



United States
Department of
Agriculture

Marketing and
Regulatory
Programs

Animal and
Plant Health
Inspection
Service

Plant Protection
and Quarantine

Golden Nematode Program Manual



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1

Golden Nematode
Program Manual

Introduction

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Purpose

The United States Department of Agriculture Animal, Plant Health Inspection Service (USDA-APHIS) takes regulatory action to prevent the spread of *Globodera rostochiensis* (golden nematode), which causes a dangerous disease of potatoes and certain other plants. In the United States, golden nematode currently infests certain counties or areas within counties in the State of New York **only**, and is neither widely prevalent nor distributed throughout the United States.

The *Golden Nematode Program Manual* will help prepare you for the following tasks:

- ◆ Performing detection and delimiting surveys for golden nematode in areas where the golden nematode is known or **not** known to occur
- ◆ Conducting treatments and certifying regulated articles for movement from regulated areas
- ◆ Determining the movement entry status of regulated and non-regulated articles
- ◆ Taking regulatory action when golden nematode is detected

Scope

What the Manual Covers

The manual is divided into tabbed chapters *Introduction* and *Procedures*. The manual also contains appendixes, a glossary, and an index.

The **Introduction** provides basic information about the manual such as purpose, scope, and users. The introduction includes contact information for problems related to the manual, and also includes the a list of related documents, directions on how to use the manual, and a description of conventions (unfamiliar or unique symbols and highlighting) that appear throughout the manual.

The **Procedures** chapter contains the following information:

- ◆ History of the golden nematode
- ◆ Life cycle of the pest, host plants and infestations
- ◆ Detection and delimiting surveys
- ◆ Sample transport
- ◆ Sample washing
- ◆ Sample reading
- ◆ Preparing the suspect cysts for identification
- ◆ Cleaning and sanitizing supplies and equipment
- ◆ Regulatory treatment and certification
- ◆ Directions for the certification of articles moving from golden nematode regulated areas
- ◆ Control methods used in the State of New York

The appendixes contain the following information:

- ◆ Examples and instructions for completing and issuing forms
- ◆ Safety procedures
- ◆ How to maintain the manual

The **Glossary** defines specialized words, abbreviations and acronyms, and other terms that are used which may be difficult or unfamiliar.

The **Index** contains topics and page numbers for quick reference.

What the Manual Does Not Cover

The manual **does not** cover detailed information about the golden nematode or detailed pest identification procedures used by the golden nematode identification specialist.

Users

This manual is written for use by USDA-APHIS-PPQ Plant Health Safety Specialists (PPQ-PHSS), PPQ Technicians, and PPQ Biological Aides; the Golden Nematode Program director; the Golden Nematode Program manager; and other Federal and State regulatory officers.

Related Documents

The authority for specific regulatory action is based on the Golden Nematode Quarantine 7CFR§301.85 and the Plant Protection Act. The State of New York Plant Regulatory Agency has enacted an interior parallel quarantine known as Part 127 of the Agriculture and Markets Law.

Application

This manual contains the policy, guidelines, and instructions that officers **must** follow as a basis for the treatment or other procedures to be used in authorizing the movement of regulated articles. This manual serves as a basis for explaining such procedures to persons interested in moving articles affected by quarantine regulations.

How to Use This Manual

Review the contents of this manual to get a feel for the scope of material covered. Glance through the section that you will be using, and familiarize yourself with the organization of the information. Use the table of contents which follows each tab to find the information you need.

EXAMPLE

To find information on the first signs of plant infestation, see [Plant Damage](#) on page 2-1-6.

If the table of contents is **not** specific enough, then turn to the index to find the topic and its page number.

How to Report Problems

Use **Table 1-1-1** to report suggestions, problems, situations, and disagreements which directly affect the contents of the *Golden Nematode Program Manual*.

TABLE 1-1-1 How to Report Problems with the Manual

If you:	And the problem is:	Then:
Are not able to access the on-line manual	→	CONTACT John Patterson in the Manuals Unit by e-mail john.l.patterson@aphis.usda.gov or phone 240-529-0351
Have identified a problem with the content of the manual	Urgent	CALL Deborah Briggs in the Manuals Unit at 240/529-0357 or contact by e-mail deborah.j.briggs@aphis.usda.gov
	Not urgent	CONTACT Deborah Briggs in the Manuals Unit by e-mail deborah.j.briggs@aphis.usda.gov or phone 240/529-0357
Have a suggestion for improving the content of the manual	→	CONTACT the PPQ Manuals Unit, Deborah Briggs by e-mail deborah.j.briggs@aphis.usda.gov or phone 240/529-0357; or COMPLETE and MAIL the Comment Sheet (located at the back of the manual)
Have a situation that requires an immediate response regarding a procedure or regulatory action	→	CONTACT the Golden Nematode Program Director, Daniel Kepich, at daniel.j.kepich@aphis.usda.gov or call 607-566-2212
Disagree with a policy, procedure, or regulatory action identified in the manual	→	

Conventions

The conventions used in this manual are established by custom and are widely recognized and accepted.

Advisories

Advisories are used throughout the manual to bring important information to your attention. Please carefully review each advisory. The definitions coincide with American National Standards Institute (ANSI), and are in the format shown below.



DANGEROUS indicates that people could **easily** be hurt or killed.



WARNING indicates that people could **possibly** be hurt or killed.



CAUTION indicates that people could possibly be endangered or slightly hurt.



NOTICE indicates a possibly dangerous situation where goods might be damaged.



IMPORTANT indicates helpful information.

Boldface

Boldfaced type is used to highlight negative or important words throughout this manual. These words are: **always, cannot do not, does not, except, mandatory, must, never, no, not, prohibited, only, other than.**

Bullets

Bulleted lists indicate that there is **no** order to the information listed.

Chapters

The manual has chapters divided into chapter sections. Every chapter and chapter section has a table of contents at the beginning that lists the heading titles within.

Control Data

Information placed at the top and bottom of each page helps users keep track of where they are in the manual and updates to the manual. At the top of each page is the chapter and first-level heading. At the bottom of each page is the month, year, manual transmittal number, title, page number, and unit responsible for content.

