United States Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection and Quarantine

Pale Cyst Nematode (*Globodera pallida*) Eradication Program- Idaho Falls, Idaho

2012 4th Quarter Report

Background

Pale cyst nematodes (PCN), *Globodera pallida*, are soil-borne organisms that do not infest potato tubers. The pests infest feeder roots, where the females attach, feed, and become sedentary. Nematodes reproduce sexually. Females form cysts containing 200 to 600 eggs, which can stay dormant for up to 30 years while the eggs inside remain viable. On host plants, large numbers of PCN can cause wilting, stunted growth, poor root development, and early plant death. If left uncontrolled, PCN can reduce yields up to 80 percent in potato fields. Even with only minor symptoms showing on the foliage, PCN can significantly reduce tuber size. PCN spreads primarily by the transport of cysts in soil. This may occur with the movement of soil on farming, construction, and other equipment; infested soil adhering to seed potatoes and other regulated crops; and any other items or means of transport such as water.

On April 19, 2006, officials of USDA's Animal and Plant Health Inspection Service (APHIS) and the Idaho State Department of Agriculture (ISDA) announced the detection of PCN, a major pest of potato crops. This was the first detection of the pest in the United States. The nematode cysts were detected during a routine survey of tare soil at an ISDA grading facility in eastern Idaho. Subsequent 2006 surveying to determine the possible origin and distribution of the pest in Idaho confirmed seven PCN-infested fields totaling 911 acres, all within a one mile radius in Bingham and Bonneville Counties, Idaho. The PCN-infested fields and an area surrounding the fields were placed under a Federal Domestic Quarantine Order and parallel State Rule in August 2006, establishing restrictions on movement of certain regulated articles from Idaho in order to prevent the spread of PCN.

As a result of continued intensive soil sampling since 2007, an additional twelve PCN-infested fields have been found in Bingham and Bonneville Counties, Idaho. All 17 known infested fields lay within a 5-mile radius. The fields associated with them through shared tenancy, farming practices, equipment, and/or shared borders have been extensively surveyed and regulated. Since program inception, approximately 50,400 acres have been regulated due to their infestation or association with an infested field. Non-infested, associated fields have been eligible for federal deregulation following a sequence of soil surveys with no PCN detections. To date, 35,600 acres have been released from federal regulation; however, some of that acreage was re-regulated due to a new association(s) with an infested field(s). At the end of 2012, 14,740 acres of farmland were regulated, of which, 1,915 acres were infested fields.

Eradication treatments in PCN-infested fields have been ongoing since the spring of 2007. Eradication treatments have included methyl bromide fumigation, Telone II fumigation, and planting of biofumigants. Testing of the soil in infested fields indicates the average viability of eggs within the PCN cysts has declined by more than 99% since eradication treatments began. As of December 2012, five infested fields have triggered the bioassay stage of evaluating eradication progress when viable eggs were no longer detected in cysts collected from those fields. One field has successfully completed the bioassay process, enabling it to return to potato production with certain regulatory and survey requirements. The field will not return to potato production in 2013. Bioassays for other fields are ongoing at the University of Idaho in Moscow.

A description of the current PCN regulated area can be found at:
http://www.aphis.usda.gov/plant_health/plant_pest_info/potato/pcn-maps.shtml

The current Federal PCN rule revised as of January 1, 2010 can be found at:
http://www.aphis.usda.gov/plant_health/plant_pest_info/potato/downloads/pcndocs/7cfr-10.txt

Survey Information

Type of survey	Idaho soil samples collected		
	4th Quarter of 2012	2012 Year to date	Since program inception
Detection	15,349	32,173	195,964
Delimiting	11,285	48,847	212,590
Eradication	1,846	5,396	66,536
Total	***28,480***	***86,416***	***474,738***

Identification and Diagnostics

Type of survey	Samples processed by the Idaho PCN Laboratory		
	4th Quarter of 2012	2012 Year to date	Since program inception
Detection	6,238	57,496	177,883
Delimiting	17,316	41,843	186,994
Eradication	2,238	8,906	65,439
Total	***25,792***	***108,245***	***430,316***

Type of survey	Samples processed by the Idaho Food Quality Assurance Laboratory
	2006-2009, now closed
Detection	49,984
Delimiting	10,224
Total	***60,208***

Program Research

At University of Idaho in both Parma and Aberdeen, work continues on sticky nightshade (*Solanum sisymbriifolium*) to look at emergence and the potential for planting after wheat harvests. They are also looking at the effects of potato specific herbicides and desiccants on sticky nightshade. At U of I in Moscow, they are comparing infection potential of PCN on the roots of potato and sticky nightshade through direct observation of the roots. They are also looking at *Trichoderma harzianum* cyst and egg parasitism using a strain with fluorescence.

