

# #020

## Exploiting Natural Variation in Pod Shatter Resistance Genes for Rapeseed (*Brassica napus*) Improvement

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*Jia Liu*

Rijin Zhou<sup>1</sup>

Wenxiang Wang<sup>1</sup>

Wen Chu<sup>1</sup>

Desheng Mei<sup>1</sup>

Hongtao Cheng<sup>1</sup>

Chao Li<sup>1</sup>

Rosy Raman<sup>2</sup>

Harsh Raman<sup>2</sup>

Qiong Hu<sup>1</sup>

1 Oil Crops Research  
Institute of the Chinese  
Academy of Agricultural  
Sciences, Wuhan, China

2 NSW Department  
Primary Industries,  
Wagga Wagga  
Agricultural Institute,  
Wagga Wagga, Australia

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Seed shattering is a natural evolutionary phenomenon in various plants. However in crops it results in economic losses. Therefore, pod shattering resistance is an important objective of rapeseed breeding worldwide. In this study, we explored the natural variation in pod shatter resistance for rapeseed improvement. Through genetic mapping and positional cloning, we have identified two genes on the chromosome A09 affecting pod shattering. An insertion of transposon element changed the gene expression, resulting in resistance to pod shatter. Sequence alignment of the A09 transposon paralogues between Chinese *Brassica rapa* and *B. napus* revealed 100% sequence identity, suggesting this transposon insertion is originated from *B. rapa*. The resistant alleles at both loci on chromosome A09 are genetically recessive, which were often masked by their dominant alleles or multiple copies of homologous genes. In addition to gene-specific markers of the two functional genes for pod shatter resistance on chromosome A09, we also developed linked markers for another QTL for pod shatter resistance on chromosome A6. These markers are currently being used for pyramiding multiple loci for pod shatter resistance into elite breeding lines by marker-assisted selection. The pod shatter resistance index (SRI) of one of the breeding lines was increased from 0.02 to 0.85 harboring all three resistant alleles. The novel pod shatter resistant resources and molecular markers developed herein will increase genetic gains for pod shattering resistance in rapeseed genetic improvement programs.