



Fine mapping and characterization of the *or* gene in Chinese cabbage (*Brassica rapa* L. ssp *pekinensis*)

C.L. Zou^{1,2*}, Y. Zheng^{1*}, P. Wang², X. Zhang², Y.-H. Wang¹, Z.Y. Liu¹ and H. Feng¹

¹Department of Horticulture, Shenyang Agricultural University, Shenyang, China

²Liaoning Academy of Agricultural Sciences, Shenyang, China

*These authors contributed equally to this study.

Corresponding authors: H. Feng / Z.Y. Liu

E-mail: fenghuiaaa@263.net / 78160708@qq.com

Genet. Mol. Res. 15 (2): gmr.15028370

Received December 29, 2015

Accepted February 11, 2016

Published April 27, 2016

DOI <http://dx.doi.org/10.4238/gmr.15028370>

ABSTRACT. Orange inner leaves/heads is a qualitative trait in Chinese cabbage that is controlled by a single recessive gene. Orange head Chinese cabbage contain more carotenoids than its white head counterpart; hence, this trait is of interest to both researchers and consumers. In this study, we selected the orange head Chinese cabbage line 07A163 and the white head Chinese cabbage line Chiifu as test materials. We localized the target gene controlling the orange head trait to the A09 linkage group, with a physical distance of approximately 19.9 kb between the two markers, *syau26* and *syau28*. This region contains six candidate genes, including *Bra031539*, which was predicted to encode CRTISO, a carotenoid isomerase specifically required for carotenoid biosynthesis. A comparison of the nucleic acid sequences of the two test materials revealed 88 and 7-bp deletions and 88 SNPs in the promoter region of *Bra031539* in line 07A163, along with a 6-bp deletion in the first exon and early termination at the 3' end

of this gene. BLAST analysis revealed that 22 amino acids were altered and 17 amino acids were lost in *Bra031539* in the orange head line 07A163. We developed the *BrPro1* molecular marker in the promoter region of *Bra031539* that can be used for early identification of orange head materials, thereby accelerating the breeding process of orange head Chinese cabbage.

Key words: Chinese cabbage; Fine mapping; CRTISO; Molecular marker; Orange head trait; Sequence blasting