Detection of quantitative trait loci for ear row number in F₂ populations of maize

C. Yang¹,², J. Liu¹,² and T.Z. Rong¹,²

¹Maize Research, Sichuan Agricultural University, Wenjiang, Sichuan, China
²Key Laboratory of Biology and Genetic Improvement of Maize in Southwest Region, Ministry of Agriculture, Wenjiang, China

Corresponding author: T.Z. Rong
E-mail: rongtz@sicau.edu.cn

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ABSTRACT. Ear row number (ERN) is not only a key trait involved in maize (Zea mays L.) evolution but is also an important component that is directly related to grain yield. In this study, quantitative trait loci (QTLs) for ERN were detected across two F₂ populations that were derived from a same cross between B73 with 16 rows (N = 233) and SICAU1212 with four rows (N = 231). As a result, 33 QTLs were associated with 12 agronomic traits: three plant traits, four ear-related traits, and five kernel-related traits. The total phenotypic variation explained by the QTLs for each trait ranged from 8.60 to 72.67%, and four QTLs were identified for ERN in the two populations. Each QTL explained between 6.78 and 36.76% of the ERN variation. Notably, three of the four QTLs (qERN2-1, qERN4-2, and qERN8-1) were associated with ERN, and qERN8-1 simultaneously influenced grain yield, plant diameter, ear diameter, and kernel length. In addition, only one significant epistatic interaction was detected in all 33 QTLs. This study should provide a foundation for further fine-mapping and map-based cloning of these consistent QTLs, and for controlling maize ERN by marker-assisted breeding.

Key words: Maize; QTL; Ear row number; Grain yield