

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 the pale cyst nematode (PCN), *Globodera pallida*, a major pest of potato crops, in southern Bonneville and northern Bingham Counties. This was the first and only detection of the pest in the United States to date. Potatoes are the principal economically significant crop attacked by PCN. PCN is a pest of worldwide concern and at high population levels can greatly reduce potato yields. PCN spreads with the movement of soil (unwashed farm equipment, seed potatoes, tare dirt, etc.) and can remain dormant in soil for 20 to 30 years until it comes into contact with a growing potato plant upon which to feed and reproduce. PCN research has demonstrated that multiple potato crops are required to increase new PCN populations to detectable levels, presenting the possibility that PCN could be inadvertently spread to other fields before being detected.

APHIS and ISDA have implemented a regulatory program designed to prevent the pest's spread outside of the known infested fields, and also to prevent spread from associated fields that were potentially exposed to soil from infested fields due to shared tenancy, ownership, farm machinery, seed, drainage or runoff, or other elements of shared cultural practices. Associated fields are subject to certain regulatory requirements including the sanitation of all equipment leaving the field and specified handling for potatoes and other commodities that cannot be washed upon leaving the field. A regulated field may become deregulated after completing a series of full-field soil surveys with no PCN detections, a process that may take 1 to 3 years depending upon the timing of exposure and length of potato rotation. Although the PCN Program makes every effort to support the sanitation needs of associated field operators, PCN regulation is undoubtedly time-consuming and costly to farming operations.

The PCN program is working to get the word out to all area growers and landowners that preventing soil movement between fields is a key strategy for avoiding the nuisance of PCN regulation. Good sanitation practices are also the first step in preventing new infestations from occurring. By voluntarily sanitizing farming equipment and vehicles moving between unregulated fields, a grower can potentially avoid becoming regulated by breaking the field-to-field associations with infested fields that may be detected in the future. Growers should also consider requiring pre-sanitation by other parties who would otherwise be entering their fields with dirty equipment carrying soil from elsewhere. The regulatory requirements and the prohibition on growing potatoes in PCN-infested fields undoubtedly devalues farmland, so landowners, too, should contemplate imposing sanitation requirements on their tenants as an additional measure of protection against acquiring the pest.

Whether done voluntarily or in response to PCN Program requirements, growers who perform routine equipment sanitation are much less likely to spread PCN or other pests and diseases to new locations.

To get the maximum long-term benefit from performing voluntary sanitation, the following details about each job should be documented: the make and model of each piece of equipment sanitized, a unique identification number distinguishing it from similar equipment used by the same operation (if applicable), the date, wash location, method of sanitation, equipment destination, and the name of the person(s) who did the cleaning. Ideally, photographs of the sanitation event and/or a GPS coordinate documenting where the sanitation took place should also be recorded. Sanitation should take place on the margins of fields so that soil and wash water are returned to their place of origin to prevent spread to other locations.

The PCN Program offers free workshops to the public that teach practical and effective sanitation strategies along with suggestions and materials for effective recordkeeping. Workshops are offered in both English and Spanish, either at the PCN Program office or at convenient on-site locations as requested. To schedule a workshop or get more information about the PCN Program, please call 208.522.2431 or visit http://www.aphis.usda.gov/plant_health/plant_pest_info/potato/pcn.shtml.

Pale Cyst Nematode (PCN) Stakeholder Update
4/30/12

UPDATES AND RELATED INFORMATION:

