Molecular mechanisms of neutron radiation dose effects on M1 generation peas

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October 21, 2023

Abstract

Radiation mutation breeding is an important method for obtaining new crop varieties. In radiation mutation breeding research, the dose effect of radiation has long been a topic of concern. However, the molecular mechanism behind the dose effect is still unclear. Through analyzing the transcriptome and proteome of M1 generation pea (Pisum sativum L.) leaves, we discovered several important rules and molecular mechanisms. We found three important rules of global gene expression in the studied dose range. One of them was closely related to the neutron absorbed dose: the greater the difference in neutron absorbed dose between two radiation treatment groups, the greater the difference in differential expression between the two groups and the control group. We also obtained important sensitive metabolic pathways of neutron radiation, as well as related key genes. Furthermore, the overall molecular regulation mechanism of dose effect was further revealed based on the main functional items obtained. Our research not only explains the molecular mechanisms of the neutron radiation dose effect on M1 generation peas, but also investigates the related metabolic pathways and genes. The research results can be applied to appropriate radiation dose estimation and agricultural production practice.

October 21, 2023

Dear Editor,

On behalf of all the authors, I would like to ask you to consider our manuscript titled “Molecular mechanisms of neutron radiation dose effects on M1 generation peas” for publication in *Molecular Ecology* as an original research article. This study investigated the molecular mechanisms of the radiation dose effect on the M₁ generation of pea seeds subjected to neutron radiation, focusing on differential expression of genes and proteins between groups of pea seeds exposed to different absorbed doses of radiation and a control group with no radiation. One motivating factor for conducting this study is that understanding the molecular mechanisms of radiation dose effects can find out the influence of radiation on gene expression regulation, which is helpful to open up new areas of research and formulate breeding strategies.

Our study found three important rules of global gene expression in the studied dose range. Furthermore, this study also reported the differential expression patterns and major metabolic pathways of different neutron radiation treatment groups, and identified sensitive important metabolic pathways and genes. We feel that the findings from this study will be of special interest to the readers of *Molecular Ecology*.

This manuscript has not been published, and it is not under consideration for publication elsewhere. All of the authors have read the manuscript and have approved this submission.

Sincerely,

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