

AFLP markers tightly linked to the aluminum-tolerance gene *Alt3* in rye (*Secale cereale* L.)

Miftahudin¹, G. J. Scoles² and J. P. Gustafson³

- (1) Department of Agronomy, University of Missouri-Columbia, Columbia, MO 65211, USA, and Department of Biology, Bogor Agricultural University, Bogor 16144 Indonesia, ID
- (2) Department of Plant Sciences, University of Saskatchewan, 51 Campus Dr, Saskatoon, SK, S7N 5A8, Canada, CA
- (3) USDA-ARS, Plant Genetics Research Unit, and Department of Agronomy, University of Missouri-Columbia, Columbia, MO 65211, USA e-mail: pgus@missouri.edu Fax: +1-573-8755359, US

Abstract

Rye (*Secale cereale* L.) is considered to be the most aluminum (Al)-tolerant species among the Triticeae. It has been suggested that aluminum tolerance in rye is controlled by three major genes (*Alt* genes) located on rye chromosome arms 3RL, 4RL, and 6RS, respectively. Screening of an F₆ rye recombinant inbred line (RIL) population derived from the cross between an Al-tolerant rye (M39A-1-6) and an Al-sensitive rye (M77A-1) showed that a single gene controls aluminum tolerance in the population analyzed. In order to identify molecular markers tightly linked to the gene, we used a combination of amplified fragment length polymorphism (AFLP) and bulked segregant analysis techniques to evaluate the F₆ rye RIL population. We analyzed approximately 22,500 selectively amplified DNA fragments using 204 primer combinations and identified three AFLP markers tightly linked to the *Alt* gene. Two of these markers flanked the *Alt* locus at distance of 0.4 and 0.7 cM. Chromosomal localization using cloned AFLP and a restriction fragment length polymorphism (RFLP) marker indicated that the gene was on the long arm of rye chromosome 4R. The RFLP marker (BCD1230) co-segregated with the *Alt* gene. Since the gene is on chromosome 4R, the gene was designated as *Alt3*. These markers are being used as a starting point in the construction of a high resolution map of the *Alt3* region in rye.

Aluminum tolerance - Rye - AFLP - Linkage Keywords