Insect biotechnology in the United States and the EU

Talking Points

GE Insects

- The olive fly is responsible for considerable damage to olive production in Europe, especially this last year. Is the EU considering the use of GE insects to control this pest in the future? Are there any GE insects (e.g., Mosquitos, Olive flies, or Medflies) currently under review in the EU, either for approval or caged trials?

[Only if asked:]

GE Mosquito:

- On October 5, 2017, the U.S. Food and Drug Administration (FDA) Center for Veterinary Medicine published a new final guidance: *Guidance for Industry (GFI) #236: Clarification of FDA and EPA Jurisdiction Over Mosquito-Related Products*. It provides information regarding FDA and U.S. Environmental Protection Agency (EPA) jurisdiction over the regulation of mosquito-related products, including those produced through the use of biotechnology, such as the Oxitec genetically engineered (GE) *Aedes aegypti* mosquito.

- The final guidance states that mosquito-related products intended to reduce mosquito populations are now under the regulatory jurisdiction of EPA, while mosquito-related products that are intended for other uses, such as to reduce the pathogen load of mosquitoes and/or to prevent mosquito-borne diseases in humans or animals remain subject to FDA's regulatory authority.

- As part of the Update to the Coordinated Framework for the Regulation of Biotechnology, the FDA, along with the EPA and USDA, committed to clarifying how the U.S. federal government intends to regulate genetically altered insects. This guidance (GFI #236) fulfills part of that overarching commitment. Please note that this guidance is not intended set any regulatory precedents for other insects created via biotechnology that may have agricultural applications.

- With the clarification of jurisdiction provided in the new guidance document, Oxitec Ltd.'s GE mosquito product (OX513A *Aedes aegypti* mosquito) has transitioned from FDA's to EPA's regulatory oversight.

- No open release field trials of this GE mosquito (intended to control mosquitos which may carry human disease causing agents such as Zika and dengue) have yet occurred in the United States.

GE Pink Bollworm:

- In 2006, APHIS completed an environmental assessment and issued a permit for field trials of sterilized pink bollworm genetically engineered to express green fluorescence as a marker.

- Since then, field trials have occurred under APHIS BRS permits using sterilized pink bollworms genetically engineered to express red or green fluorescence proteins.

GE Diamondback Moth:

- USDA/APHIS published a final EA for the Oxitec Diamondback Moth in July 2017. Following APHIS' analysis of the public comments received on the draft EA, APHIS revised its EA and prepared a Finding of No Significant Impact (FONSI). These documents, the final EA and FONSI, are posted on APHIS' web page.

- Cornell University just completed their initial field trials with these GE moths in October 2017.

Background

Oxitec, a British company now wholly owned by an American company, Intrexon, has developed GE insects, currently undergoing regulatory review in the United States (and other countries), for population suppression of the same species in the wild based on a genetic sterile insect technique. The goal for this technology is to reduce the local target insect population by the release of conditionally lethal GE males of the same species that mate with wild females. The GE males do produce sperm which can fertilize the female's eggs; however, the resulting hemizygous offspring will inherit the self-limiting gene from the homozygous GE male parent and will die before reaching adulthood. In some implementations (Oxitec GE mosquito), offspring of both sexes will die before reaching adulthood, whereas in other implementations (e.g. diamondback moth) only female offspring will die.

Regulation of GE Insects in the United States: EPA, FDA and USDA will continue to examine their regulatory structures with the goal of clarifying how the U.S. Federal Government will regulate genetically engineered insects in an integrated and coordinated fashion to cover the full range of potential products. The characteristics or intended use of the GE insect determines which agency(ies) has jurisdiction for its regulation. APHIS-BRS regulations govern GE insects that are plant pests (i.e. harm or damage plants or plant products). Now that FDA's Guidance For Industry #236 is finalized, EPA will regulate GE mosquito-related products intended to reduce the population of mosquitoes and FDA will regulate such products with other claims such as those intended to reduce the virus/pathogen load within a mosquito and also products that are intended to prevent mosquito-borne disease in humans or animals. FDA's Center for Veterinary Medicine (FDA-CVM) has said it does not intend to regulate GE insects that are regulated by another U.S. government agency, such as those that are regulated by APHIS-BRS under their regulations. [also see Briefing Paper on "Modernizing the U.S. regulatory system for biotechnology products".]

For insect plant pests, such as strains of Oxitec's GE diamondback moth (a pest of cruciferous crops, such as cabbage) and Oxitec's GE pink bollworm, the Animal and Plant Health Inspection Service (APHIS), pursuant to the Plant Protection Act of 2000, regulates genetically engineered plant pests under its regulations at 7 CFR part 340. In response to a permit application from Cornell University for field release of an Oxitec strain of GE diamondback moth, APHIS BRS

posted to its web site its final environmental assessment and FONSI for this GE moth in July 2017. The first field releases of this GE insect occurred shortly thereafter; these initial field trials were completed in October 2017.

In 2006, APHIS BRS completed an environmental assessment and issued a permit to an APHIS researcher for field trials using an Oxitec strain of pink bollworm genetically engineered to express green fluorescence as a marker. Between 2006 and 2016, the permittee has conducted field trials under APHIS BRS permits using sterilized pink bollworms genetically engineered to express red or green fluorescence proteins as a marker.

GE mosquito: FDA had released a final environmental assessment (EA) on the potential environmental impacts of conducting a proposed field trial of Oxitec's GE *Aedes aegypti* mosquito in Key Haven, FL and a final finding of no significant impact (FONSI) agreeing with the EA's conclusion that the proposed field trial would not have significant impacts on the environment. This applied to the then proposed release in Key Haven, FL only and did not cover any other potential release sites.

In November 2016, residents in the Florida Keys voted in a non-binding referendum on whether to support investigational releases of Oxitec's GE mosquito. Voters in Key Haven, the proposed trial site, voted against the releases while voters in the rest of the Keys (Monroe country) voted in favor of the releases. Following the vote, the local mosquito control district said that it would not go forward with the Key Haven release. It is up to the mosquito control district and Oxitec whether they will seek to conduct a release elsewhere and, if they do, these releases will be under the jurisdiction of EPA. No releases of GE mosquitos have yet occurred in the United States.

In April 2016, this GE mosquito received a special temporary registration from the National Health Surveillance Agency of Brazil (ANVISA). In 2014 the National Technical Commission of Biosecurity (CTNBio) found the Oxitec mosquito safe to use in Brazil.

Additional information: In addition to the diamondback moth and pink bollworm, Oxitec has produced a number of GE insects for the control of insect plant pests, including the Olive Fly, Medfly (an Oxitec GE Medfly is approved for field trials in Brazil), and Mexfly. [*NB: The Oxitec GE olive fly that is in development is targeted at the European olive industry (e.g., Spain).*]

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