9. Identification of a new allele of F1 pollen sterility gene, S21, detected from the hybrid between Oryza sativa and O. rufipogon

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Two QTLs associated with the F1 pollen sterility observed in a cross between a cultivated rice (Oryza sativa L. cv. Taichung 65 (T65)) and a wild rice (O. rufipogon Acc. IRGC105715) (Miyazaki et al. 2007). Here we report the identification and mapping of one of the QTLs, that is a new allele of S21 originally found in an O. sativa - O. glaberrima cross (Doi et al. 1999).

The BC4F2 mapping population was obtained from a BC4F1 plant, which was selected from an introgression library of IRGC105715 with T65 background. The SSR markers used for the selection were RM5508, RM5455 and RM248 on the long arm of rice chromosome 7 (McCouch et al. 2002).

The BC4F2 population showed clear-cut bimodal distribution for pollen fertility when classified into normal and semi-sterile plants (Fig. 1). In the population consisting of 94 plants, there were 49 normal and 45 semi-sterile segregants. Linkage analysis revealed that the gene controlling the pollen semi-sterility was located between the two SSR markers, RM5455 and RM6063 on chromosome 7, with map distances of 2.2 and 0.5 cM, respectively (Fig. 2). At the RM6063 locus, 47 plants showing normal pollen fertility were homozygous for T65 allele except for 1 plant that was heterozygous, 1 plant showing normal pollen fertility was homozygous for IRGC105715 allele, and 45 plants showing semi-sterile were heterozygous. This map position was identical to that of S21 previously identified from O. glaberrima (S21-gla). S23 identified from O. glumaepatula (Sobrizal et al. 2000) was allelic to S21-gla (unpublished data). Thus, it is suggested that this gene (S21-ruf) is a probable allele of S21. This result implied that S21 is widely distributed in wild species.

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Fig. 1. Frequency distribution of pollen fertility in the BC₄F₂ population.

Fig. 2. A linkage map showing the location of S21-ruf. Framework map was quoted from Harushima et al. (1998).

References


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