Decision Tables

Decision tables are used throughout the manual. The first and middle columns in each table represent conditions, and the last column represents the action to take after all conditions listed for that row are considered. Begin with the column headings and move left-to-right, then continue one row at a time.

TABLE 1-1-2 How to Use Decision Tables

If you:	And:	Then:
Read this row first; and if this condition applies then continue in this row	If this condition applies	TAKE the action listed here
If the condition in the cell above did not apply, then read this row next	If this condition applies	TAKE the action listed here

Examples

Examples are used to clarify a point by applying a real-world situation.

EXAMPLE

Examples are graphically placed boxes within the text as a means of visually separating from other information on the page. Examples **always** appear in a box like this.

Footnotes

Footnotes comment on or cite a reference to text and are referenced by number. Two types of footnotes are used in this manual: general text footnotes and table or figure footnotes.

General text footnotes are located at the bottom of the page and are consecutively numbered throughout the manual.

Table and Figure footnotes are located at the bottom of the associated single-page table or figure when space allows. However, for multi-page tables or tables that cover the length of a page, footnote numbers and footnote text **cannot** be listed on the same page. To locate footnote text, be sure to check the last page and the page following the end of the associated table or figure.

Heading Levels

Within each chapter there are three heading levels. The first heading is indicated by a horizontal line followed by the title which continues across both the left and right columns. The second heading is subordinate to the first heading, is in the right-hand column with the text beginning below. The third heading is subordinate to the second heading, and located in the left-hand margin.

Highlighting and Hypertext Links

When tables, figures, or other headings are cross-referenced in the body of the manual, they are emphasized in boldface and highlighted. Headings and titles are also italicized. These appear in blue hypertext in the on-line manual.

EXAMPLE

See [Figure 2-1-1 on page 2-1-3](#).

Indentions

Entry requirements which are summarized from CFRs, permits, or policies are indented on the page.

Italicized Brackets

When completing or reviewing certain certificates and forms, information that is to be entered, listed, or filled in is italicized and enclosed in brackets.

Numbered Lists

Numbered lists are used to indicate the specific order in which the information listed is to be followed.

Numbering Scheme

A two-level numbering scheme is used in this manual for pages, tables, and figures. The first number represents the chapter. The second number represents the page, table, or figure. This numbering scheme allows for easier updating and adding and removing pages without having to reprint an entire chapter. Dashes are used in page numbering to differentiate page numbers from decimal points.

2

Golden Nematode
Program Manual

Procedures

Introduction

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Introduction

The *Introduction* section of the *Procedures* chapter provides information about the Golden Nematode Program: a map of areas in New York State that are currently regulated for golden nematode; and general information about the history of the pest, the life cycle, pest hosts, and plant and crop damage.

Golden Nematode Program

The goal of the USDA-APHIS-PPQ Golden Nematode Program is to maintain a risk-based management system to prevent the spread of golden nematode (*Globodera rostochiensis*) and new infestations in potatoes, and to facilitate international and interstate agricultural shipments.

The Golden Nematode Program includes the following components:

- ◆ Certification of regulated articles for movement from regulated areas
- ◆ Decision-making on the movement of regulated and non-regulated articles into regulated areas
- ◆ Survey of regulated land
- ◆ Survey of fields planted with susceptible crop varieties
- ◆ Soil sample processing for golden nematode
- ◆ Control of golden nematode infestations and regulated land

- ◆ Treatment of equipment and supplies that enter, are used on, or exit regulated land

Cooperation With Other Agencies

Sometimes the regulations of different Federal, State, and local agencies govern the same pests. As a result, USDA-APHIS-PPQ cooperates with the following Federal, State, and local agencies regarding golden nematode research, survey, and control.

Federal

The USDA-Agricultural Research Service (ARS) provides assistance with the Golden Nematode Program.

State and Local

The New York Department of Agriculture and Markets shares regulatory responsibility for the Golden Nematode Program with APHIS. APHIS supports the development of golden nematode-resistant potato varieties at Cornell University through cooperative agreement. The New York Certified Seed Potato Improvement Cooperative provides research. The Extension Service of the Cooperative State Research Service provides assistance.

Map of Quarantine Areas

The map in **Figure 2-1-1** shows the areas in New York State that are regulated for golden nematode as of November 2005. The most recent golden nematode quarantine map, is available at http://www.aphis.usda.gov/plant_health/plant_pest_info/nematode/downloads/gnquarantinemap.pdf.

