

P050

QTL mapping of low-temperature germinability and identification of *qLTG1* candidate genes in rice

Sun Ha Kim, Kyu-Chan Shim, Hyun-Sook Lee, Anh Quynh Le, Sang-Nag Ahn*

Department of Agronomy, College of Agriculture & Life Sciences, Chungnam National University, Daejeon 305-764, Korea

Abstract

Low-temperature is one of the environmental stress factors that affect plant growth and development and consequently limit crop productivity. The control of seed germination under low-temperature is organized by many genes which are called quantitative trait loci (QTLs). High germination rate for low-temperature is an important factor of growing rice. Previously, we identified a major QTL controlling low-temperature germinability in rice using 96 introgression lines (ILs) derived from a cross between *Oryza rufipogon* (Rufi) and the Korean japonica cultivar, 'Hwaseongbyeon (HS)'. A BC₃F₇ line (TR5) showed better low-temperature germinability than its recurrent parent. TR5 was crossed with HS to develop a segregating F₂:₃ populations for the target QTL. Six SSR markers polymorphic between HS and Rufi were used to screen and fine map the *qLTG1*. The *qLTG1* on chromosome 1, which accounted for 55.5% of the total phenotypic variation, confirmed that Rufi allele enhanced the low-temperature germinability. Intervals between markers CRM16 and CRM15, four candidate genes were identified. The identified candidate genes, which are encoded by a protein of unknown function, showed their direct involvement on seed germination at low-temperature. To identify genes targeted by *qLTG1*, we investigated the expression profiles of these candidate genes and germination behavior of *qLTG1* under different stress conditions and compared to HS, Rufi, and TR5 at 13±2°C for 3 days after incubation. Furthermore, transgenic rice plants will also be developed to conduct a detailed investigation on low-temperature germinability. Hence, the QTL for low-temperature germinability would be useful in rice breeding programs especially in the development of lines possessing low-temperature germinability.

Keywords: Quantitative trait loci, Low-temperature germinability 1, *qLTG1*, Rice, breeding program

Corresponding author*

Sang-nag Ahn

Address

Department of Agronomy, College of Agriculture & Life Sciences, Chungnam National University, Daejeon 305-764, Korea

Tel and Fax

Tel) 042-821-5728 Fax) 042-822-2631

E-mail

ahnsn@cnu.ac.kr