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| Category | : 8th Rice Genetics Symposium |
| Select Theme | : Genetics of Abiotic interactions: Stress tolerance and Mitigation |
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| Genetics of Abiotic interactions Stress tolerance and Mitigation Keyword 3 | : |
| Title of Entry | : Marker-trait Association Analysis for 12 Root Specific Traits in Rice (<i>Oryza sativa</i> L.) |
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Abstract : Rice, the major food crop suffers greater yield losses due to occurrence of frequent drought. Improvement in root architecture is essential to breed drought tolerant varieties. Although more than 675 QTL's have been reported for various root traits in rice, very few association analysis along with comprehensive root phenotyping have been performed for drought stress in rice. So, the present study characterized the marker–trait association of 94 rice genotypes with 27 gene-based markers for 12 root specific traits. Phenotyping was done in two replications in a messed basket (18x7x8.5 cm) with rectangular mess size of 0.5x0.2 cm buried on the top surface of 100 cm soil. After withholding irrigation from 40th to 59th day of sowing, observations on total root length, number of roots at crown region, number of roots penetrating from 0 to 30°, 30 to 50° and 50 to 90° angle from the basket, root volume, root thickness at 0 to 10 cm and 10 to 20 cm, root dry weight, ratio of deep rooting, root to shoot ratio, number of roots/tiller were recorded. PCA showed 89% of variation in first two components. STRUCTURE analysis identified two sub population (K=2) among the genotypes. Mixed-linear model with population correction showed six significant associations for root traits such as root volume (R²: 10.70%), no. of roots penetrating from 0 to 30° (R²: 8.41%), 30 to 50° (R²: 8.98%) and 50 to 90° angle (R²: 9.63%), root to shoot ratio (R²: 9.61%), ratio of deep rooting (R²: 10.17%). Significantly, one of the markers RGNMS2496 showed association for four root related traits such as root volume, total number of roots penetrating from 0

to 30°, 30 to 50°, and root to shoot ratio. Thus, the identified trait associated markers can be effectively used for varietal improvement in rice.

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