

**Division-1-02**

## **The Variation of Yield-Related Traits of the QTL Pyramiding Lines for Climate-resilience and Nutrition Uptake in Rice**

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### **[Abstract]**

Greenhouse gas emissions are one of the critical factors that drive change in rice cropping systems. Within this changing system, less water irrigation and chemical fertilizer are seriously considered, as well combining precision farming technologies with irrigation control. Water and phosphorus (P) fertilizer are two of the most critical inputs in rice cultivation. Due to the lack of water availability in the system, P fertilizer is not available, especially in acidic soil conditions. Moreover, the various types of abiotic stresses, such as drought, high temperature, salinity, submergence, and limited fertilizer result in significant yield loss in the system. Even in the late stage of growth, the waves caused by diseases and insects make the field more unfruitful. Therefore, agronomists and breeders need to identify the secondary phenotypes to estimate the yield loss of when stress appears. The prediction will be clearer if we have a set of markers tagging the causal variation and the associated precise phenotype indices. Although there have been various studies for abiotic stress tolerance, we still lack functional molecular markers and phenotype indices. This is due to the underlying challenges caused by environmental factors in highly unpredictable regional and yearly environmental conditions in the field system. *Pup1* (*phosphorus uptake 1*) is still known as the first QTL associated with phosphorus uptake and have been validated in different field crops. Interestingly, some pyramiding lines of *Pup1* and other QTLs for other stress tolerances showed preferable phenotypes in the yield. Precise physiological studies with the help of genomics are on-going and some results will be discussed.

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