2021 STATEMENT OF WORK - SUMMARY
Los Alamos National Laboratory
USDA-ARS: National Predictive Modeling Tool Initiative

1.0 Non-Proprietary Abstract:

To leverage decision support tools (analytics, databases, and forecasting models) developed for human and animal infectious diseases for use in plant-based diseases. To leverage LANL assay development capabilities to develop fieldable assays (e.g., lateral flow assays) to detect mycotoxins pre- and post-harvest.

2.0 Objective:

United States Department of Agriculture – Agricultural Research Service is the primary funding resource for this project.

National Predictive Modeling Tool Initiative (NPMTI) wishes to develop tools to ensure crop sustainability and quality, increase precision of pesticide use, improve soil health, and improve crop disease management to reduce yield losses. This project leverages work done to develop tools to forecast human disease conditions to create tools that forecast plant disease conditions. It also leverages LANL's assay development capabilities for plant disease detection. If successful, this work may lead to decreased crop losses in corn, wheat, and cotton.

3.0 Phases/Tasks of the Project and Duration:

Phase No.	Task No.	Task Title	Duration (Months) (Start)	(End)
1		**REFINE ANALYTICS AND MODELS FOR THE PURPOSES OF CROP DISEASE FORECASTING.**	1	12
	2.1	Develop algorithms for Wheat blotch diseases and specific corn and cotton diseases identified by crop partners (e.g., tar spot, areolate mildew).	1	12
	2.2	Refine LANL disease database for corn, cotton, and wheat based on user testing on an ongoing basis.	1	7
2		**DEVELOP A LATERAL FLOW-BASED ASSAY FOR DETECTION OF MYCOTOXINS IN THE FIELD.**	1	12
	1.1	Perform literature review of current state of the art for mycotoxin detection on the field. Collect requirements from corn and wheat partners for mycotoxin type, technical, and operational specifications for a lateral flow or alternative fieldable platform.	1	3
	1.2	Begin development of assay(s) required for mycotoxin detection.	3	12
	1.3	Design lateral flow or alternative fieldable platform for mycotoxin detection (one or more depending on requirements).	6	12

4.0 Deliverables, Reports, Data:

Provide report of data and models for implementation into NPMTI.
Provide the design for a lateral flow or alternative fieldable platform for at least one mycotoxin.

5.0 Special Considerations:

Triad* will house and aggregate to a common protocol the data submitted by each PI from the NPMTI. Triad also will leverage appropriate Triad tools for decision support.

* Triad is the management corporation under which Los Alamos National Laboratory operates.

National Predictive Modeling Tool Initiative (NPMTI)
2021 Statement of Work (SOW) – Detail
Los Alamos National Laboratory (LANL)

OVERVIEW – According to the White House National Strategy on Biosurveillance (2012), biosurveillance is defined as the process of gathering, integrating, interpreting, and communicating essential information related to all-hazards threats or disease activity affecting human, animal, or plant health to achieve early detection and warning, contribute to overall situational awareness of the health aspects of an incident, and to enable better decision making at all levels. The NPMTI is foundational for plant disease biosurveillance, and LANL will support the NPMTI by leveraging decision support tools (analytics, databases, and forecasting models) that have been developed for human and animal infectious diseases. Adaptation of these tools for key diseases of corn, cotton, and wheat will facilitate disease management and preventive/mitigative actions and planning for disease prevention. These tools offer decision support at varying temporal and spatial scales, and individual tools can be used at different points along the spectrum of crop disease surveillance, from early detection to post outbreak management.

We propose to adapt and then integrate these tools to provide a full-spectrum disease management suite, through two tasks:

1) Refine Triad* Analytics and Models for the Purpose of Crop Disease Forecasting; Cost estimate = $228,825 ($190,422 reimbursable + $38,403 contribution).
   This will include the following subtasks:
   a. Develop AIDO algorithms for wheat blotch diseases and specific corn and cotton diseases identified by crop partners (e.g., tar spot, areolate mildew).
   b. Refine LANL disease database for corn, cotton, and wheat based on user testing on an ongoing basis.

2) Develop a Lateral Flow Based Assay for Detection of Mycotoxins in the Field:
   a. Perform literature review of current state of the art for mycotoxin detection on the field. Collect requirements from corn and wheat partners for mycotoxin type, technical and operational specifications for a lateral flow or alternative fieldable platform.
   b. Begin development of assay(s) required for mycotoxin detection.
   c. Design lateral flow or alternative fieldable platform for mycotoxin detection (one or more depending on requirements).