

Genetically Engineered Fruit Flies Could Save Crops

Natural Environment Research Council, Oxitec Ltd.

Releasing genetically engineered fruit flies into the wild could prove to be a cheap, effective and environmentally friendly way of pest control according to scientists at the University of East Anglia and Oxitec Ltd.

“Oxitec have developed a genetic approach to control medfly that is species specific and cost effective that relies on males passing on a self-limiting trait to female offspring. This collaborative research study, with UEA shows that this approach is effective and once appropriate regulatory approvals are received the technology will offer growers a safe and effective route to protect their crops. Currently medfly causes crop losses in many parts of the world where it is an introduced, invasive and difficult to control pest as well as its native Mediterranean habitat.” Today reveals how the release of genetically engineered male flies could be used as an effective population suppression method – saving crops around the world.

The Mediterranean fruit fly is a serious agricultural pest which causes extensive damage to crops. It is currently controlled by a combination of insecticides, baited traps, biological control and releasing sterilised insects to produce non-viable matings, known as the Sterile Insect Technique (SIT).

Researchers simulated a wild environment within greenhouses in Crete and studied the impact of releasing Oxitec flies.

Lead researcher Dr Philip Leftwich, from UEA’s school of [Biological Sciences](#) [1] and Oxitec, said: “The Mediterranean Fruit Fly infests more than 300 types of cultivated and wild fruits, vegetables and nuts. It is a real pest to agriculture and causes extreme damage to crops all around the world.

“Of all of the current techniques used to control these flies, SIT is considered the most environmentally friendly as it uses sterile males to interrupt matings between wild males and females. The down side is that these males don’t tend to mate as well in the wild because the irradiation method used for sterilisation weakens them.

“Our research looked at whether releasing Oxitec flies, which are genetically engineered so that only male fly offspring survive, could provide a better alternative.

“The genetically engineered flies are not sterile, but they are only capable of producing male offspring after mating with local pest females - which rapidly reduces the number of crop-damaging females in the population. Using this method means that the males do not have to be sterilized by radiation before release, and we have shown they are healthier than the flies traditionally used for SIT.

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“We simulated a wild environment within secure eight-meter greenhouses containing lemon trees at the University of Crete. When we tested the release of the genetically modified male flies, we found that they were capable of producing rapid population collapse in our closed system.

“This method presents a cheap and effective alternative to irradiation. We believe this is a promising new tool to deal with insects which is both environmentally friendly and effective.”

The Oxitec method works by introducing a female-specific gene into the insects that interrupts development before females reach a reproductive stage. Populations of healthy males and females can be produced in controlled environments by the addition of a chemical repressor. If the chemical repressor is absent in the genetically engineered flies' diet, only males survive. The surviving males are released, mate with local wild pest females and pass the female specific self-limiting trait onto the progeny resulting in no viable female offspring.

Dr Simon Warner, chief scientific officer at Oxitec Ltd, said: “Oxitec have developed a genetic approach to control medfly that is species specific and cost effective that relies on males passing on a self-limiting trait to female offspring. This collaborative research study with UEA shows that this approach is effective and, once appropriate regulatory approvals are received, the technology will offer growers a safe and effective route to protect their crops. Currently medfly causes crop losses in many parts of the world where it is an introduced, invasive and difficult to control pest as well as its native Mediterranean habitat.”

The next stage of the research will be to gain approval for open-field studies.

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[1] <http://www.uea.ac.uk/bio>