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Screening of salt-alkali resistant varieties and dissection of genetic basis of salt-alkali tolerance in *Brassica napus*

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Background:

Salt-alkali stress has been considered as a major environmental threat to the entire terrestrial ecosystem, which is one of the main reasons inhibiting the growth, development, and even the yield of crops worldwide. Improving crop tolerance is important for maintain food supplies as the world's population continues to grow.

Objective:

In order to screen salt-alkali stress resistant *Brassica napus* varieties and explore adaptation to salt-alkali stress in *Brassica napus*, we collected the phenotypic data of 505 *B. napus* accessions at seedling and mature stages under control, low and high salt-alkali soil stress conditions in Inner Mongolia of China.

Methods:

Genome-wide association studies for 15 absolute values and 10 tolerance coefficients of growth and agronomic traits were applied to investigate the genetic basis of salt-alkali tolerance of *Brassica napus*. We also screened salt-alkali stress resistant and sensitive materials according to the growth and agronomic traits at both seedling and mature stages.

Results:

We finally mapped 9 significant QTLs related to salt-alkali stress response and predicted 20 candidate genes related to salt-alkali stress tolerance. Some important candidate genes, including BnABA4, BnBBX14, BnVTI12, BnPYL8, and BnCRR1, were identified by combining sequence variation annotation and expression differences. In addition, six resistant and five sensitive materials, respectively, were identified both in Inner Mongolia and Xinjiang Uygur Autonomous Region of China.

Conclusions:

This study can help us to reveal the genetic basis of salt-alkali stress responses and lay a foundation for understanding molecular mechanism of salt-alkali stress adaptation in *Brassica napus*. The identified valuable loci and germplasms could be useful for breeding salt-alkali tolerant *Brassica napus* varieties and provide rich genetic resources for the large-scale production of *Brassica napus* on salt-alkali land in the future.