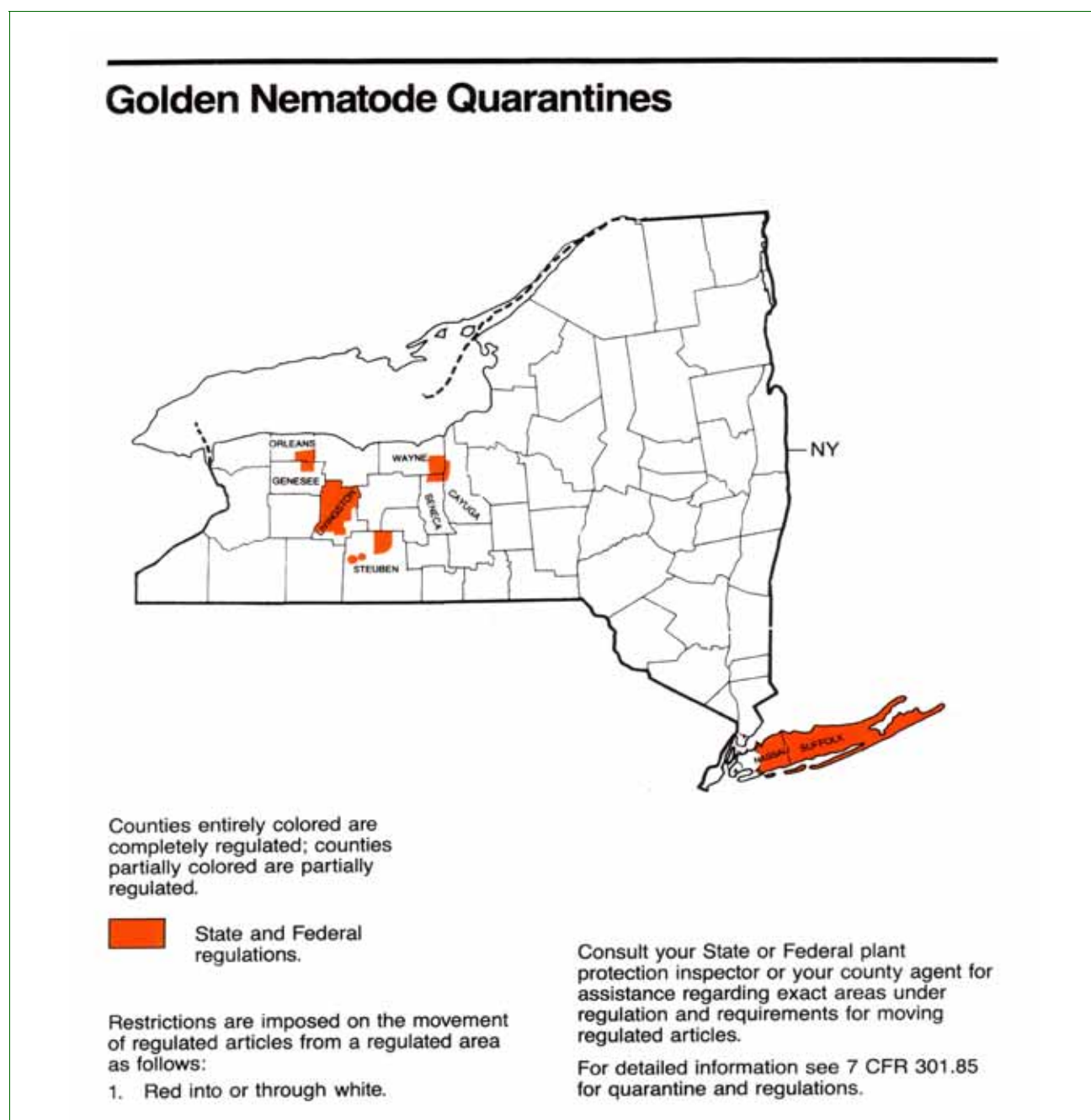


FIGURE 2-1-1 Map of Golden Nematode Quarantine Areas in the State of New York (Nov 2005)

General Pest Information

Of the many plant pests of foreign origin that have become established in the United States, *Globodera rostochiensis* (golden nematode) is potentially more dangerous than any of the other insects and diseases affecting the potato industry. Damaging populations of golden nematode develop when susceptible crops are planted in monoculture or rotation.

Potatoes and tomatoes are the principal crops of importance that are attacked by the golden nematode. Once golden nematode is established, the growing of potatoes and tomatoes **must** be done **only** by planting nematode-resistant varieties or by rotating with other crops for long periods. Continuous planting of non-resistant varieties of potatoes is impractical in golden nematode infested soil, due to decreases in crop yield caused by increases in the nematode population.

Strains

There are presently two strains of golden nematode (GN) infesting land in New York. The primary GN race that infests land in New York is Ro1; however, a second race Ro2 has also been found in a few fields.

All survey and regulatory information in this manual applies to both GN Ro1 and Ro2. Data collected indicates Ro2 develops on land infested with Ro1 where the same Ro1 potato-resistant variety is grown. Special crop rotation procedures are required on land where Ro2 has been detected. Grower options are very limited because Ro2 resistant potato varieties are still being developed.

Distribution

In the United States, golden nematode Ro1 was discovered in 1941 on Long Island, New York. Infestations have since been confirmed in the New York counties of Cayuga, Genesee, Livingston, Nassau, Orleans, Seneca, Steuben, Suffolk, and Wayne.

New Castle County, Delaware was infested, but has since been eradicated of golden nematode. Delaware was removed from quarantine in 1970.

Today the golden nematode is a major pest of potatoes in Europe. In England alone, nearly 75 percent of potato production land has severe crop restrictions due to golden nematode infestation. In addition to Europe and the U.S., golden nematode has been also been found in parts of South America and Asia.

The first recorded Golden nematode infestation was in Germany in 1881. At the time, golden nematode was considered to be a strain of *Heteroda schachtii*. By 1913, this nematode was discovered in Scotland. Finally in 1923, the golden nematode was described as a completely different species and **not** a strain of *Heteroda schachtii*.

Hosts

Although potatoes and tomatoes are the primary crops established to be golden nematode hosts, the golden nematode also reproduces on the roots of eggplants and on some wild solanaceous weeds.

Damaging populations of the nematode develop in infested fields when susceptible crops are planted in a monoculture or rotation. The pest will develop when fields of crops are planted with potatoes following potatoes, tomatoes following tomatoes, and potatoes following tomatoes, or tomatoes following tomatoes.

Life History

Golden nematode eggs and larvae live within cysts produced during previous infestations, and over-winter in the soil. When soil temperatures become favorable during spring and summer, the larvae begin to emerge from the eggs in direct response to chemical exudates of host plant roots. As the larvae leave the cysts, they enter the soil, penetrate the host plant roots behind the root tip, and then migrate to a position near the host's vascular system where feeding begins. Larvae continue to emerge from cysts throughout the growing season, and golden nematodes in various stages of development can be found in and on host roots. Normally **only** one golden nematode generation is produced per year in the New York temperature zone.

Golden Nematode Female Larvae

As the developing golden nematode female larvae enlarge and break through the surface of the roots of the host plant, they remain attached to the host plant roots by their necks. Females pass through pearly-white and yellow color phases and retain eggs within their bodies.

The female nematode continues to be attached to host-plant roots while being fertilized by the adult male nematode. At death, females become the brown cysts which are easily detached from host-plant roots and remain in the soil after harvest of the host-plant crop.