Work in Ithaca (both Cornell and ARS) continues to examine the effects of NY121 and NY 140 on *Globodera pallida*. Both show good but not complete resistance to *G. pallida*. They have also cloned effector genes from *G. pallida* and are inserting them into potatoes to try and confer broad resistance across the genus *Globodera*.

ARS in Prosser continues to examine hatching factors from different plants, Sticky nightshade and potatoes among them, and is currently using a serial dilution test to examine *Globodera spp.* dose response. *G. ellingtonae* has proven to be a good surrogate for *G. pallida* and is being used in these tests. *G. ellingtonae* hatches much faster than *G. pallida* does.

Eradication Activities

In May 2012, methyl bromide was applied to 6 infested fields (653 acres total). Neither the fields in bioassay at that time nor the infested fields with <1% viability were fumigated in 2012. Non-PCN host crops were planted in all of the infested fields in 2012. No Telone II or additional methyl bromide treatments were conducted in the fall of 2012.

Since 2007, methyl bromide has been applied to the infested fields annually in the spring and to one field in the fall of 2011. Telone II was applied in the late summer of 2007- 2008 and 2010-2011. Telone II was not used in 2009 due to a world-wide shortage of the chemical. Biofumigants with nematicidal activity were planted in the infested fields in the summers of 2007 (oil radish) and 2009 (arugula).

Regulatory Actions

Since the last update to the PCN Regulated Area on December 12, 2012, approximately 870 acres were released from regulation under the Federal PCN Final Rule (effective April 29, 2009). The 870 acres were released after completing a deregulation protocol (comprised of a sequence of surveys with negative laboratory results for PCN); upon receiving additional field history 109 acres were added to the regulated area due to their association with an infested field.

Regulatory Treatments

Treatment type	Regulatory Treatments (# of pieces of equipment)		
	4th Quarter of 2012	2012 Year to date	Since program inception
Pressure washed	657	3,124	12,256
Steam sanitized	115	557	1,995
Total	***772***	***3,681***	***14,251***

Regulatory Documentation

Documentation type	Regulatory Documentation		
	4th Quarter of 2012	2012 Year to date	Since program inception
Certificate (PPQ 540)	236	1,025	7,162
Limited permit (PPQ 530)	90	375	1,768
New compliance agreements	0	5	154

Stakeholder Self-Sanitation & Certification

Self-Sanitation &	Regulatory Documentation

Certification Documentation			
	4th Quarter of 2012	2012 Year to date	Since program inception
Stakeholders participating in self-sanitation and certification	12	11	12
Self-certified regulated articles	230	1,030	1,030

Impacts on Commerce

In response to the initial PCN detection in 2006, Canada, Mexico and Korea shut off importation of potatoes from Idaho, while Japan cut off importation of potatoes from the entire U.S. The Mexican and Canadian export markets have both been re-opened with the exception of potatoes from PCN-regulated areas. Both require PCN soil surveys from origin fields. The Korean market was reopened in June 2010 with the exception of potatoes originating from Bingham and Bonneville Counties, ID. The Japanese market remains closed to Idaho potatoes but negotiations are actively underway to re-gain market access. Because of extensive field surveys conducted throughout production areas in Idaho, all of which have been negative beyond the seventeen infested fields, the general opinion by our trading partners is that potatoes produced outside regulated areas do not pose the biological risk for introduction of PCN.

Communication and Outreach

- On November 16, PPQ met with the infested field owners and operators to discuss research options for non-chemical PCN control methods, the bioassays underway at the University of Idaho, and the PCN Program budget and funding outlook for FY13.
- In November, PPQ conducted outreach to local power companies that service irrigation systems in regulated fields. The program explained sanitation requirements for service equipment leaving regulated fields and contact information and instructions for scheduling sanitation services was provided.

The next stakeholder update is due out in April 2013. Stakeholder updates are available at:
http://www.aphis.usda.gov/plant_health/plant_pest_info/potato/pcn_stakeholder.shtml