GLOBODERA ALLIANCE (GLOBAL): RISK ASSESSMENT AND ERADICATION OF *GLOBODERA* SPP. IN U.S. PRODUCTION OF POTATO.

Learn more at: http://www.globodera.org

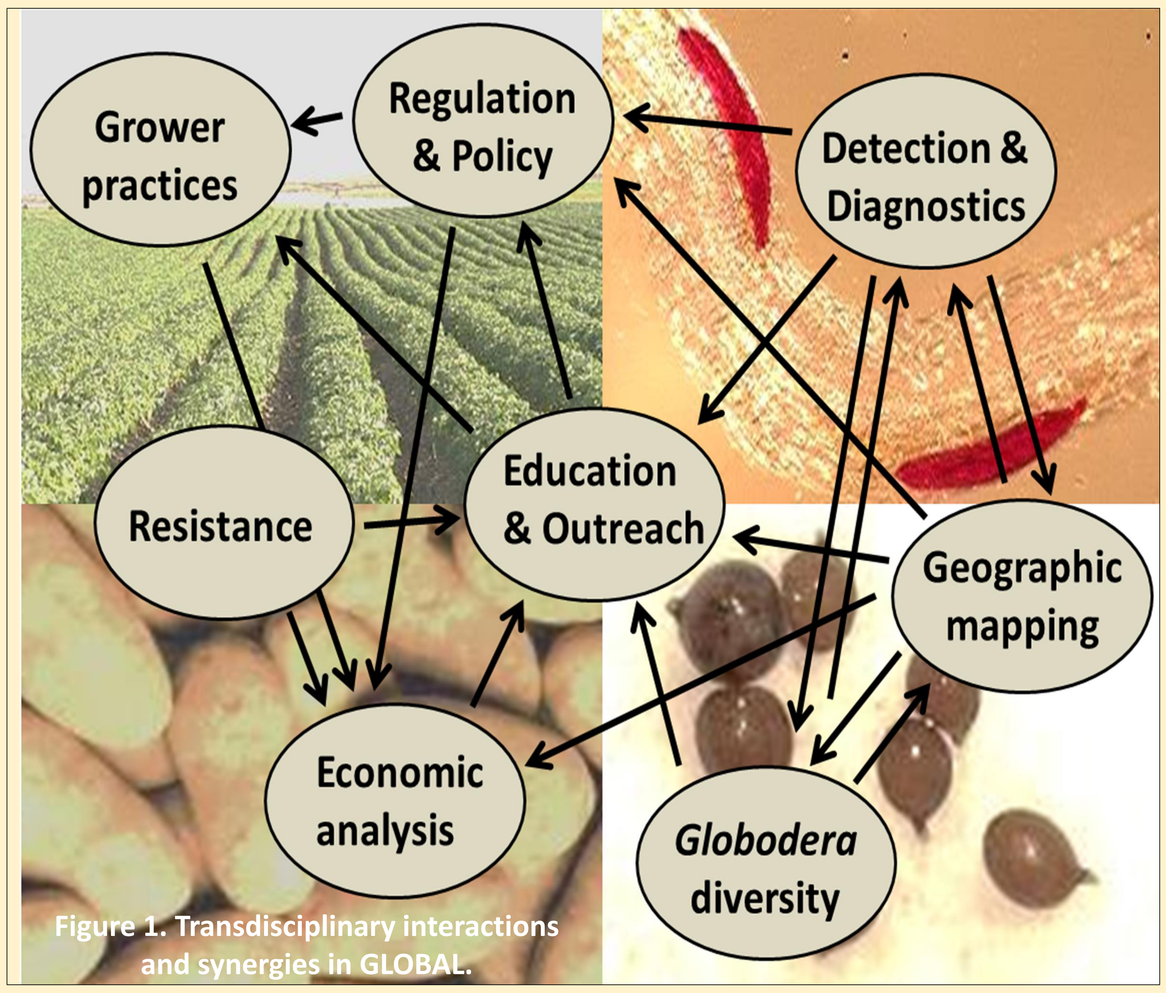


Figure 1. Transdisciplinary interactions and synergies in GLOBAL.

Introduction

Globodera rostochiensis and *G. pallida*, collectively known as potato cyst nematodes, are of worldwide regulatory concern, and are two of the most economically important pests of potato. The introduction and potential spread of both of these nematodes has serious implications for U.S. potato production and export. The presence of *G. rostochiensis* in New York, the unexpected appearance of *G. pallida* in Idaho in 2006, the recent discovery of a new species (*G. ellingtonae*) in Oregon and Idaho in 2012, and the emergence of a new pathotype of *G. rostochiensis* in New York, all highlight the threat that this group of nematodes poses to the multi-billion-dollar U.S. potato industry. The total economic impact from these *Globodera* spp. has not been calculated, but the sum of direct and indirect impacts must be considered, and includes the impacts of lost income, jobs, and wages in all forward and backward linked sectors of the economy.

Objectives

The GLOBAL project will advance the sustainability of U.S. agriculture, by helping to solve a critical constraint on production of a major food crop, reducing reliance on environmentally damaging chemical fumigation, providing biologically-based *Globodera* resistance as a viable control measure, facilitating the avoidance and/or recovery of quarantined potato production acreage through improved diagnostic methods, and improving the profitability and economic viability of farm operations and related economic sectors.

