

# New tools to breed cereal crops that survive flooding

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Scientists at The University of Nottingham hope new research could lead to the introduction of cereal crops better able to tolerate flooding. They have identified the mechanism used by plants in stress conditions to sense low oxygen levels and used advanced breeding techniques to reduce yield loss in barley in water-logged conditions.

Previously Michael Holdsworth, Professor of Crop Science in the School of Biosciences, and colleagues, identified the mechanism used by plants in [stress conditions](#) to sense low [oxygen](#) levels. This initial breakthrough was published in the prestigious academic journal *Nature* in October 2011.

Now Professor Holdsworth and his team, including first author Dr Guillermina Mendiondo, have discovered how this works in [barley](#). Professor Holdsworth said: "We now know how to breed barley cultivars more tolerant to waterlogging and flooding." The latest development has been published today in *Plant Biotechnology Journal*. Watch the video to find out more about this research.

Across the world farmers are falling victim to the increasing frequency of catastrophic flooding events. Plants starved of oxygen cannot survive flooding for long periods of time. Persistent flooding and saturated arable land can wipe out crops and reduce harvests so the search for flood tolerant crops is a key target for global food security.

## Living on low oxygen

This latest research - 'Enhanced waterlogging tolerance in barley by manipulation of expression of the N-end rule pathway E3 ligase PROTEOLYSIS6'- brought together experts from the University's Schools of Biosciences and Mathematical Sciences, the University of Silesia, SABMiller plc and the Pierre et Marie Curie University in Paris.

Professor Holdsworth said: "Barley cultivars with the capability to withstand waterlogging have excellent growth, superior yields, retain their green appearance due to chlorophyll retention and have a more efficient metabolism even in [low oxygen conditions](#)."

Barley is comparatively more susceptible to waterlogging than other cereals. Average yields can be reduced by up to 50 per cent as a result of waterlogging. Resistance to this stress is an important objective of breeding efforts in high-rainfall areas of the world.

Professor Holdsworth said: "We now have the strategy developed for plant breeding to select for enhanced tolerance to waterlogging in barley and other crops."

**More information:** [onlinelibrary.wiley.com/doi/10 ...  
1/pbi.12334/abstract](https://onlinelibrary.wiley.com/doi/10.1111/pbi.12334/abstract)

Provided by University of Nottingham

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