# D10 Identification of RAPD Markers Associated with Grain Weight in Rice

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## 벼의 입중과 관련된 RAPD marker의 동정

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## Objectives

This study was carried out to the selection of RAPD markers associated with grain weight of a large-grain mutant, Hyacp 39-26-1, derived from anther culture of a rice 'Hwayeongbyeo'.

## Materials and Methods

- Plant material : Parents, $F_1$, $F_2$, and $F_3$ from 'Hwayeongbyeo/Hyacp 39-26-1'.
- Grain characteristics : Grain length, width, shape(length/width), and weight.
- DNA extraction : CTAB method.
- PCR cycling conditions : Samples were first heated at 96℃ for 5min before entering a 45 cycle PCR procedure of 96℃ for 1min, 36℃ for 1min and 72℃ for 2min. A final time delay phase of 72℃ for 7min was always run before an optional soak period at 4℃.

## Results and Discussion

- The grain weight of 'Hyacp 39-26-1' was about 50% heavier than that of the donor cultivar, 'Hwayeongbyeo'. The segregation mode for grain weight in $F_2$ population from a cross, 'Hwayeongbyeo/Hyacp 39-26-1', showed a nearly normal distribution. The 191 $F_2$ plants were ranged from 21.8g to 34.7g in 1,000-grain weight with a mean of 26.8g.
- The 54 of the 520 operon primers yielded polymorphic fragments between 'Hwayeongbyeo' and 'Hyacp 39-26-1'. Four RAPD markers(OPB18, OPH07, OPT20, and OPX20) of these 54 markers were significantly associated with the grain weight of 21 $F_3$ lines derived from the cross, 'Hwayeongbyeo/Hyacp 39-26-1'(Tab. 1), and amplified band size was 850bp, 1100bp, 1350bp and 1200bp, respectively(Fig. 2).

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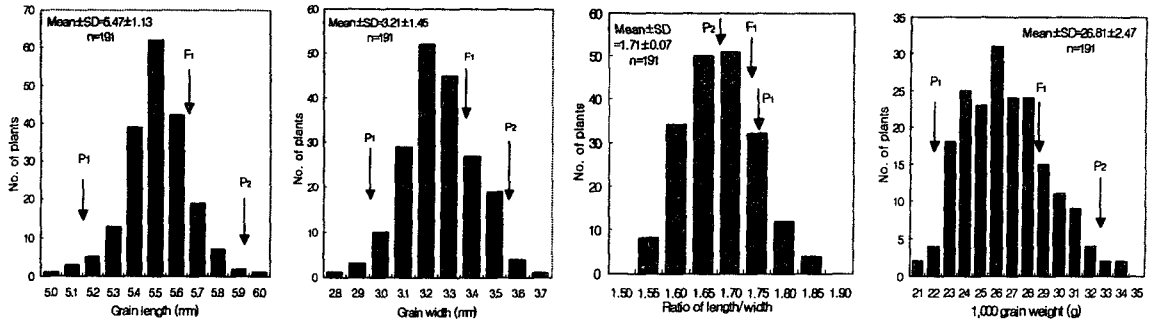


Fig. 1. Frequency distributions of grain length, width, shape(length/width ratio), and 1,000 grain weight in $F_2$ population from a cross between 'Hwayeongbyeo($P_1$)' and 'Hyacp 39-26-1($P_2$)'.

Table 1. Relationship between RAPD markers and grain weight of $F_3$ lines derived from a cross, 'Hwayeongbyeo/Hyacp 39-26-1'

| RAPD markers | Average value of grain weight in each genotype (g) | | t-value |
|---|---|---|---|
| | Hwayeongbyeo allele | Hyacp 39-26-1 allele | |
| OPB18 | 25.35±4.31[a] (10)[b] | 29.80±3.82 (11) | 2.91* |
| OPH07 | 25.38±4.06 (10) | 29.37±4.33 (11) | 2.17* |
| OPT20 | 24.30±4.89 (9) | 27.94±4.50 (12) | 2.26* |
| OPX20 | 24.73±3.70 (10) | 29.52±4.16 (11) | 2.66* |

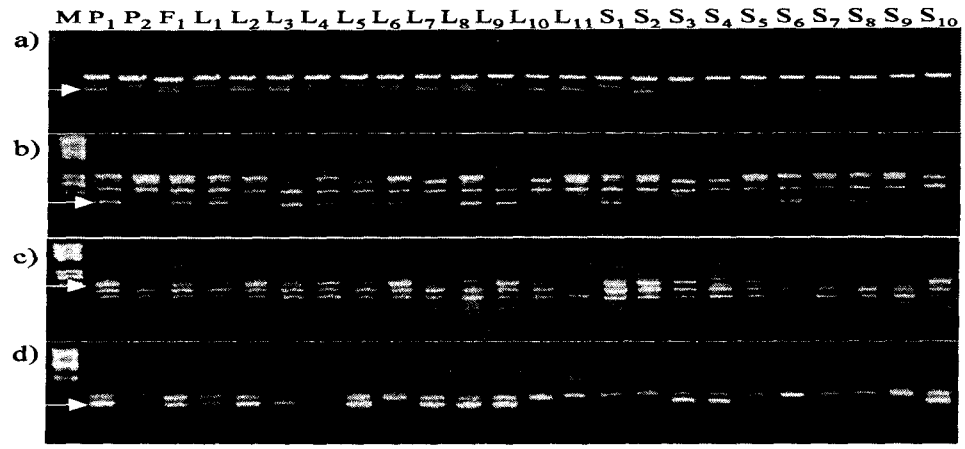


Fig. 2. RAPD polymorphisms of $F_3$ lines revealed after amplification with primers, OPB18(a), OPH07(b), OPT20(c), and OPX20(d). Amplification products were loaded onto a 1.2% agarose gel containing ethidium bromide. Arrows indicate the phenotype-specific RAPD fragment. M : Size marker provided by *EcoR* I and *Hind*III - digested with Lambda DNA, $P_1$ : 'Hyacp 39-26-1', $P_2$ : 'Hwayeongbyeo', $L_{1\sim11}$ : $F_3$ lines with large grain, $S_{1\sim10}$ : $F_3$ lines with small grain.