

Retention and evolution of centromeric histone paralogs in rye: essential for the organization of chromosomes in rye meiosis

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The functional centromeres of eukaryotic chromosomes are responsible for the assembly of the microtubule binding kinetochore and faithful segregation during cell division of sister chromatids and homologous chromosomes, respectively. The centromeric histone H3, called CENH3 in plants, is a key component of centromeres functioning. Most of studied cereal species have only one copy of the *CENH3* gene. However, similarly to other Triticeae species, two genes, α CENH3 and β CENH3, were revealed in rye (*Secale cereale* L.). We determined the organization of the CENH3 locus in rye, using the rye genome assembly. We compared the expression of these genes at different stages of plant development using quantitative real-time PCR. The transcription of both variants CENH3 reaches its highest in the generative tissue. Using CENH3 variant-specific antibodies, we revealed that meiotic nuclei had much brighter β CENH3 fluorescence compared with the smaller signals in mitotic nuclei from. It is possible that the advantage of having two functional CENH3 genes is to increase the loading of CENH3 proteins into the centromeric chromatin to ensure chromosome clustering during the first meiotic division.

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

Elisafenko E.A. et al. *The origin and evolution of a two-component system of paralogous genes encoding the centromeric histone CENH3 in cereals* // *BMC Plant Biol.* (2021) 21:541. doi: 10.1186/s12870-021-03264-3

Evtushenko E.V. et al. *Expression of Two Rye CENH3 Variants and Their Loading into Centromeres* // *Plants* (2021) 10:2043. doi:10.3390/plants10102043