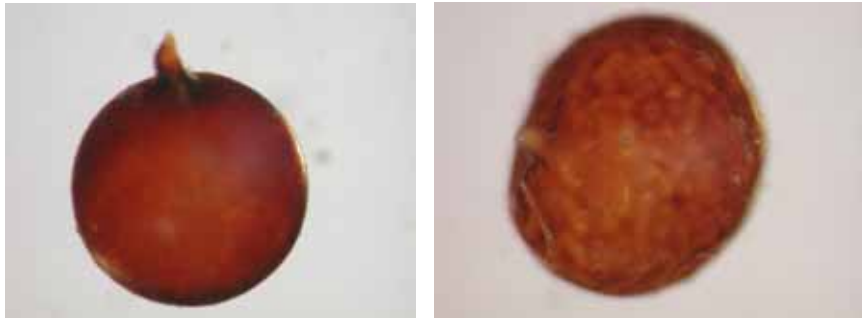
Adult Golden Nematode Males

Adult golden nematode males are worm-like. They separate from the roots of the host-plant to search, find, and fertilize the female larvae.

Golden Nematode Cysts

A golden nematode cyst is the dead body of a female nematode. The cyst is a spheroid, brown, thick-walled structure, and small enough that several cysts will fit on a pinhead. The cyst gives considerable

protection for the eggs and larvae within. Each cyst can contain up to 500 eggs and larvae. The eggs inside these cysts can remain viable at least 20 years.



Photos by Zafar Handoo

FIGURE 2-1-2 Mature golden nematode cysts (right cyst shows larvae movement)

Plant Damage

Golden nematodes bore into the roots of host plants and feed on the plants' juices. This feeding **does not** cause immediate damage to the above-ground part of the infested plant, and consequently infestation often goes undetected for years.



Photo by Zafar Handoo

FIGURE 2-1-3 Mature female cysts on potato plant roots

Signs of Infestation

The first sign of infestation is usually poor plant growth in one or more areas of the potato, tomato, or eggplant field. Signs of infestation include wilting, stunted growth, poor root development, and early death of the plant. As golden nematode populations increase, poor plant growth areas enlarge and newly-damaged areas appear on plants in the field. Eventually, the entire field shows poor plant growth.



FIGURE 2-1-4 Field of potato plants showing first visible signs of golden nematode infestation

2

Golden Nematode
Program Manual

Procedures

Preparation, Sanitization, and Clean-up

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Introduction

The *Preparation, Sanitization, and Clean-up* section of the *Procedures* chapter provides information that will help personnel get ready to conduct a survey; procedures to follow during a survey; and instructions for proper cleaning and sanitizing of supplies, equipment, and vehicles after the survey is finished.

Soil Survey

Soil survey for golden nematode is conducted to determine whether or **not** the soil is infested. Survey for golden nematode is conducted in all potato production areas in New York State.

Exposed Land

Exposed land is land that meets any of the following criteria:

- ◆ Land that was infested and has been fumigated, resurveyed, and released from quarantine regulation prior to 1972¹
- ◆ Land operated by a farmer who has farmed infested land
- ◆ Land farmed with equipment used in a field with a history of infestation
- ◆ Land bordering a field with a history of infestation
- ◆ Land that receives direct drainage from a field with a history of infestation
- ◆ Land exposed as a result of a regulatory violation

Non-exposed Land

Non-exposed land and fields are those that have **never** had golden nematode infestation. Non-exposed fields are sampled and tested for golden nematode when the fields are planted with a susceptible variety or varieties of potatoes, tomatoes, or eggplant in a county or area that is regulated for golden nematode.

Where surveying all potato or tomato fields is **not** possible, the selection of fields to survey should be based on crop history. Select fields which have been planted to potatoes and/or tomatoes consecutively for the longest period of time.

¹ All land found infested from 1972 to the present is regulated by New York State Part 127, Golden Nematode Quarantine. Under New York State Law, this land is officially called regulated land.

There is little likelihood of finding nematode in fields planted to a host crop for less than three (3) consecutive years. If crop rotation is practiced on a field, then a longer period of time (more than 3 consecutive years) is required for the nematode to build up to a detectable level.

Soil Conditions

If the soil is too wet, then delay survey until the ground is dry.

EXAMPLE	If you can take a clump or handful of soil and squeeze the soil into a ball, then the soil is too wet to sample.
----------------	------------------------------------------------------------------------------------------------------------------

Survey Preparation

Review the survey process listed in [Figure 2-2-1](#), then continue to [Step 1: Confirm the Reason for the Survey Is Valid](#).

Survey Preparation
<ol style="list-style-type: none">1. Confirm the reason for conducting the survey is valid.2. Determine the type of survey to conduct.3. Prepare for the survey.4. Assemble the survey crew.5. Prepare at the survey site.
Conduct the Survey
Survey Site Clean Up
<ol style="list-style-type: none">1. Clean up and sanitize survey materials and equipment.2. Transport the samples to the laboratory.

FIGURE 2-2-1 Summary of the survey process

Step 1: Confirm the Reason for the Survey Is Valid

Any of the following conditions are valid for conducting a golden nematode survey:

- ◆ Farmer requests export certification for freedom from golden nematode (voluntary survey)
- ◆ Land exposure to possible golden nematode infestation (**mandatory** survey)
- ◆ Potato varieties susceptible to golden nematode have been planted and grown three (3) years or more, consecutively or in rotation (**mandatory** survey)
- ◆ Regulatory violation (i.e., someone moves equipment from an area that has golden nematode to an area that **does not** have golden nematode infestation (**mandatory** survey)
- ◆ Seed potato certification (i.e., grower needs to certify potatoes for export certification or interstate movement) (**mandatory** survey)

Confirm the reason to conduct the survey falls under a category listed above. Continue to [Step 2: Determine the Type of Survey to Conduct](#).

Step 2: Determine the Type of Survey to Conduct

Field soil sampling is used for detection and delimiting purposes. The pattern and number of samples to be taken will vary depending upon the likelihood of infestation, acreage involved, personnel available, and other factors.

The first-line supervisor or program manager will decide which type of survey to conduct based on the results of the initial survey or confirmation survey.

