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Evaluation for anaerobic germinability of rice germplasm for direct-seeding cultivation under submerged conditions

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Abstract

Stable stand establishment is pre-requisite in direct rice seeding system for obtaining optimal yield of rice crop in rain-fed and waterlogged areas. Anaerobic condition on waterlogged soil causes low germination which significantly reduces crop yield. Due to low availability of tolerant genetic material for anaerobic germination, there is urgent need to evaluate rice germplasm for better germinability under anaerobic conditions. Seeds of the 185 rice accessions were evaluated for germination vigor and coleoptile length under anaerobic conditions. The variation among germplasm was tested for significance using analysis of variance and various multivariate components. Significant level of variation was observed among all accessions for germination vigor and coleoptiles length. Although highest mean values for coleoptiles length (2.1cm) and germination rate (60%) were observed in *japonica* accessions but maximum coleoptile length (4.68cm) and germination rate (96%) was found in *indica* genotype CO18. A highly significant and positive correlation was also observed between germination vigor and coleoptiles length, which signify the importance of elongated coleoptile under anaerobic conditions. The PCA analysis illustrated that 97.24% variation was accounted by PC1 while PC2 and PC3 explained 2.54% and 0.24% variation for germination vigor and coleoptile length. PCA scattered plot divided the accessions in four various groups. All AG tolerant accessions were included in group I. Likewise in the case of cluster analysis, two major clades (I and II) were formed. All accessions showing >40% germination rate were included in clade I, whereas all other accessions with <40% germination rate were grouped in clade II. Further more highly tolerant accessions (>80% germination) were grouped in sub-cluster IA.

Keywords: rice, germplasm, anaerobic germinability, evaluation, multivariate

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