

United States Department of Agriculture  
Project Initiation

<b>Title: Gene Drive Applications to Agriculture in Texas: Knowledge, Perceptions, and Values</b>			
<b>Accession No.</b>	1015199	<b>Sponsoring Institution</b>	National Institute of Food and Agriculture
<b>Project No.</b>		<b>Project Status</b>	ACTIVE
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<b>Submitted By</b>	Kent Portney	<b>Date Submitted to NIFA</b>	12/22/2017

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**Program Name** AFRI Foundational - Social Implications of Emerging Technologies

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{NO DATA ENTERED}

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{NO DATA ENTERED}

**Collaborating/Partnering States**

{NO DATA ENTERED}

**Collaborating/Partnering Countries**

{NO DATA ENTERED}

**Collaborating/Partnering Organizations**

{NO DATA ENTERED}

**Non-Technical Summary**

This project evaluates the environment for public and stakeholder engagement around the potential research, development, and use of gene drive technology in the control of agricultural pests in Texas. The focus of this project is to understand the social impacts, perceived risks, underlying values, and potential behavioral responses of Texans to gene drive technologies in agriculture, with specific reference to four potential pest control applications as case studies. We believe that it is possible to convey to consumers, growers, and other stakeholders and decision-makers, sufficient knowledge about the complex science of gene drives and their possible uses in agriculture to generate an informed public understanding of gene drives' potential benefits and hazards, uncertainties, overall acceptability, and appropriate governance. More specifically, we believe that by examining how the science and its potential impacts are communicated to the public, stakeholders, and decision-makers, we can identify (1) how this information shapes the formation of public opinion and stakeholders' perspectives, and (2) how values, related perceptions of risk, and the trust in science affect views on the development and deployment of gene drive applications.

**Goals / Objectives**

This project evaluates the environment for public and stakeholder engagement around the potential research, development, and use of gene drive technology in the control of agricultural pests in Texas. This project seeks to understand the social impacts, perceived risks, underlying values, and potential behavioral responses of Texans to gene drive technologies in agriculture, with specific reference to four potential pest control applications as case studies. Specifically, we examine how the science and its potential impacts are communicated to the public, stakeholders, and decision-makers, we can identify (1) how this information shapes the formation of public opinion and stakeholders' perspectives, and (2) how values, related perceptions of risk, and the

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trust in science affect views on the development and deployment of gene drive applications.

We will test the validity of our proposed interactive learning approach by accomplishing three objectives: (1) Evaluate the ability of extension agents from Texas Integrated Pest Management program to communicate the science, technological uses and limitations, and potential benefits and hazards of gene drives effectively to the public, stakeholders, and decision-makers; (2) Determine key value-based and socio-economic drivers of knowledge, concerns, risk perception, and policy preferences regarding research and development of gene drives; and (3) Establish and use multi-directional channels of communication between growers, community members, and scientists to develop informed and responsive policy on gene drives in agriculture.

We will employ a three-prong approach for achieving our objectives. We will: (1) Convene and participate in interactive engagement sessions, organized workshops, focus groups, and online forums to evaluate our communication and listening approaches by performing evaluations prior to and following each session; (2) Conduct a representative public opinion survey of Texas residents and consumers; and (3) Complete a series of surveys of key stakeholders across the state. Using case studies on the boll weevil, pigweed, the Indian mealmoth, and *Aedes* spp. mosquitoes, we will explore the promise and pitfalls of gene drives in order to advance a broad understanding of their social implications well beyond what would be gleaned from any single approach. The four applications in our case studies are still only hypothetical, but they share the potential for significantly improving agricultural productivity by mitigating costly damage and loss to some of Texas' most important crops and livestock.

We will use all three approaches to develop a comprehensive assessment of Texans' knowledge, perceptions, and levels of acceptance or rejection of potential gene drive applications in pest control. Our goal is to collect original data to be used to test a number of specific research questions, and the results of this analysis will be used to inform the development of effective communication strategies for public education and engagement about gene drive technologies.

## Methods

Our research will use a five-phase approach to achieve this objective. Because our research questions relate both to the stakeholders relevant to the four gene drive applications in our case studies and to the general public, we will rely on separate processes for collecting data. The first four phases relate to an extensive, multi-faceted, stakeholder engagement process to accomplish two primary goals. First, it will be provide a priori information about stakeholders' knowledge of, and concerns over, gene drive technologies. Second, stakeholders will be asked to respond to different approaches to gene drive technology in an effort to examine whether any approach might create less concern than others. Although there will be overlap in the importance of specific stakeholder groups across all four gene drive applications, not all stakeholder groups will be relevant. So different stakeholder groups must be engaged for each. Below we describe stakeholder groups according to their expected relevance to each application. The fifth phase focuses on collecting data to be used in examining research questions that relate to the broader general and consuming public in Texas.