1. Prior to beginning the survey work, contact all growers involved in the survey to inquire and determine whether the growers have encountered any trouble spots in potato fields or tomato fields. (See *Plant Damage* on page 2-1-6.)
2. Visit the proposed survey site. If the soil is too wet, then **do not** conduct the survey until the soil is dry.
3. Obtain a GIS map of the site.

Survey Types

The survey types available are:

- ◆ Confirmation survey (see [page 2-3-10](#))
- ◆ Grader survey (see [page 2-3-9](#))
- ◆ Manual survey/systematic manual soil sampling (see [page 2-3-4](#))
 - ❖ 8-x-8 block method (see [page 2-3-5](#))
 - ❖ Simplified 8-x-8 block method (see [page 2-3-6](#))
 - ❖ Modified 8-x-8 (4-x-8) block method (see [page 2-3-6](#))
- ◆ Mechanical survey/wheel soil sampling (see [page 2-3-7](#))
- ◆ Nursery survey (see [page 2-3-9](#))
- ◆ Peripheral survey (see [page 2-3-10](#))
- ◆ Post crop survey (see [page 2-3-10](#))
- ◆ Post resistant variety treatment survey (see [page 2-3-11](#))
- ◆ Rested field survey (see [page 2-3-11](#))
- ◆ Selected area soil sampling (see [page 2-3-8](#))
- ◆ Symptom survey (see [page 2-3-12](#))
- ◆ Survey to release land from exposed status (see [page 2-3-12](#))
- ◆ Survey of seed potato production areas (see [page 2-3-2](#))
- ◆ Survey outside regulated areas (see [page 2-3-12](#))

Step 3: Prepare for the Survey



Depending on the size and quantity of fields to survey, the number of persons conducting a survey may be as few as one and as many as eight.

Duties will be adjusted accordingly.

Staff will follow the procedures listed below to prepare for the survey. Plant Health Safeguarding Specialists (PHSS) or PPQ Technicians may lead crews of temporary employees used for survey.

All survey personnel **must** be mindful that the land on which they work may have a re-entry period due to a recent pesticide application.

The Plant Health Safeguarding Specialist's (PHSS) responsibilities for the assigned area include the following:

PPQ Plant
Health
Safeguarding
Specialist
(PHSS)

1. Interview the farmer or grower to obtain information and complete the *Golden Nematode Survey Data* worksheet prior to the survey (see the example on [page A-1-9](#)).
2. Contact the property owner and ask if there is a re-entry period in effect due to pesticide application.
3. Use the data from the each *Golden Nematode Survey Data* worksheet to compile a master document for review.
4. Set up the survey.
5. Complete as much information as possible in advance on *PPQ Form 312, Golden Nematode Survey* (see the example on [page A-1-12](#)).
6. Obtain an aerial map of the field to be surveyed.
 - A. If available, use GIS software to obtain the map (i.e., ArcGIS orthorimagery, Google Maps, etc.). GIS maps are the highest quality and provide the greatest detail. (See Google maps at <http://www.google.maps.satellite>.)
 - B. If GIS maps are **not** available, then use an aerial photographic map or topographic map.
 - C. If none of the maps above are available, then substitute good hand-drawn maps with clear details (road names, landmarks, etc.).
7. Place the map on the back of *PPQ Form 312, Golden Nematode Survey*. Take a GPS reading at the entrance point of the field and enter the latitude and longitude on the form. Mark North on the map.
8. Coordinate all survey and regulatory responsibilities in the assigned area of coverage.

9. Oversee PPQ Technicians and temporary personnel (hired to conduct the survey sampling).
10. Oversee the survey.
11. Check the weather status and determine if conditions are acceptable to conduct the survey.
 - A. If raining, then **do not** conduct the survey.
 - B. If soil is too wet, then **do not** conduct the survey.
 - C. If the survey will **not** be conducted due to weather conditions, then notify the crew leader and the survey crew.
12. Review the completed *PPQ Form 312, Golden Nematode Survey* at end of each day.
13. File the completed PPQ Form 312 in the appropriate county *Record of Infestation Folder*. The form will remain in the folder while the sample bags are drying in the rack room.

PPQ Technician Responsibilities

The PPQ Technician's responsibilities may include the following:

1. Obtain the maps from the PPQ-PHSS or prepare maps for the next day's sampling.
2. Assemble the survey crew.
3. Perform the crew leader duties.
4. Assist the PHSS.

Crew Leader Responsibilities

The crew leader's (PPQ-PHSS, PPQ Technician, or temporary personnel) responsibilities include the following, which are to be conducted before departing the USDA facility each day:

1. If raining, then check with the PPQ-PHSS to determine whether or **not** the survey will be conducted.
2. Gather supplies (steno notebook and pencil to sketch field) and make sure there are enough boots in the vehicle for each crew member. If supplies have already been gathered (at the end of the previous workday), then verify everything is in the survey vehicle. Place fresh drinking water in the thermos the morning of survey.
3. Determine how many fields to survey for the day.
4. Identify on the map, which field(s) to survey.
5. Review and identify the field(s) to survey on the map(s).
6. Supervise the initial stocking of supplies (including boots for the crew) in the transport vehicle.
7. Distribute the markers and the sample bags for the crew members to number on the way to the site (see *Sample Bag Labeling* on page 2-2-15).

Golden Nematode Survey Binder Contents

- ◆ Crew guidelines
- ◆ Expense log
- ◆ *Golden Nematode Quarantines Map* and list of regulated articles that require a certificate or permit year-round
- ◆ Fact sheet: *Golden Nematode A Pest of Importance*
- ◆ Flyer: *Reduce Your Risk of Tractor Overturn*
- ◆ Flyer: *What You Need to Know About Preventing Plant Poisoning*
- ◆ Important phone numbers list
- ◆ Local hospital's Poison and Drug Information Center phone number (taped to the inside binder)
- ◆ Paper, blank sheets (5)
- ◆ *PPQ Form 312, Golden Nematode Survey* (3)
- ◆ *PPQ Form 333, Cyst Nematode Field Survey Log* (3)
- ◆ Reminders
- ◆ Safety procedures from the Avoca Work Unit Safety & Health Office
- ◆ Tractor operator guidelines

FIGURE 2-2-2 Items to include in field copy of Golden Nematode Survey binder

Step 4: Assemble the Survey Crew

A typical field crew for a manual survey is 3 people, but the number of crew members may vary from 1 to 7 people, depending on the size and number of fields to sample, and the survey type.

