method, all the plant tissues were sampled by wave cutting and then observed by electron microscopy. Such destructive sampling is irreversible for tissue organism damage and also damaged to their lesion tissue study. We can observe the leaf structure non-invasively and non-destructively by using OCT technology. Through the obtained two-dimensional and three-dimensional maps of rice leaf tissue, the rice samples before and after inoculation with Bacterial Leaf Blight were subjected to comparative analysis, and the experimental data of lesion tissues were recorded and statistically analyzed. After that we can used QTL program to analysis these data with genetic maps of CNDH population to get the target regions on different chromosomes. And using plant molecular breeding techniques to make a new rice population can improve the resistance to BLB disease

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