

Fighting contaminated land with help from the humble fruit fly

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Scientists have discovered that a gene found in the common fruit fly can be successfully expressed in a plant and used to detoxify land contaminated with TNT.

The breakthrough could pave the way for millions of hectares of land contaminated by munitions to be cleaned up.

The study, published in *New Phytologist*, shows how a gene found in the common fruit fly, *Drosophila melanogaster*, can be expressed in *Arabidopsis*, a member of the cabbage family, to improve TNT removal from [contaminated soil](#).

When scientists engineered the plants to express the glutathione transferase (DmGSTE6) gene found in [fruit flies](#), they found that plants expressing the gene were more resistant to TNT and were better able to remove it from contaminated soil than wild-type plants without the gene.

The fruit fly has an enzyme which attaches itself to the TNT molecule and is able to modify it and make it less toxic, not only to the plant itself, but the [environment](#).

Professor Neil Bruce from the Centre for Novel Agricultural Products (CNAP) in the University of York's Department of Biology said: "What is important about this transformation is that it converts TNT into a product that could be more amenable to being broken down in the environment.

"At the moment there are sites going back to the Second World War which are still contaminated with TNT.

"The next stage would be to demonstrate that the TNT molecules are more biodegradable, but also to put these [genes](#) into plant species that could be used in the environment to clean up these sites."

Dr Liz Rylott, who co-lead the research at CNAP added: "Areas of land contaminated with explosives are a threat to human health and the environment.

"We know that TNT does not readily break down in the environment, but by using specially developed plants we could be able to tackle this problem."

The team from York has previously worked on a new transgenic grass species that can neutralize and eradicate RDX, an organic compound, which along with TNT, forms the base for many common military explosives.

Dr Bruce added: "The next stage would be to put the fly gene into the grasses, like we have done with the other RDX degrading genes.

"RDX and TNT are often combined in munitions so we need to have systems to cope with both pollutants. This is a global issue that is not going to go away."

The research involved collaboration from Stockholm University and was funded by the US Department of Defense and a PhD studentship for co-author Kyriakos Tzafestas was kindly funded by the Burgess family.

More information: Kyriakos Tzafestas et al. Expression of a *Drosophila* glutathione transferase in *Arabidopsis* confers the ability to

detoxify the environmental pollutant, and explosive, 2,4,6-trinitrotoluene, *New Phytologist* (2016). [DOI: 10.1111/nph.14326](https://doi.org/10.1111/nph.14326)

Provided by University of York

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