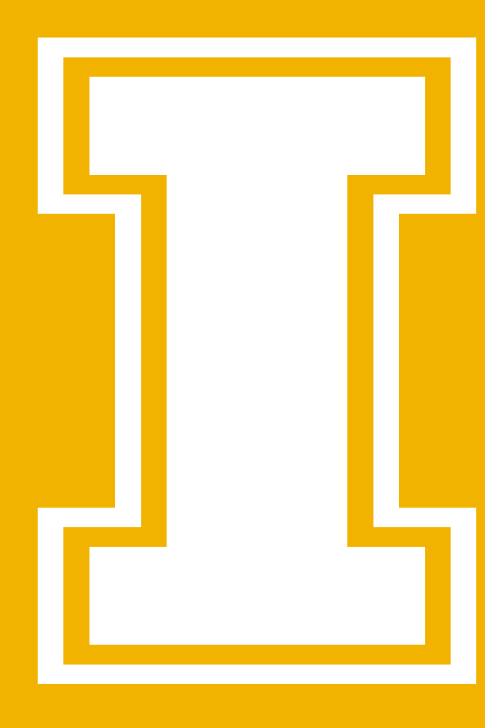


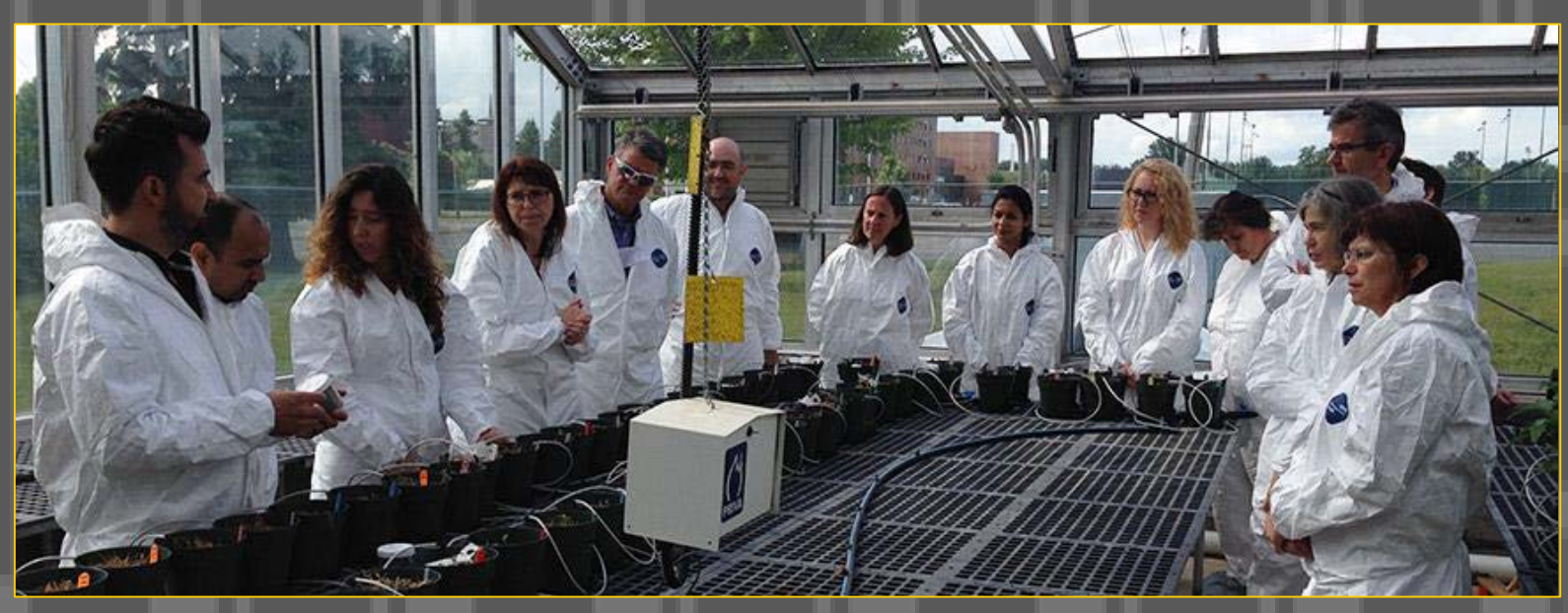
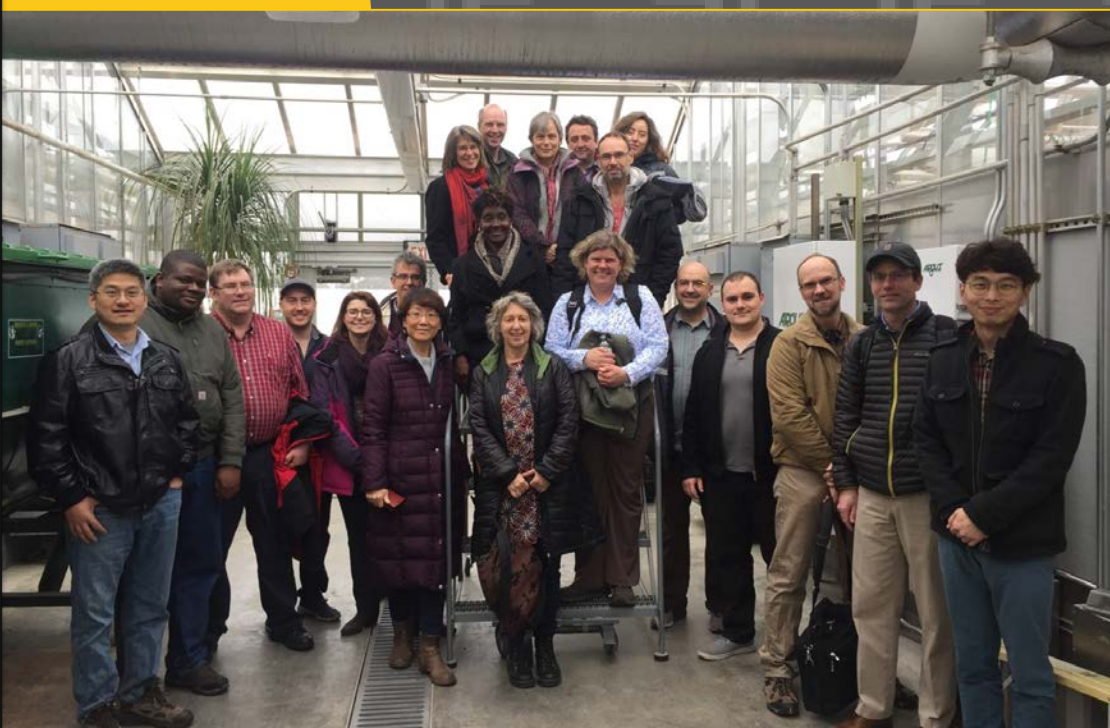
RISK MANAGEMENT AND ERADICATION OF INVASIVE POTATO CYST NEMATODES FROM THE UNITED STATES



The *Globodera* Alliance (GLOBAL) is a five-year, \$3.2 million coordinated agricultural project, funded by USDA-NIFA, to address the ongoing threat of invasive potato cyst nematodes (PCN) with risk management and eradication programming. **GLOBAL is working to eradicate *Globodera* spp. in U.S. potato production.**

The GLOBAL project team is a unique group of 16 researchers, extension specialists, and educators:

- University of Idaho, Oregon State University, Cornell University
- USDA-APHIS, USDA-ARS, Agriculture and Agri-Food Canada
- The James Hutton Institute, and French National Institute of Agricultural Research.



Potato cyst nematodes (PCN)
Golden nematode (*Globodera rostochiensis*) and Pale cyst nematode (*G. pallida*) are two of the most economically important pests of potato. Left uncontrolled, PCN can cause up to 80 percent yield loss, and worldwide this pest accounts for more than 12% yield losses in potato.



