

## Accepted Manuscript

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PII: S0734-9750(13)00167-5  
DOI: doi: [10.1016/j.biotechadv.2013.09.011](https://doi.org/10.1016/j.biotechadv.2013.09.011)  
Reference: JBA 6742

To appear in: *Biotechnology Advances*

Received date: 8 June 2013  
Revised date: 20 September 2013  
Accepted date: 24 September 2013



Please cite this article as: Mrízová Katarína, Holasková Edita, Öz M. Tufan, Jiskrová Eva, Frébort Ivo, Galuszka Petr, Transgenic barley: A prospective tool for biotechnology and agriculture, *Biotechnology Advances* (2013), doi: [10.1016/j.biotechadv.2013.09.011](https://doi.org/10.1016/j.biotechadv.2013.09.011)

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**Transgenic barley: A prospective tool for biotechnology and agriculture**

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Barley (*Hordeum vulgare* L.) is one of the founder crops of agriculture, and today it is the fourth most important cereal grain worldwide. Barley is used as malt in brewing and distilling industry, as an additive for animal feed, and as a component of various food and bread for human consumption. Progress in stable genetic transformation of barley ensures a potential for improvement of its agronomic performance or use of barley in various biotechnological and industrial applications. Recently, barley grain has been successfully used in molecular farming as a promising bioreactor adapted for production of human therapeutic proteins or animal vaccines. In addition to development of reliable transformation technologies, an extensive amount of various barley genetic resources and tools such as sequence data, microarrays, genetic maps, and databases have been generated. Current status on barley transformation technologies including gene transfer techniques, targets, and progeny stabilization, recent trials for improvement of agricultural traits and performance of barley, especially in relation to increased biotic and abiotic stress tolerance, and potential use of barley grain as a protein production platform have been reviewed in this study. Overall, barley represents a promising tool for both agricultural and biotechnological transgenic approaches, and is considered an ancient but rediscovered crop as a model industrial platform for molecular farming.

Key words: Barley; transgenesis; stress tolerance; pathogen resistance; molecular pharming; yield improvement.

Abbreviations: AMP, antimicrobial peptides; AMY, amylase; HOR3-1, hordein D; GFP, green

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