## Target Audience

This project has multiple audiences. We describe one set of audiences as "stakeholders," as outlined below. A second set of audiences is made up of policy makers -- legislators and other elected officials, and agency officials -- at the federal and state level.

### Gene drive application

#### Stakeholders

**Boll Weevil** for protection of cotton

**Pigweed** for protection of cotton

General public and wholesale and retail consumers of cotton products; Texas Boll Weevil Eradication Foundation; Texas Cotton Producers; Plains Cotton Growers (the single largest grower's organization in the US); South Texas Cotton & Grain Association; Cotton & Grain Producers of the Lower Rio Grande Valley; Dairy farmers who use cotton seed as livestock feed; Cotton growers; Cotton field workers; National Center for Farmworker Health; Migrant Clinicians Network; manufacturers and distributors of agricultural supplies; Transporters of raw plant materials; Texas A&M Agricultural Extension specialists

**Indian Mealmoth** for the protection of stored grain products

The general public and consumers of affected stored products; Affected property owners and residents (e.g., homes, apartment complexes, warehouses, restaurants, grocery stores, bakeries); Field workers; Transporters of affected products (trucking, rail, ship transportation); Local, county, and state policy makers; Pest management professionals; Texas A&M Agricultural Extension specialists

**Aedes spp Mosquito** for protection of livestock against Rift Valley Fever

Cattle ranchers, and ranchers' trade associations (National Cattlemen's Association, National Dairy Federation); Sheep and goat farmers and their trade associations (Texas Sheep & Goat Raisers Association) ; Landowners; Field workers; Handlers and

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transporters of cattle and associated materials and their families; Large animal veterinarians; Consumers of milk, meat, and cattle products; Selected local, county, and state policy makers; Residents in proximity to areas of potential release

**Products**

This project will yield a comprehensive picture of stakeholder and general population responses to four gene drive applications in Texas; it will systematically produce data to examine gene drive issues across a wide array of relevant stakeholders; it will provide insight into the future social and political context that gene drive is likely to confront in the future; and it will clarify issues that various federal and state regulators will likely confront as gene drive technologies develop. The project will produce numerous publishable papers that will significantly improve the scholarly analysis of stakeholder and general public perspectives on gene drive and potential approaches to public engagement for future research, policy making, and governance.

**Expected Outcomes**

The focus of this project is to understand the social impacts, perceived risks, underlying values, and potential behavioral responses of Texans to gene drive technologies in agriculture, with specific reference to four potential pest control applications as case studies. We believe that it is possible to convey to consumers, growers, and other stakeholders and decision-makers, sufficient knowledge about the complex science of gene drives and their possible uses in agriculture to generate an informed public understanding of gene drives' potential benefits and hazards, uncertainties, overall acceptability, and appropriate governance. More specifically, we believe that by examining how the science and its potential impacts are communicated to the public, stakeholders, and decision-makers, we can identify (1) how this information shapes the formation of public opinion and stakeholders' perspectives, and (2) how values, related perceptions of risk, and the trust in science affect views on the development and deployment of gene drive applications.

**Keywords**

emerging t ~gene drive ~public opinion ~public policy ~science communication ~stakeholder engagement

**Estimated Project FTEs For The Project Duration**

Role	Non-Students or Faculty	Students with Staffing Roles			Computed Total by Role
		Undergraduate	Graduate	Post-Doctorate	
Scientist	0.0	0.0	0.0	0.0	0.0
Professional	0.0	0.0	0.0	0.0	0.0
Technical	0.0	0.0	0.0	0.0	0.0
Administrative	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0
Computed Total	0.0	0.0	0.0	0.0	0.0

**Animal Health Component** 0 %

**Activities**

**Research** 100 %  
**Extension** 0 %  
**Education** 0 %

**Research Effort Categories**

**Basic** 0 %  
**Applied** 100 %  
**Developmental** 0 %

**Classification**

Knowledge Area (KA)	Subject of Investigation (SOI)	Field of Science (FOS)	Percent
804	6050	3080	100

**Knowledge Area**

804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

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**Subject Of Investigation**

6050 - Communities, areas, and regions, including states and their institutions and organizations

**Field Of Science**

3080 - Sociology