

Investigation of the formation mechanism of hulled barley trait on the model of isogenic lines obtained by genome editing

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The sign of nakedness is a valuable breeding trait in barley. Naked barley has advantages over hulled barley for consumption, as it is cheaper to process and contains more valuable nutritional components. The *Nud* gene encodes a transcription factor presumably involved in the formation of the lipid layer on the surface of grain. In the recent study, we generated lines with a disrupted *nud* gene by site-directed mutagenesis using guide RNA and Cas9 endonuclease in the Golden promise cultivar [1].

The lines were analyzed of different agronomically significant properties [2] and one was selected for transcriptomic analysis to identify a set of genes involved in the nudity formation. For the experiment, two isogenic lines were taken: the control line and the *nud* mutant line. The seed coats of the grains were collected at two stages of spike development: early milk development and dough development.

RNA was isolated from samples of aleurons and pericarp and was subjected to transcriptomic analysis. A group of genes with expression upregulation and downregulation were identified in the mutant line.

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The main publications of authors on the subject of the abstract:

1. Gerasimova, S.V., Hertig, C., Korotkova, A.M. et al. Conversion of hulled into naked barley by Cas endonuclease-mediated knockout of the *NUD* gene // *BMC PLANT BIOL* –2020 – 20, 255.

2. Antonova, E.V.; Shimalina, N.S.; Korotkova, A.M. et al. Seedling Biometry of *nud* Knockout and *win1* Knockout Barley Lines under Ionizing Radiation // *Plants* 2022, 11, 2474. <https://doi.org/10.3390/plants11192474>

Take-home message:

The nakedness of barley is a valuable agricultural trait. However, how the *Nud* gene is involved in its suppression remains to be explored. Naked mutants have been obtained. They appear a good model for studying the nakedness trait.