Golden nematode in New York:

- Introduced on military equipment returning from WWI.
- Disease symptoms first noticed in the 1930's, identified in 1941.
- 8 counties, 5,985 infested acres, 312,708 regulated acres.

Pale cyst nematode (also referred to as PCN) in Eastern Idaho: APHIS announced first detection in 2006 and a subsequent quarantine.

- Origins remain unknown but similar to European populations
- Since 2006: 29 infested fields found all within an 8.5 mi radius.
- 2 counties, 3,277 acres infested; 4,277 are regulated by association.
- Extensive sampling – none detected anywhere else in the U.S.

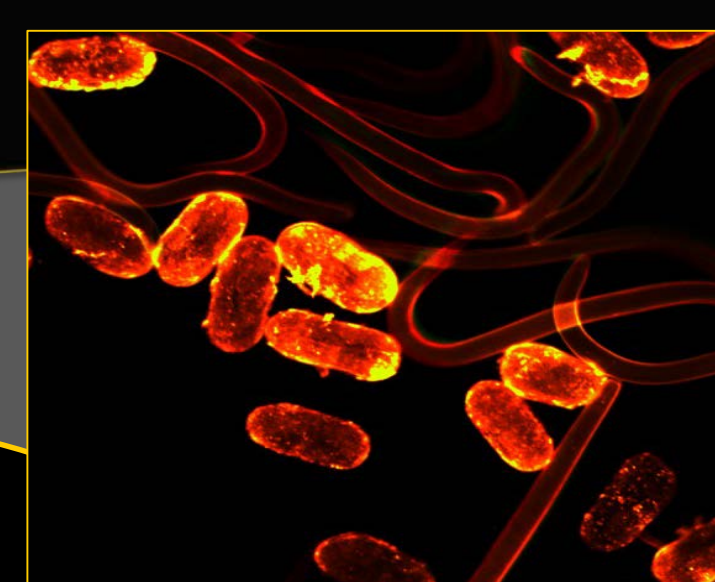


Another integral part of the team is the potato industry including growers, potato commissions, regulators, and policy-makers, as well as the Idaho State Dept. of Agriculture and the New York State Dept. of Agriculture and Markets

The team is co-developing science-based, sustainable, environmentally sound agricultural approaches.

PCN has spread passively from field to field through contaminated soil.
✓ It is completely contained in Idaho by early and ongoing eradication efforts led by USDA-APHIS. GLOBAL has contributed to the eradication.

Objective 1 – Genomic approaches to risk assessment of *Globodera* spp. Understanding the molecular basis underlying virulence will inform detection and diagnosis, guide the deployment of resistance, and reduce the threat of new *Globodera* introductions.

