

D12 Quantitative Trait Loci(QTLs) Mapping Associated with Callus Formation and Plant Regenerability in Anther Culture of Rice

Department of Agronomy, Kyungpook Nat'l Univ. : Yong-Sham KWON^{*} · Jae-Keun SOHN
National Institute of Agricultural Science & Technology, RDA : Moo-Young EUN

Objectives

The objective of this study was to detect QTLs associated with ability of callus formation and plant regeneration in anther culture of 164 MG RILs using NIAST map.

Materials and Methods

- o. Plant materials : Anthers of 164 MG RILs(F_{13,14})
 - MG RILs : Milyang 23-Gihobyeo recombinant inbred lines
- o. Anthers pretreatment : 10 days at 12°C
 - Culture method : One-step culture.
 - Medium : N₆-Y₁ + 1 mg/ℓ NAA + 2 mg/ℓ kinetin + 30 g/ℓ sucrose + 5 g/ℓ gelrite
- o. Linkage Map : NIAST map(Cho et al, 1998, Eun et al, 1998)
- o. QTL analysis : QGENE(Nelson, 1997)

Results and Discussions

Frequency of plant regeneration in anther culture of parental cultivars was 1.5% for 'Milyang 23' and 15.1% for 'Gihobyeo'(Table 1). Variation of plant regeneration frequency in anther culture of 164 RILs ranged from 0% to 38.6% with a mean of 6.1%. Transgressive segregation was observed for the ability of callus formation and plant regeneration in anther culture of the 164 MG RILs(Figure 1). Two QTLs for callus formation located on chromosome 3 and 11. Two loci controlling callus formation accounted for 17.8% total phenotypic variation(Table 2). Two QTLs associated with green plant regeneration were detected on chromosome 3 and 10. They explained 19.6% total phenotypic variation(Table 2).

Table 1. Mean value of callus formation and plant regeneration in anther culture of 164 MG RILs(F_{13, 14})

Parents & RILs	% of callus formation	% of plant regeneration	
		green	albino
Milyang 23	11.6 ± 3.4 ^{a)}	1.5 ± 1.1	0.2 ± 0.1
Gihobyeo	17.7 ± 4.1	15.1 ± 1.5	1.6 ± 0.2
RILs(F _{13, 14})	24.4 ± 16.1	6.1 ± 5.9	0.7 ± 1.4

^{a)} Mean ± SD.

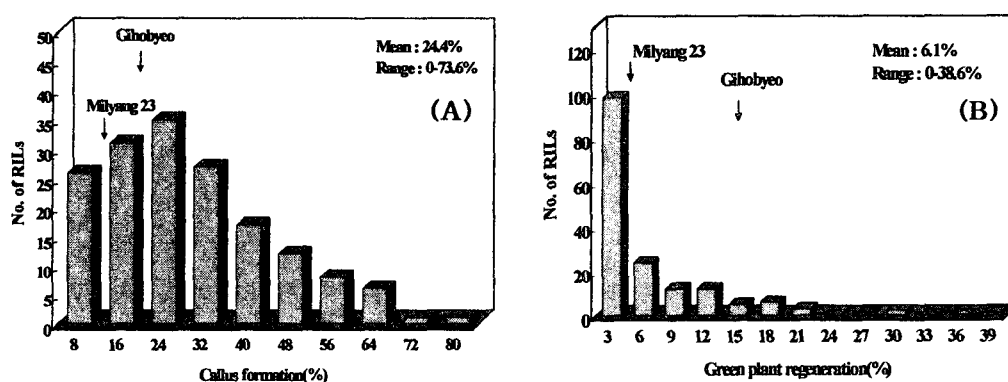


Figure 1. Frequency distribution of the ability of callus formation(A) and plant regeneration(B) in anther culture of 164 MG RILs(F_{13,14}).

Table 2. Characteristics of QTLs associated with the ability of callus formation and plant regeneration in anther culture of 164 MG RILs(F_{13,14})

Traits	QTLs	Chromo	Bordering markers	LOD	Variation (%)	Additive effect
Callus formation	qACF- 3	3	E26M47.104 - RM251	3.59	9.96	-4.58
	qACF-11	11	GA476 - GA567	3.11	7.88	3.13
Albino plant regeneration	qAAR- 1	1	E26M49.417 - E13M60.082	2.86	6.68	0.76
	qAAR- 3	3	E26M47.240 - RG944	2.69	7.33	-0.92
Green plant regeneration	qAAR- 4	4	E25M50.138 - E25M59.186	2.87	7.66	-1.81
	qAGR- 3	3	E13M59.207 - E25M48.237	3.32	9.75	-1.81
Green plant regeneration	qAGR-10	10	RG323(RZ400) - E13M59.517	4.19	9.82	-2.45