- PPQ confirmed three new PCN-infested fields in February 2012; two are located in Bingham County (54 and 120 acres each) and one in Bonneville County (114 acres). These fields were previously regulated due to their association with one or more infested fields in the past. There are currently fifteen infested fields all located within a 5-mile radius that spans a portion of northern Bingham County and southern Bonneville County, Idaho. The current regulated area is 14,455 acres, of which 1,756 are infested.
- In February 2012, PPQ found that two additional infested fields in the eradication program had no viable nematodes according to a non-vital staining analysis conducted at the PCN laboratory in Idaho Falls. Three fields already reached zero viability in 2010. Cysts collected from these five fields advanced to bioassay, which is the next step toward determining eradication success. Bioassay assesses nematodes' ability to hatch from a cyst, infect a host plant, and reproduce. Bioassays are currently underway in a greenhouse at the University of Idaho in Moscow, Idaho. The entire bioassay process takes 1.5 to 2 years to complete. The bioassays that started in 2011 are ongoing; preliminary results obtained in early 2012 have been favorable.
- PPQ will treat the six infested fields detected in 2011-2012 with methyl bromide in May 2012. The five fields currently in bioassay and the four fields with an average viability of <1% will not be fumigated this year. Growers in all fifteen infested fields will plant non-host crops in 2012.
- Research and plans for field trials are currently underway to provide additional non-fumigant treatment options for infested fields. These include fungal biocontrol agents that attack PCN cysts, and trap crops and hatching factors that stimulate PCN hatch but do not provide a food source, which is essential for completing the nematode's reproductive cycle. Rapeseed meal, a byproduct of canola oil production, is being evaluated for use as a biofumigant against PCN. The meal is amended into the soil and releases glucosinolates that can kill PCN larvae. Since the rapeseed meal is processed, there is little odor released into the atmosphere unlike the arugula green manures utilized previously by the program.
- In a 5-year review of the PCN program completed in March 2012, Plant Protection and Quarantine (PPQ), Idaho State Department of Agriculture (ISDA) and Idaho Potato Commission (IPC) officials considered feedback from industry representatives and state/federal agencies, and analyzed the latest program data and input from PCN technical experts. Seven industry representatives expressed the views of growers of infested fields, regulated fields, deregulated fields, shippers, fields outside the regulated area, and exporters. The review panel determined that the eradication goals established in 2007 are being met and that eradication will remain the program's focus in 2012 and beyond.
- Based on industry and grower feedback, along with input from technical experts during the 5-year review, the PCN Program will modify the criteria for releasing non-infested regulated fields from regulation by requiring negative results from a series of two full-field surveys (20 lbs./acre) conducted by APHIS after each of two potato crops. The program will work directly with individual growers to ensure that each field makes an appropriate transition to the modified protocol. As a result of this protocol modification, the ISDA post-regulation monitoring surveys will no longer be required after 2012.
- Equipment moving from non-infested APHIS-regulated fields may require cleaning prior to their movement out of the field. Cleaning can be performed by either APHIS personnel or by private parties. New in 2012, stakeholders have the option to conduct their own inspections and self-certify their cleaned equipment by entering into a compliance agreement with APHIS. The compliance agree requires stakeholders to attend a sanitation training course offered by the PCN

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Program and to document information about equipment sanitation and movement. For more information about self-certification or to sign up for sanitation training, please contact the program office at (208) 522-2431.

SAMPLING INFORMATION:

- To date, the PCN Program has collected more than 347,000 soil samples in Idaho to ensure Idaho's freedom from PCN outside of the 15 known infested fields.
- More than 62,000 samples have been collected from the eradication fields in order to monitor eradication progress and to provide cysts to several institutions for PCN research.
- To date, the PCN laboratory in Idaho Falls has screened more than 300,000 soil samples collected in Idaho and approximately 42,500 samples from other potato-producing states. There have been no pale cyst nematode detections in the U.S. outside of Idaho.
- Since program inception, the viability of 696 cyst samples collected from infested fields has been analyzed before and after fumigation treatments. The average viability of PCN in the treated fields has declined by more than 99% since eradication treatments began.
- Since 2009, approximately 54,500 soil samples have been collected in support of the ISDA's post-regulation survey of fields deregulated by the USDA.
- At growers' and shippers' request, ISDA is sampling fields growing potatoes in 2012 that are destined for export to Mexico. Fields must be sampled at least one week prior to planting and have negative PCN lab results to be eligible for export. Ideally, fields should be signed up and sampled the fall before a potato crop is planted to ensure ample time for survey planning and lab processing. Contact the PCN Program office (208-522-2431) to make an export survey request.

PROGRAM CHRONOLOGY:

Infested field detections and regulatory response:

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 pale cyst nematode (PCN), *Globodera pallida*, 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 grader facility in eastern Idaho. Subsequent 2006 surveying to determine the possible origin and distribution of the pest in Idaho confirmed seven PCN-positive fields, all located in close proximity, within Bingham and Bonneville Counties, Idaho. In response to the detection, Canada, Mexico and Korea shut off importation of potatoes from Idaho, while Japan cut off importation of potatoes from the entire U.S.

On August 28, 2006, the positive fields and an area surrounding the fields were placed under a Federal Domestic Quarantine Order and parallel State Rule establishing restrictions on planting and interstate/intrastate movement of certain regulated articles from/within Idaho in order to prevent the spread of PCN.

A trace of seed sources for the positive fields did not yield any evidence that seed was the source of infestation. Over 90% of the 2006 Idaho certified seed potato crop was surveyed and found negative for PCN. Other sources of introduction such as imported farm equipment, nursery stock, foreign flower bulbs, and other soil bearing items were investigated without providing any leads as to the origin of the infestation. As a result of the extensive surveying, negative test results and the regulatory actions of USDA and ISDA, Canada, Mexico, and Korea reopened their markets to Idaho

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potatoes with some restrictions. Japan allows potatoes from the U.S. except for Idaho, provided the product is not from Idaho seed.