Crew Leader Responsibilities

Plant Health Safety Specialists (PHSS) or technicians may lead crews of temporary employees. The crew leader will assemble the survey crew.

Survey Crew Responsibilities

Prior to and on the way to the survey site, the survey crew's responsibilities include the following:

1. In the event of bad weather, the GN Survey Crew should call the officer-in-charge of their area before coming to work. If the officer-in-charge **cannot** be reached, then call the Avoca office.
2. Use a vehicle which can be washed, cleaned, and sanitized. A work-type van with **no** carpeting or a covered-bed pickup truck is preferred. If a vehicle with carpeting **must** be used, then place plastic sheathing over the seat back and on the carpeted area where the samples will be loaded.
3. Prepare the truck or van for the trip to sample site.
 - A. Gather the supplies.
 - B. Confirm the bags, equipment, and tools are clean.
 - C. Arrange the supplies in the rear of a covered-bed pickup truck or van in an organized manner, so that items can be easily removed from the vehicle.
 - D. Leave space toward the rear of the vehicle so that paper sample bags can be stacked side-to-side.
4. Review the survey maps.
5. Help label the paper sample bags on the way to the survey site (see [Sample Bag Labeling](#) on page 2-2-15).
6. Help clean and restock the survey van or truck with supplies for the next day's work.

Tractor Operator Responsibilities

Mechanical surveys are conducted by tractor operators. The tractor operator's responsibilities include the following:

1. Review the survey map with the PPQ-PHSS or PPQ Technician, and discuss the survey conditions and where to park.
2. Know daily where you are going to sample and post the sampling location on the schedule board.
3. Make sure daily you have all equipment and supplies for daily operation. Ensure that tools are **not** misplaced during the workday.
 - A. Check the tool box assigned to your tractor each morning before departing for the sampling location.
 - B. Check the tool box assigned to your tractor with your supervisor at the end of the day.
 - C. Remove the tool box and tools from your tractor, and store in the tractor shed as directed. **Do not** leave tools on the tractor overnight.
 - D. When samples are taken to the rack room, make sure the [Sample Storage Worksheet \(Rack Sheet\)](#) are filled out.
4. Follow the tractor operation and maintenance guidelines. As a tractor operator, you are responsible for the safe operation and routine maintenance of the equipment assigned to you.
 - A. First day of each week:
 - i. Check the oil level; and if needed, add oil.
 - ii. Check the transmission fluid; and if needed, add fluid.
 - iii. If applicable, check the battery fluid level.
 - B. Daily:
 - i. Check the oil level; and fill as needed.
 - ii. Check the gas level; and add gas while the gas tank is cold and the engine is off.
 - iii. Check the trailer tires, tie-downs, and lights; and secure the safety chain to be sure all are in working order.
5. Operate the tractor safely.
 - A. Keep the tractor at a speed low enough to prevent bouncing.
 - B. **Do not** attempt sharp turns at a high speed.
 - C. When driving the tractor on a highway, lock the brakes together.
 - D. Use the flashers and the lights when on roads and highways.
 - E. Use farm roads to enter and leave the fields.

- F. If operating the tractor in the field, then unlock the brakes.
 - G. Raise the equipment before turning at the field ends.
 - H. Make end turns slow and brake-assisted, but **not** locked.
6. Carry *PPQ Form 312, Cyst Nematode Survey*, with you. Have the form completed when the collection is done; and give the form to your supervisor.
 7. The tractor **must** be washed before moving between divided and/or different growers' fields. Open the tractor's battery box; clean the battery box and the extra punches.
 8. Clean and secure the tractor at the end of each work day.
 9. **Do not smoke** in vehicles or government buildings; smoking is **not** allowed.
 10. Obtain the supervisor's approval before having lunch in restaurants or dinners during the work day.

Step 5: Prepare at the Survey Site

In addition to the procedures listed under [Survey](#) on page 2-3-1, follow the steps listed below at the survey site.

Crew Leader Responsibilities

At the sampling site, the crew leader will do as follows:

1. Park the vehicle on a hard-surface road. **Do not** park in the field or on the field roads. Place one (1) orange traffic cone in front of the vehicle and one (1) traffic cone at the rear of the vehicle.
2. Put rubber boots or Tyvek® boot covers on before entering the field, and make sure the crew members have their boots on, too.
3. Walk to the field entrance point, take a GPS reading, and record NW on PPQ Form 312.
4. Use your judgment to determine which end of the field to start sampling.
5. If conducting a manual survey, then take the mesh duffle bags, mesh backpacks, trowels, and paper sample bags with you to the field. You will use the mesh bags to collect and hold the filled paper sample bags.
6. If conducting a mechanical survey, then have the tractor operator remove the sample bags from the bag holders, fold and staple each bag, and place the bags in the bag basket.
7. Use the notebook to sketch an outline of the field, the location of each sample, and any landmarks (fences, mailboxes, road names, etc.).
8. Conduct and/or assist with the sampling.
9. Make sure all crew members keep their boots on until sampling is finished.
10. When the field sampling is complete, carefully place all samples into the mesh duffle bags and/or mesh backpacks and carry them to the vehicle.
11. Remove the soil sample bags from the mesh duffle bags and/or backpacks; staple each sample bag closed; and stack the sample bags in consecutive order in the transport vehicle.

Manual Survey Crew Responsibilities

At the survey site, the manual survey field crew will do as follows:

1. Put boots on before entering the survey field.
2. Start sampling where directed by the crew leader.
3. Place the filled sample bags in the mesh duffle bags located at the end of the sample row.
4. After finished sampling, be sure to keep your boots on and walk to the vehicle.

5. Remove the sample bags from the mesh duffle bags, and staple each sample bag closed.
6. If a carpeted van or other carpeted vehicle is being used as the transport vehicle, then make sure plastic is placed over the carpet before loading the sample bags into the vehicle.
7. Load and stack the sample bags in consecutive order in the transport vehicle.