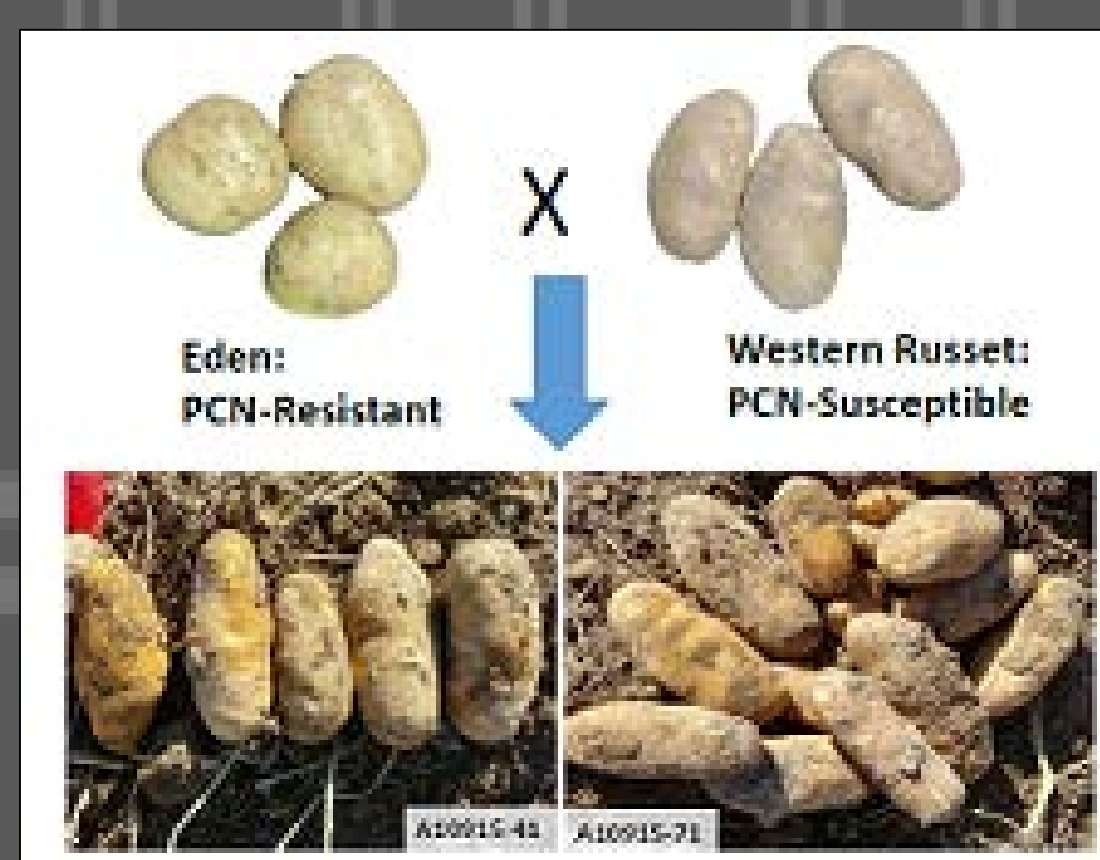


A method to quantify the viability of eggs of using qRT-PCR was developed.

Input-Output model with 2016 IMPLAN data set were used for economic prediction.

- Potato is the most important crop in ID and replacing it with grains means loss.
- The model calculated impact of using grain crops on direct (potato sector) and indirect (linked sectors) as a total loss of \$25,557,868 to the economy.

Objective 2 – Enhance potato breeding for resistance to *Globodera*.



Provide measures to manage risk
Identify and implement actions
An effective and durable way to eradicate PCN is the use of resistant potato cultivars.
Hybridizations have been conducted between *Globodera*-resistant breeding clones and varieties to russet-skinned breeding clones and varieties suitable for production in the western U.S

Provide measures to assess risk
Risk assessment determines the likelihood and severity of possible invasive pest introduction and spread

Spatial analysis is being used to understand the infestation pattern of the pale cyst nematode and predict the ability of this invasive species to spread.

Objective 3 – Outreach/ Extension/ Education
Enhance stakeholder engagement, knowledge and action related to *Globodera* and consequences on the U.S. potato industry. Develop educational programs, using PCN as a model, to teach concepts of ecological, agro economic, and global trade aspects of invasive plant pathogens

- PCN related information was communicated through GLOBAL website and YouTube.
- Knowledge was also communicated through 18 PCN related information was communicated through GLOBAL website and YouTube. .

