Baker's yeast can help plants cope with soil contamination

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Arabidopsis thaliana. Credit: Raquel Carvalho

Few plant species can tolerate the toxic effects of soil pollutants. In a study published in *Scientific Reports*, a research team led by Paula Duque from the Instituto Gulbenkian de Ciencia (IGC; Portugal) reports that two genes from baker's yeast can increase plant resistance to a broad range of toxic substances, enabling their growth in contaminated soils.

Heavy metals and organic pollutants released into the environment by the industry, as well as the misuse of herbicides and pesticides commonly used in agriculture, negatively affect the quality of soils. Some plant

species are able to remove soil contaminants and grow normally, but these are a small minority. "Current strategies to decontaminate soils are very expensive and not so effective. The scientific community has been looking for alternative strategies to make plants more resilient to toxic compounds. A possible solution may lie in Saccharomyces cerevisiae, a species of yeast used for baking, brewing, and winemaking," says Paula Duque.

In fact, it was known that S. cerevisiae can resist herbicides and other chemicals. Isabel Sa-Correia's team at Instituto Superior Tecnico, Universidade de Lisboa (Portugal), who collaborated in this study, had identified two yeast genes playing a role in this mechanism. The Duque research group analysed the ability of those genes to confer multidrug resistance on Arabidopsis thaliana, a small flowering plant used as a model organism to understand biological processes common to other plants. After inserting either of the two yeast genes into this plant, the researchers found that it became more resistant to herbicides, fungicides and heavy metals. Plants carrying the yeast genes grew significantly better than wild-type plants in contaminated soils.

Paula Duque explains: "These two yeast genes produce proteins that are able to expel molecules from cells. So we hypothesized that they could play a similar role in plants, eliminating toxic molecules and allowing normal growth." The IGC researcher adds: "To extrapolate these results to crops, we will need further experiments in Arabidopsis to understand the mechanisms underlying plant resistance as well as studies in other plant species. But our results, obtained with genes of the yeast species that makes bread or beer, hold much promise to help solve a difficult environmental problem."

More information: Estelle Remy et al, Heterologous expression of the yeast Tpo1p or Pdr5p membrane transporters in Arabidopsis confers plant xenobiotic tolerance, *Scientific Reports* (2017). DOI:

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