Mechanical Survey Tractor Operator Responsibilities

The tractor operator will do as follows to prepare at the survey site:

1. Review the survey map with the PPQ Technician; and discuss the survey conditions and where to park.
2. Operate the tractor in a safe manner.
3. Unload the tractor from the transport trailer.
4. Wear boots (**must**) while in the survey fields; and wash the boots at the same time as the tractor.
5. Place the prenumbered paper sample bags in the bag holders on the mechanical sampling equipment.
6. Watch the sample bags so that each bag is **no** more than one-third to one-half full.
7. Stop the tractor; remove each bag; and fold and staple the top. Place the filled bags in the bag basket, and safeguard the sample bags.
8. Place new sample bags in the sample bag collection holder.
9. Complete *PPQ Form 312, Cyst Nematode Survey*. Give the completed form to the PHSS or PPQ technician at the end of each day.

Special Preparations for Seed Potato Field Survey

Before entering and sampling seed potato lands, personnel **must** put on rubber boots or Tyvek® boot covers; tuck trouser or pant legs inside the boots; and keep them tucked in while samples are being collected. Special sanitary procedures also apply. See [Cleaning and Sanitizing for Survey of Seed Potato Fields](#) on page 2-2-19

Survey Equipment and Materials

Equipment

The following equipment is needed to conduct mechanical surveys:

- ◆ Low pressure pump
- ◆ Pick-up truck
- ◆ Tank of water
- ◆ Tractor (for mechanical survey)
 - ❖ Two-wheel sampling equipment (use on non-exposed field that has **no** previous golden nematode infestation)
 - ❖ Three-wheel sampling equipment (use on exposed field)
- ◆ Trailer (for mechanical survey to attach to a tractor with a mechanical sampler and samples; and pulled by a pressure-washing, cleaning-equipment truck)
- ◆ Truck (preferred) or van **without** carpet

Materials

Materials needed for the manual survey and the mechanical survey are listed below:

- ◆ Boots, rubber or Tyvek® (1 pair for each crew member and a few spare pairs)
- ◆ Brushes, stiff bristle
- ◆ Clipboard
- ◆ First Aid kit
- ◆ Hypochlorite, 5.25 percent (bleach)
- ◆ Maps
- ◆ Mesh backpacks
- ◆ Mesh duffel bags
- ◆ Orange safety vests
- ◆ Paper bags, heavy duty
- ◆ Permanent markers (red, green, and black ink)
- ◆ Plastic tubs (3) (for cleaning and sanitizing boots and trowels)
- ◆ *PPQ Form 312, Golden Nematode Survey*
- ◆ Raincoats (for use while cleaning equipment or steam cleaning)
- ◆ Rubber gloves, lined (3-7 pair)
- ◆ Safety cones

- ◆ Sponges
- ◆ Stapler, heavy duty
- ◆ Traffic cones (2 for manual survey)
- ◆ Trowels (long-handled)
- ◆ Water containers, 5-gallon, filled with clean drinking water

See the survey materials in [Figure 2-2-3](#).



Photo by Dan Kepich

FIGURE 2-2-3 Survey Supplies in Van

Sample Bag Labeling

Regardless of the type of sampling followed, all paper sample bags used **must** be properly labeled and accurate records prepared and maintained.

Label each paper sample bag with the following information, starting just below the top fold of the bag:

1. Use the designated permanent marker color:
 - ❖ Red ink: Ro2 samples; post-treatment samples
 - ❖ Green ink: certified seed potato land samples
 - ❖ Black ink: all other samples

2. Print the crew leader's initials, consecutive collection number, and year on the first line in the center of the sample bag. The crew leader **must**:

- ❖ Exercise caution so that numbers are **not** duplicated
- ❖ Continue with consecutive numbering through the same calendar year (even when moving the sampling to another township, county, or State)
- ❖ **Do not** start new numbering until the beginning of the next calendar year

EXAMPLE	JJD-1-07 (for John J. Doe, collection 1, in 2007)
----------------	------------------------------------------------------

3. Print the field number on the second line.
4. Print the date (month, day, and year) in the lower right-hand corner, **only** on the first (START) and last (END) paper sample bags for each collection.
5. Begin with 1 for the first sample bag, and then consecutively number each sample bag in the collection (each sample bag has a separate number) in the lower left-hand corner and circle the number, Write "END" above the last sample bag number in the collection.

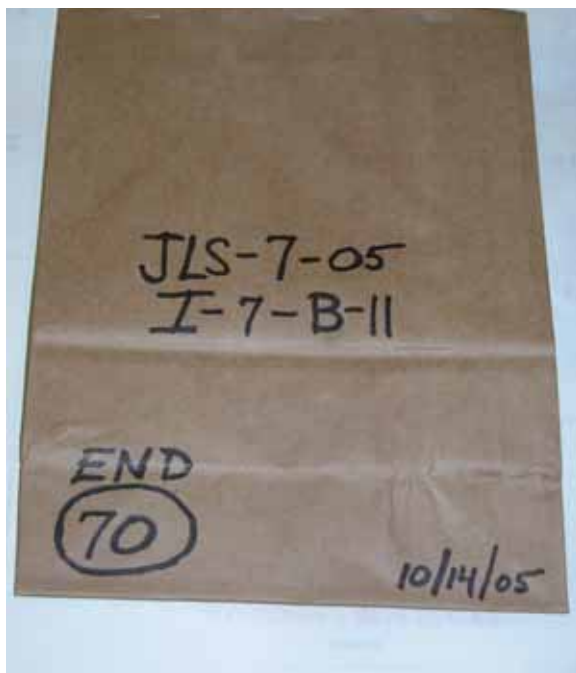


FIGURE 2-2-4 Example of survey sample bag labeling

Survey Site Clean-up

After the survey is finished for each collection, then the crew leader, survey crew, and tractor operator will clean-up and sanitize at the survey site.

