VOX pops cereal challenge

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A popular technique for studying genes from different organisms plus a new carrier to transfer them to plants has yielded a powerful tool for understanding crops better.

A plant virus with a simple genome promises to reveal traits and diseases

in wheat and maize more quickly and easily than existing techniques and, as its full potential is tapped, to work across a range of different plant species.

The Foxtail mosaic virus (FoMV) has now overcome the limitations of existing carriers, or vectors, to enable a much greater range of proteins to be expressed in host plants. It uses an established and popular technique known as virus-mediated overexpression (VOX), reports a team of investigators led by Rothamsted Research.

The team, which also includes Syngenta Technology in the U.S. and Syngenta Crop Protection in Switzerland, selects genes from different organisms, including fungal pathogens, and transfers them into cereal crops. It then investigates the genes' functions by studying the effects of the proteins that they express. The team's findings are published in full in the August edition of Plant Physiology.

"The development has stirred much interest among cereal pathologists around the world since preliminary findings began to emerge in early June," says Kostya Kanyuka, a molecular plant pathologist at Rothamsted, who led the study and whose group specialises in state-of-the-art functional genomics.

"You don't need the whole (stable crop transformation) kitchen," says Kanyuka, emphasising the simplicity and cost effectiveness of his team's latest development. "And we've demonstrated successful expression of proteins up to 600 amino acids long, at least three times larger than was possible in the past."

Kanyuka notes: "The new FoMV-derived vector PV101 enables rapid and cost-effective expression of proteins in cereal plants as a route to understanding the function of their genes. And the range of proteins that can be expressed using this vector is wide, plus the new vector

overcomes limitations of previously available VOX vectors."

According to Kim Hammond-Kosack, who leads molecular wheat disease research at Rothamsted and is a member of the team that developed the new vector: "The level and duration of expression of proteins of interest, both locally and systemically from the new FoMV-VOX vector, is impressive. It's enabled us to ramp up our de novo protein screening rate in wheat plants, and this is already benefiting several research projects."

More information: Clément Bouton et al. Foxtail mosaic virus: A viral vector for protein expression in cereals, *Plant Physiology* (2018). DOI: 10.1104/pp.17.01679

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