

## Genetic Analysis of Agronomic Traits Related to Lodging of Rice

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### Objective

The aim of this study is to identify the genetic mode among several traits related to lodging resistance using the DH population derived from a cross 'Samgangbyeo / Nagdongbyeo' and to make basic data for constructing QTLs map .

### Material and Methods

#### ○ Plant materials

- 120 DH lines were established by anther culture of F<sub>1</sub> hybrids from 'Samgangbyeo / Nagdongbyeo'.

#### ○ Methods

- Traits related to lodging: 3rd internode length, bending strength, lodging index (Mo/BW), moment (length×fresh weight).
- A breaking weight in 3rd internode (BW) was evaluated by the mechanical properties of the stem section using the universal testing machine (TA-XT plus texture analyser, SMS, USA)

### Results

- All traits related to lodging showed a wide range of variation and continuous distribution. Transgressive variation, both positive and negative, was observed for all traits. Means for the traits were presented in Table 1. The variation of bending strength ranged from 441.2 to 1843.8 with a mean (832.67) lower than average value of parents (1083.2).
- Correlations among the traits were evaluated at  $p>0.05$  and  $p>0.01$  as summarized in Table 2. Stem length was positively correlated with BW, moment and bending strength, while BW was negatively correlated with lodging index.

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Table. 1. Variation of traits related to lodging in DH lines and donor cultivars

Traits	Samgangbyeo (P <sub>1</sub> )	Nagdongbyeo (P <sub>2</sub> )	Mean of parents	DH lines	Range of DH lines
Breaking weight in 3rd internode (BW)	1031.0	702.0	866.5	695.09	352.9-1474.9
Moment (Mo)	1553.6	1137.6	1345.6	900.71	265.9-1919.7
Lodging index (LI)	150.7	162.1	156.4	128.86	44.6-277.3
Bending strength (BS)	1288.8	877.5	1083.2	832.67	441.2-1843.8
3 <sup>rd</sup> internode length	10.1	12.8	11.5	11.62	4.8-20.2

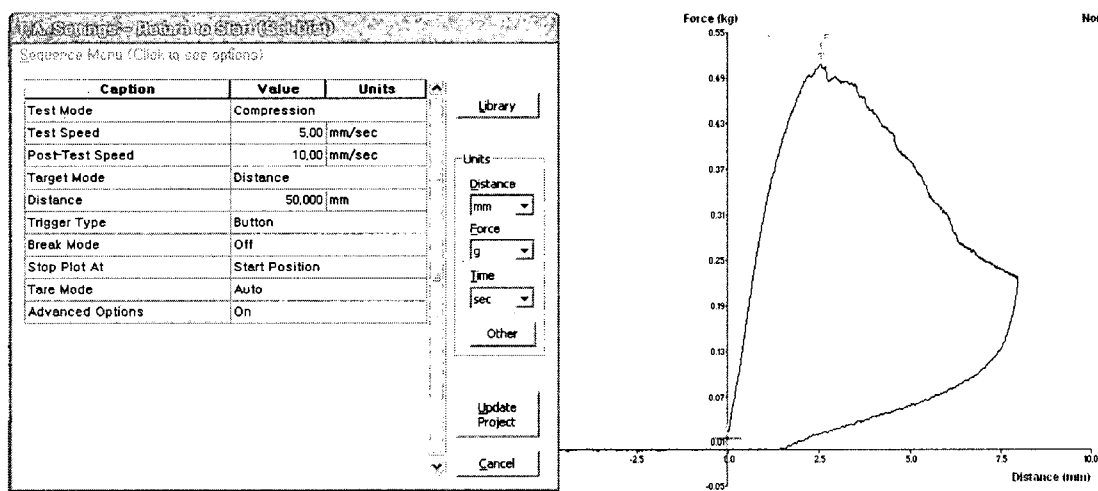


Fig. 2. Force/deflection graph from mechanical property test of the rice stem.

Table 2. Correlation coefficients among 6 traits related to lodging in the DH population derived from 'Samgangbyeo / Nagdongbyeo'

Variables	SL	3rd	BW	Mo	LI	S
Stem length (SL)	1.00					
3rd internode length (3rd)	-0.05 <sup>ns</sup>	1.00				
Breaking weight in 3rd internode (BW)	0.58 <sup>**</sup>	-0.02 <sup>ns</sup>	1.00			
Moment (Mo)	0.48 <sup>**</sup>	0.49 <sup>**</sup>	0.47 <sup>**</sup>	1.00		
Lodging Index (LI)	-0.06 <sup>ns</sup>	0.45 <sup>**</sup>	-0.37 <sup>**</sup>	0.45 <sup>**</sup>	1.00	
Bending strength (S)	0.42 <sup>**</sup>	-0.02 <sup>ns</sup>	1.00 <sup>**</sup>	0.32 <sup>**</sup>	0.01 <sup>ns</sup>	1.00

\*, \*\* : Significant at the 5% and 1% level respectively, ns: Not significant.