PA16

Genetic Analysis for Rice Grain Properties

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Objective

Quantitative traits loci analysis was applied for improving rice grain quality which is controlled by major and minor genes. Appearance qualities and physicochemical traits of 120 lines derived from DH population had been evaluated to depict mean and frequency distribution of the traits related to the grain properties.

Materials and Methods

O Materials

-120 doubled-haploid (DH) lines developed by anther culture of F1 plants which obtained from a cross 'Samgangbyeo and Nagdongbyeo'.

O Methods

-Grain length and width: 20 grains for each line using vernier caliper.

-NIR spectrophotometer (Foss 6500) was applied for amylose content, protein and lipid content.

Results

O The mean amylose content of DH lines was 4% and 2% lower than that of Samgangbyeo and Nagdongbyeo, respectively (Fig. 1-a). The mean of protein content in DH population (Fig.1-b) was 17% higher than that of Nagdongbyeo, but similar to the value of Samgangbyeo. Lipid content showed a continuous distribution with transgressive segregation (Fig.1-c). The average values of DH lines for grain weight, grain length and the ratio of grain length to width were near the mid-parent value (Fig.2. and Table1.).

O The correlation coefficients for grain characteristics of 120 DH lines indicated that there was positive correlation between amylose content and grain weight at 1% level significant. There were negative correlations between grain weight and protein content or lipid content. Protein content was significantly correlated with amylose content (Table2.).

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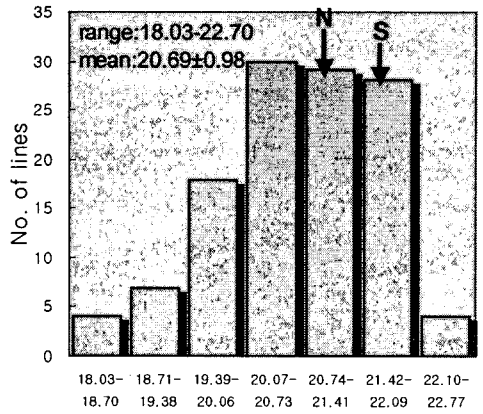
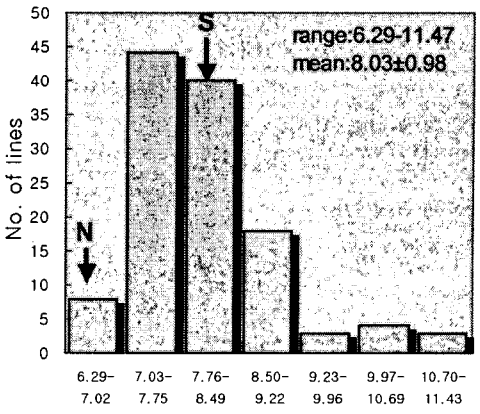
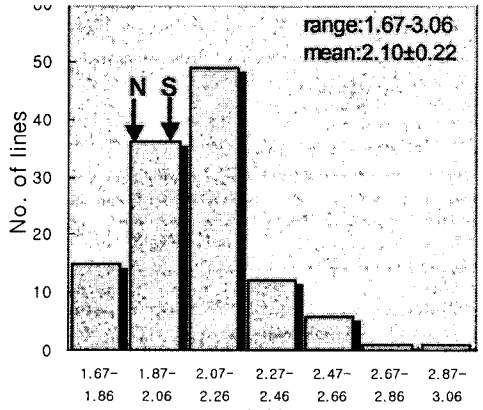


(a) Amylose



(b) Protein



(c) Lipid

Fig.1. Frequency distribution of amylose (a), protein (b) and lipid content (c) of 120 DH lines from a cross 'Samgangbyeo (S) and Nagdongbyeo (N)'.

Table1. Mean value for grain appearance of 120 DH lines

Appearance	Mean value			Range of DH lines
	Samgangbyeo	Nagdongbyeo	DH lines	
1000 grain weight	17.73±0.15	20.77±0.55	18.06±0.40	12.6-24.9
Grain length	5.64±0.06	5.20±0.01	5.28±0.06	4.76-5.87
The ratio of grain length to width	2.25±0.03	1.77±0.02	1.97±0.02	1.65-2.46

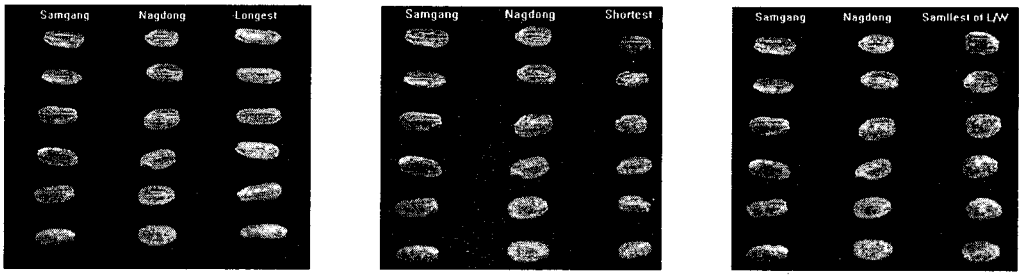


Fig.2. The comparison on the grain length and shape between DH lines and parents

Table2. Correlation coefficients among 6 grain characteristics of 120 DH lines

Grain properties	X1	X2	X3	X4	X5	X6
Grain weight (x1)	1.00					
Grain length (x2)	0.42**	1.00				
Grain width (x3)	0.85**	0.10^{ns}	1.00			
Protein content (x4)	-0.40**	-0.09^{ns}	-0.37**	1.00		
Lipid content (x5)	-0.37**	-0.16^{ns}	-0.27**	-0.02^{ns}	1.00	
Amylose content (x6)	0.27**	0.11^{ns}	0.18^{ns}	-0.57**	-0.10^{ns}	1.00

Note: **–Significant at the 1% level; ^{ns}–Not significant.