D29 QTL ANALYSIS OF GRAIN QUALITY TRAITS IN RICE BASED ON QTL X ENVIRONMENT INTERACTION BY AMMI MODEL

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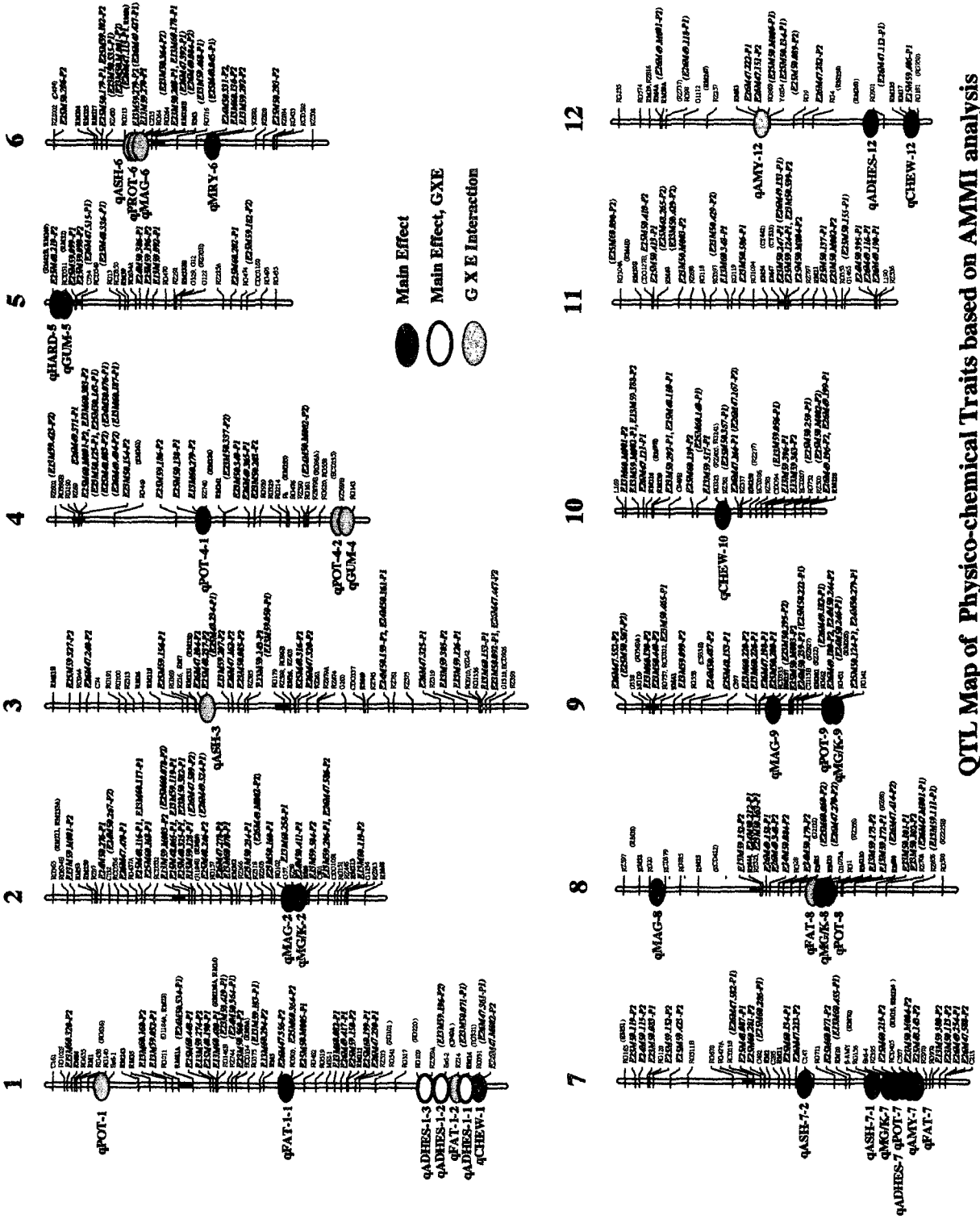
Objectives :

The objective of the present study was to identify quantitative trait loci for grain quality traits showing genotypic main effects by AMMI analysis for further detailed research, such as map-based cloning or marker-assisted selection (MAS).

Materials and Methods :

o Population : Milyang23/Gihobyeo RILs - F11('95), F12 ('96), F13 ('97)
o Experimental fields : Iksan
o Molecular map : 736 RFLP, SSLP, AFLP markers
  - RFLPs, SSLPs (Dr. SR McCouch), RFLPs (Dr. T Sasaki)
  - New cDNA markers (KRGRP), AFLP (co-work with KeyGene)
o QTLs analyzed : grain quality traits - physical & chemical characters
o G x E analysis : AMMI model
o QTL analysis & permutation test : Qgene(V2.30b_AA), QTL Cartographer(V1.13)

Results and Discussion :

Quantitative trait loci (QTL) have been detected with many different rice populations. However, some of them might be identified by genotype x environment interaction. To use markers linked to QTLs of interest for map-based cloning or marker-assisted selection (MAS), QTLs which show the genotypic main effects may be discriminated from QTLs with G x E interaction. The additive main effects and multiplicative interaction (AMMI) model has emerged as a powerful analytical tools for genotype x environment studies. A recombinant inbred population of rice, consisting of 164 RILs derived from a cross between Milyang 23 (*Tongil* type) and Gihobyeo (*Japonica* type), was used for mapping quantitative trait loci (QTLs) of grain quality traits. Grain quality traits were investigated for three years (1995-1997) in Honam region of Korea. The dataset for three-environments was used to analyze for AMMI model. The molecular map used for QTL analysis covers 1,984cM with an average interval size of 2.8 cM, involving 736 markers of RFLP, RAPD, AFLP and SSLP. A total of thirty-seven QTLs were identified on grain quality traits; twenty-four QTLs were detected with main effects; nine QTLs were identified with GxE interaction; four QTLs showed main effects and GxE interaction.

QTL Map of Physico-chemical Traits based on AMMI analysis

Legend:
- Main Effect
- Main Effect, GXE
- G X E Interaction