On November 1, 2007 a Federal Interim Rule and Idaho State Rule went into effect, providing a framework for continued protection of Idaho and U.S. potato interests. In an effort to provide the best protection possible to the potato production and marketing system, the federal interim rule defined a regulated area in Bingham, Bonneville, and Jefferson Counties based on their associations with infested fields and production of a host crop within the past 10 years. Approximately 15,300 acres were added to the regulated area in response to the publication of the Interim Rule. Approximately 5,700 acres regulated by the Federal Order in August of 2006 were released from regulated status because they had no known association with the infested fields. Additionally, corn and small grain were removed from the list of regulated articles; peas and beans were added to the list of regulated articles.

On November 28, 2007, APHIS confirmed PCN in an additional field in Bingham County, Idaho as a result of continued intensive delimitation sampling. This find represented the 8th PCN-infested field found in Idaho. The field had been regulated since August 28, 2006 under the Federal Order, Interim Rule, and Idaho State Rules covering PCN in Idaho. The field is adjacent to two other infested fields. In response to discovering the 8th infested field, approximately 267 acres of farmland in parts of Bingham and Bonneville Counties were added to the regulated area. These fields became regulated due to having been farmed by a common operator in the same year as the 8th infested field and because they had at least one potato crop in the last ten years.

On December 11, 2008, APHIS confirmed PCN in another field located in Bingham County, Idaho as a result of continued intensive delimitation sampling. This find represented the 9th PCN-infested field in the regulated area in Idaho and is in close proximity to the other infested fields. The field has been regulated since August 28, 2006 under the Federal Order, Interim Rule, and Idaho State Rules covering PCN in Idaho. In response to discovering the 9th infested field, approximately 4,800 acres of farmland in parts of Bingham and Bonneville Counties were added to the regulated area. These fields became regulated due to having been farmed by a common operator in the same year as the 9th infested field and because they had at least one potato crop in the last ten years.

On April 29, 2009 APHIS published a Final Rule for PCN with three changes; 1) referring to the nematode of concern, *Globodera pallida*, by the common name “pale cyst nematode” rather than by the name “potato cyst nematode;” 2) allows the movement of *Phaseolus* species (beans) and *Pisum* species (peas) under the same conditions that apply to the movement of other crops to which soil is often attached; 3) requires that a protocol approved by the Administrator as sufficient to support removal of infested fields from quarantine, rather than a 3-year biosecurity protocol, be completed in order to remove an infested field from quarantine. The change specifying a protocol approved by the Administrator provides an opportunity to amend the requirements for removal of infested fields from quarantine in a more streamlined manner. PCN officials do not anticipate this change will have any negative effect on the quarantine removal program.

On March 18, 2011, APHIS confirmed PCN in an additional field located in Bonneville County. This find represented the 10th PCN-infested field in Idaho. The 175-acre field is located about 1.5 miles from the nearest infested field. The detection was made in samples collected in 2010 as part of ongoing cooperative monitoring efforts by APHIS and the Idaho State Department of Agriculture (ISDA). In response to the 10th field detection, approximately 6,500 acres in Bingham and Bonneville County became regulated due to having been farmed by a common operator in the same year as the 10th infested field and because they had at least one potato crop in the last ten years.

PPQ confirmed an 11th and 12th PCN-infested field in Bonneville County, Idaho on August 17th, and September 16th, 2011, respectively. Prior to their detection, these two fields (150 and 42 acres each) were regulated due to their association with one or more infested fields in the past.

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Successful survey, regulatory, and eradication activities since the initial detection in 2006 have facilitated some regulatory relief in Idaho while forwarding the program objectives of: preventing the spread of PCN, delimiting the current infestation of PCN, eradicating PCN, restoring lost potato markets, and maintaining existing potato markets.

Eradication treatments:

In 2007, USDA and ISDA initiated a program to treat fields which have tested positive for PCN. The program has included pre-treatment sampling, fumigation, and post treatment sampling for up to two treatments per year. In 2007-2011, the fields were treated with methyl bromide in the spring and with Telone II (a commonly used nematicide) in the fall. The ISDA contracts with land owners for activities related to eradication of PCN from infested fields including access, tillage, irrigation, and maintaining a biosecurity planting at a fixed cost per acre. Bio-fumigants (oil radish, clover, and arugula) were planted on the infested fields in 2007-2009, and small grains in 2010-2011 to add an additional measure of control and prevent soil erosion over the summer months. The plants were tilled into the fields to replenish organic matter and rejuvenate the soil. In 2011, a small grain crop was grown for harvest in the three infested fields that triggered bioassay in 2010. No crops were grown for harvest in the infested fields in 2007-2010.