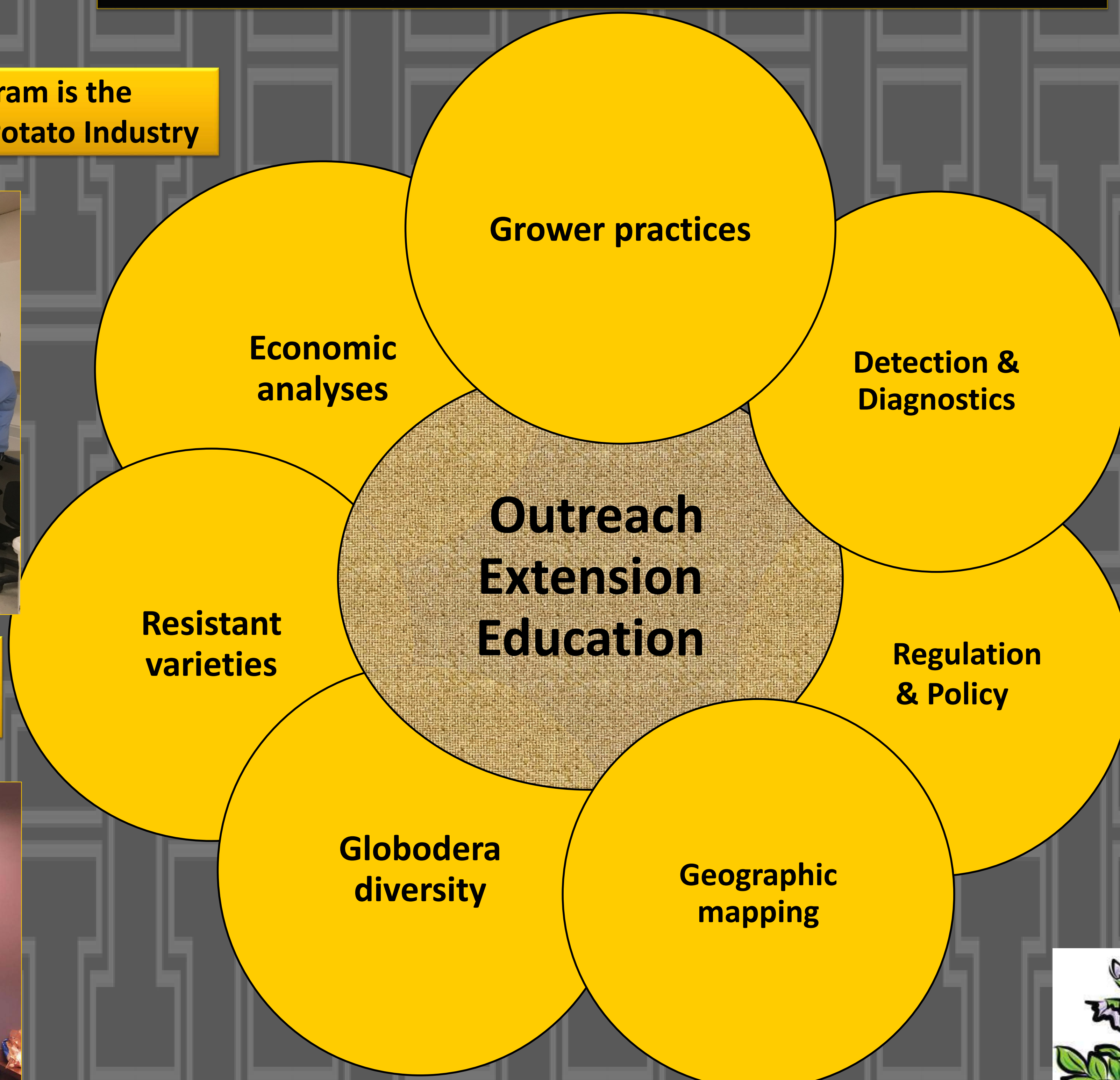
A highlight of the Education Program is the PLSc 504 Grad Student Tour of Idaho Potato Industry



UI Grad Student Potato Industry Tour with Tina Gresham, Director, PCN Program USDA APHIS PCN facility, Idaho Falls, ID



UI Grad Student Potato Industry Tour with Frank Muir, President/CEO Idaho Potato Commission



GLOBAL was involved in five field days.



Pamela J.S. Hutchinson and Tina Gresham. Annual Snake River Pest Management Tour. Update on PCN and trap crop Litchi tomato

Post-doctoral associates and graduate students benefited from international cross-lab discussion, gained professional experience by attending GLOBAL project meetings and professional conferences.

