# Phenotypic Evaluation of Weed-competitive Traits and Yield of Rice RILs from an Indica x Tropical Japonica Mapping Population

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**Abstract**

*Indica* rice cultivars can suppress weedy grasses. To better understand the important traits and genes underlying weed suppression and crop productivity, a recombinant inbred line (RIL) F8 population was developed by crossing non-suppressive 'Katy' and high-yielding, allelopathic 'PI312777'. Three hundred RILs were evaluated in the field (2014-2016) for traits related to growth, tillering, leaf production, and yield. Emergence of several RILs was earlier than either parent. Tiller and leaf production by PI312777 exceeded that by Katy, and some RILs exceeded PI312777. RILs with diverse photosynthesis rates were identified. Yields of PI312777 were 30% greater than those of Katy, and few RILs yielded more than PI312777. In field studies using selected RILs (_˜10% of total) with extreme, contrasting phenotypes, several RILs exhibited as much or more suppression than parents. Midseason weed biomass was highly correlated with rice dry weight (r=-0.73) and tiller number (r=-0.67). In the greenhouse, the main culm node from which the first tiller arose (NT1) was 1.4 for both parents and as low as 0.5 for RILs. Low values for NT1 were associated with more panicles (r=-0.37) and tillers (r=-0.30), suggesting that NT1 might be useful in understanding interactions between yield, early vigor, and weed suppression. In the greenhouse, PI312777 produced twice the root mass compared with Katy. In agar, PI312777 produced more numerous, spreading roots compared with Katy, and initial root growth angles among RILs ranged from _˜5 to _˜40 degrees from vertical. Few RILs suppressed weeds better, or yielded more than PI312777. Genomic regions associated with key traits are being determined by combining phenotypic data (and allelopathic activity; in progress) with genotypic data generated by the 2nd generation Illumina 6K SNP chip. The resulting QTL information will provide a foundation for mapping, and a better understanding of the roles of genes in yield and weed suppression.

**Keywords:** allelopathic rice, root growth and architecture, tillering, photosynthesis, single nucleotide polymorphism (SNP) chip

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