For a full listing of PCN regulated articles, regulations, regulated areas, and past stakeholder updates, visit http://www.aphis.usda.gov/plant_health/plant_pest_info/potato/pcn.shtml.

Pale Cyst Nematode (PCN) Stakeholder Update
6/18/2012

UPDATES AND RELATED INFORMATION:

- In June 2012, PPQ determined that soil samples from two additional fields in eastern Idaho were positive for pale cyst nematodes (PCN). The two fields, located in Bingham County, total 151 acres and are in close proximity to previously identified infested fields. All 17 confirmed infested fields, 1,916 acres total, are within a 5-mile radius spanning part of southern Bonneville and northern Bingham Counties. PPQ will publish the addition of these two fields and a list of exposed fields to the regulated area in the upcoming weeks.
- PPQ treated the six infested fields detected in 2011-2012 with methyl bromide in May 2012. The five fields currently in bioassay and the four fields with an average viability of less than 1% were not fumigated this year. Operators of the infested fields planted non-host crops in 2012.
- Equipment moving from non-infested APHIS-regulated fields may require cleaning prior to their movement out of the field. Cleaning can be performed by either APHIS personnel or by private parties. New in 2012, stakeholders have the option to conduct their own inspections and self-certify their cleaned equipment by entering into a compliance agreement with APHIS. The compliance agreement requires stakeholders to attend a sanitation training course offered by the PCN Program and to document and retain for review information about equipment sanitation and movement. For more information about self-certification or to sign up for sanitation training, please contact the program office at (208) 522-2431.
- Research and plans for field trials are currently underway to provide additional non-fumigant treatment options for infested fields. These include fungal biocontrol agents that attack PCN cysts, and trap crops and hatching factors that stimulate PCN eggs to hatch but do not provide a food source, which is essential for completing the nematode's reproductive cycle. Rapeseed meal, a byproduct of canola oil production, is being evaluated for use as a biofumigant against PCN. The meal is amended into the soil and releases glucosinolates that can kill PCN larvae. Since the rapeseed meal is processed, there is little odor released into the atmosphere unlike the arugula green manures utilized previously by the program.
- In February 2012, PPQ found that two additional infested fields in the eradication program had no viable nematodes according to a non-vital staining analysis conducted at the PCN laboratory in Idaho Falls. Three fields already reached zero viability in 2010. Cysts collected from these five fields advanced to bioassay, which is the next step toward determining eradication success. Bioassay assesses nematodes' ability to hatch from a cyst, infect a host plant, and reproduce. Bioassays are currently underway in a greenhouse at the University of Idaho in Moscow, Idaho. The entire bioassay process takes 1.5 to 2 years to complete. The bioassays that started in 2011 are ongoing; preliminary results obtained in early 2012 have been favorable.

SAMPLING INFORMATION:

- To date, the PCN Program has collected more than 370,400 soil samples in Idaho to ensure Idaho's freedom from PCN outside of the 17 known infested fields.
- More than 64,200 samples have been collected from the eradication fields in order to monitor eradication progress and to provide cysts to several institutions for PCN research.
- To date, the PCN laboratory in Idaho Falls has screened more than 341,400 soil samples collected in Idaho and approximately 42,500 samples from other potato-producing states. There have been no pale cyst nematode detections in the U.S. outside of Idaho.

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- Since program inception, the viability of 696 cyst samples collected from infested fields has been analyzed before and after fumigation treatments. The average viability of PCN in the treated fields has declined by more than 99% since eradication treatments began.
- Since 2009, approximately 56,600 soil samples have been collected in support of the ISDA's post-regulation survey of fields deregulated by the USDA.
- At growers' and shippers' request, ISDA will sample fields in the summer and fall of 2012 that will grow potatoes in 2013 for export to Mexico. Fields must be sampled at least one week prior to planting and have negative PCN lab results to be eligible for export. Ideally, fields should be signed up and sampled the year before a potato crop is planted to ensure ample time for survey planning and lab processing. Contact the PCN Program office (208-522-2431) to make an export survey request.

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PPQ confirmed three new PCN-infested fields in February 2012; two located in Bingham County (54 and 120 acres each) and one in Bonneville County (114 acres). These fields were previously regulated due to their association with one or more infested fields in the past. Approximately 2,829 acres were added to the regulated area in response to these detections.

Successful survey, regulatory, and eradication activities since the initial detection in 2006 have facilitated some regulatory relief in Idaho while forwarding the program objectives of: preventing the spread of PCN, delimiting the current infestation of PCN, eradicating PCN, restoring lost potato markets, and maintaining existing potato markets.

Eradication treatments:

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