Ongoing Research

1) Genomic approaches to risk assessment of *Globodera*:

- Global phylogenies of 120 *Globodera* spp. populations from around the world were determined by using Genotype by Sequencing (GBS).
- Molecular markers for pathotyping and identifying source of *G. pallida* gene pool were developed.
- A set of 31 SNPs was identified from virulent and avirulent *G. pallida* to follow virulence alleles in natural populations.
- A capture array probe set was generated based on effector sequences from *Globodera* spp.

2) Enhancing potato breeding for resistance to *Globodera*:

- A correlation between molecular marker 57R linked to *H1* for *G. rostochiensis* resistance and *G. ellingtonae* was established.
- Molecular markers are being use to track *Globodera* resistance genes in potato cultivars and breeding lines.
- Existing germplasm in the Aberdeen, Idaho breeding program was screened and evaluated for response to *G. rostochiensis*, *G. pallida,* and *G. ellingtonae* and material resistant to one or more species identified.

3) Extension and Outreach:

- GLOBAL PIs, post-docs, and graduate students presented research findings at yearly regional, national, and international research forums.
- The *Globodera* Alliance Newsletters (in English, Spanish, and French) were distributed at conferences, field days, and online.

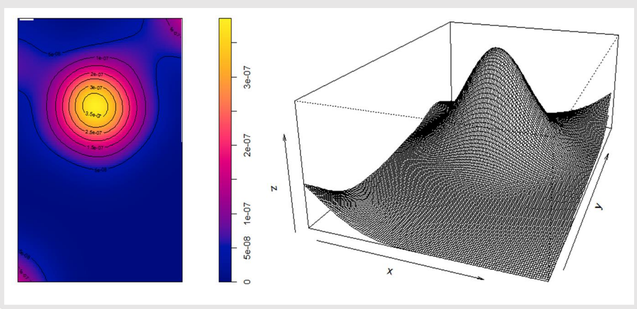
4) Education Objective:

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

Spatial Analysis of *G. pallida* in Idaho

J.B. Contina and L.-M. Dandurand

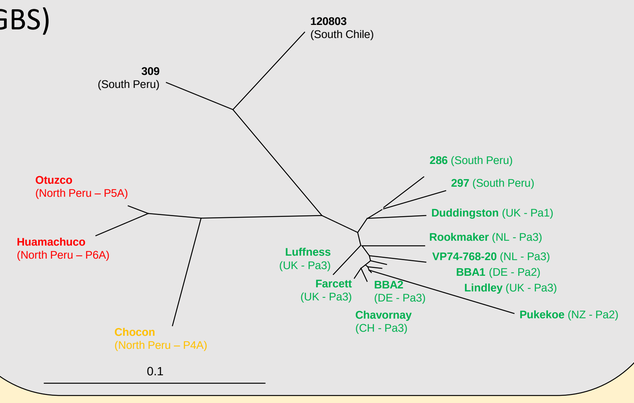
Spatial analysis revealed a contagion effect scenario for *G. pallida* spread in Idaho. Spatial aggregation confines the infestation to a small area (1,233 ha).



Global Population Structure of *Globodera*

B. Mimee and E. Greiner

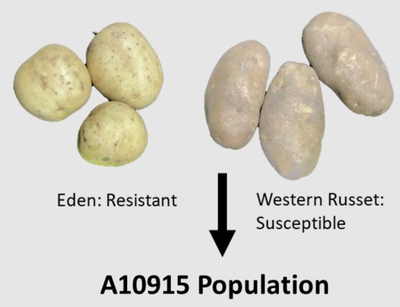
Global phylogenies of 120 *Globodera* spp. populations from around the world were determined by using Genotype by Sequencing (GBS)



Breeding for *Globodera* spp. resistance

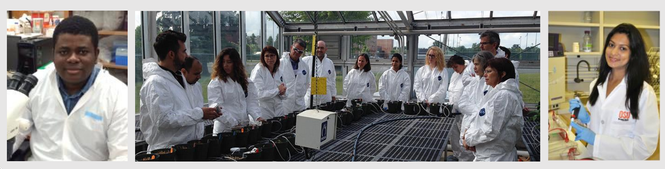
R. Novy, J. Whitworth, J. Kuhl, W. DeJong
I. Zasada, X. Wang, and L.-M. Dandurand

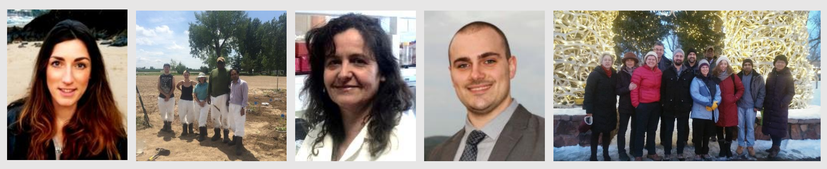
Mapping population of a *Globodera* resistant (Eden) by susceptible (Western Russet) cross with *Globodera* resitance markers H1, $GPAIV_{adg}$, and GPA5 is being phenotyped.



Training

9 students and post-docs are part of GLOBAL





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