The integrative study on drought tolerance (DT) in rice

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Water shortage has become a limiting factor to rice production as it consumed about 50% water recourses. Drought increasingly reduced the rice yield in most rained area. Rice cultivation with water layer in irrigated area not only is profuse in fresh water but also resulting in the increasing environmental pollution. It is not clear that how much water are should be exactly need in normal rice production and if there is room left for economizing the water usage by further improvement on drought tolerance in rice. Since 1998, we have being focused on understanding the genetic base of DT and improving the DT ability of rice varieties. The major progresses will be present in the meeting as outlined in the follows. 1) Establishment of field screen facility and evaluation method on drought tolerance. Two field screen facilities with precise water supply control system were set up in Shanghai. It could be used to phenotype two mapping populations. A new large screen field (2 hectare) is under construction in Hainan island. 2) Identification and evaluation of drought tolerant rice germplasm resources. More than 1000 accession were found to show several degree of drought tolerance. 3) Genetic dissection on drought tolerance in rice. Several QTLs of drought tolerance were mapped in a RIL population from the cross “ZS97/IRAT109” and the alleles of drought tolerant parent were introduced to the sensitive parent. A set of near isogenic lines was created. 4) Discovery of drought tolerant related gene/QTLs. DT candidate genes involving different physiological pathways were cloned and over-expressed in rice cultivar Zhonghua 11. The further study should be the functional analysis and evaluation on its breeding value. 5) DT germplasm enhancement and variety development. Two new drought tolerant hybrid rice varieties will be released next year. The next efforts will focus on the establishment of DT core collection, the functional studies of candidate genes, germplasm enhancement by MAS, development of high yield and good quality DT hybrid rice, and setting up the cultivation system of DT cultivars.
土壤水分梯度鉴定系统

可同时容纳3000份材料抗旱鉴定

Figure 1. Field screen facility

Figure 2. OsI17 showing DT recovery

Figure 3. Drought tolerant hybrid rice Hanyou 3