Crew Leader Responsibilities

After the survey is finished, then the crew leader will make sure the supplies and equipment are cleaned and sanitized as follows:

1. Set up three wash tubs for cleaning and sanitizing boots, mesh duffle bags, and trowels.
 - A. Prepare a bleach solution (1 part 5.25% bleach (hypochlorite) to 10 parts of water) in one wash tub to use for sanitizing.
 - B. Add clear water in the other two tubs to use for cleaning and rinsing before sanitizing.
2. Remove your boots and have each person remove their boots at the vehicle, and then have each person clean their boots. See [Cleaning and Sanitizing Materials and Supplies](#) on page 2-2-20.
3. **Do not** allow anyone to re-enter the field after their boots have been removed.
4. Clean and sanitize survey tractors and pickup trucks at the survey site. See [Cleaning Vehicles](#) on page 2-2-18.
5. If a van is used to transport samples, then stop at a car wash to wash the van on the way back to the Work Unit laboratory from the survey site.

Manual Survey Crew Responsibilities

After completing a manual survey, the field crew will do as follows:

1. Clean the boots, trowels, mesh duffle bags and backpacks with the bleach solution. (See [Cleaning and Sanitizing Materials and Supplies](#).)
2. Confirm the boots, trowels and mesh bags have been thoroughly cleaned with the bleach solution before placing the trowels and boots in a clean container in the transport vehicle.
3. Empty and rinse the buckets, containers, and brushes; and then clean and sanitize them with the bleach solution.



Empty the wash water onto the same side of the road as the field that was surveyed, so that the wash water will drain back into the survey area.

4. Place the sanitized buckets, containers, and brushes back into the transport vehicle.

5. At the end of the survey sampling day, transport the sample bags to the Work Unit rack room.

Mechanical Survey Tractor Operator Responsibilities

The tractor operator will clean-up at the survey site as follows:

1. Clean and sanitize the tractor and trailer (see [Cleaning and Sanitizing Equipment](#) on page 2-2-20).
2. Clean the boots with the sanitizing solution.
3. Load the tractor onto the transport trailer.

Continue to [Sanitization](#) for detailed instructions.

Sanitization

Particular care **must** be taken when working in golden nematode infested fields. Each person and piece of equipment involved in the golden nematode quarantine program activities is a potential carrier of golden nematode. Every reasonable precaution **must** be taken to prevent the spread of golden nematode by program personnel and equipment.

Cleaning Vehicles

Vehicles (cars, trucks, trailers, etc.) should remain on hard-surface roads. When driving vehicles on field roads is necessary, a mobile pressure washer **must** be available to thoroughly clean the vehicle before leaving the survey site. Tractors used on survey fields for a mechanical survey **must** also be thoroughly sanitized before leaving the survey site.

Follow the steps below:

1. Remove all soil from the vehicles and equipment. Use power washing equipment to remove soil from the vehicles.
2. If driving on field roads is necessary, then a mobile pressure washer **must** be available and used to thoroughly clean the vehicles and equipment with hot water under pressure before leaving the survey site.
3. If the survey is of seed potato production areas, then additional sanitary procedures are required. See [Cleaning and Sanitizing for Survey of Seed Potato Fields](#) on page 2-2-19.



No vehicles or mechanical soil sampling equipment can be used or enter seed potato production land. **No** equipment for golden nematode survey that has been used on infested or exposed land can be used on seed potato production land.

Cleaning Clothing, Equipment, and Supplies During Survey of Commercial Potato Fields

On surveys of commercial potato fields, special cleaning **must** be completed as follows before leaving one field and entering the next field:

1. Each crew member **must** use a stiff bristle brush to clean all soil from their trousers, shoes, and materials.
2. Thoroughly clean the trowels used for sample collection. Trowels **must** be free of recesses or grooves where soil may become impacted.
3. Before leaving the survey property, clean mechanical sampling equipment with hot water under pressure, using a single orifice nozzle to remove all soil from the equipment. (See [Cleaning and Sanitizing Equipment](#) on page 2-2-20.)

Cleaning and Sanitizing for Survey of Seed Potato Fields

Personnel conducting survey on seed potato lands **must** take extra sanitary precautions before entering, moving from one field to the next, and exiting survey fields.

When the seed potato field survey is complete, clean your boots, materials, and tools with a stiff bristle brush to remove all soil. Sanitize boots, materials, and tools by scrubbing with a solution of 1 part 5.25 percent hypochlorite to 10 parts water before leaving one field and continuing in another field.



Photo by Dan Kepich

FIGURE 2-2-5 Sanitizing Manual Survey Equipment

Cleaning and Sanitizing for Confirmatory and Other Surveys

Sanitary procedures outlined for seed potato fields will be followed while conducting confirmatory surveys and at any other time the inspector deems appropriate.

All confirmatory surveys conducted will be accomplished by manual survey procedures. (These procedures are the same as used for seed potato fields.)

Personnel sampling confirmatory surveys will be provided with rubber or Tyvek® boots. Tuck trouser legs or pant legs inside your boots before entering the sampling field, and keep tucked in while samples are being collected.

Cleaning and Sanitizing Materials and Supplies

Crew Leader

After the survey is finished, set up a cleaning site that is near the sampling site and slopes downward. Follow the steps below:

1. Set up 3 stations for sanitizing supplies. Prepare a solution of 1 part 5.25 percent hypochlorite (bleach) to 10 parts water in tubs.
2. Remove your boots and have the crew remove their boots at the vehicle. **Do not** re-enter the field after boots have been removed.
3. Use a stiff bristle brush to remove the loose soil from boots, trowels, and mesh duffle bags.
4. Clean and sanitize boots, trowels, and mesh duffle bags using the bleach solution and brush.
5. Empty the used cleaning solution to drain back into the field.
6. Use a whisk broom to remove any loose soil from the vehicle.
7. Place the supplies in the vehicle.

Cleaning and Sanitizing Equipment

A concrete pad, blacktop area, or driveway is the ideal location for cleaning equipment; otherwise, a gravel area or a grassy area right next to the field sampled can be used. The location of the cleaning site **must** be sloping downward so that the runoff will drain back into the field sampled. See [Figure 2-2-6 on page 2-21](#).



Photo by Dan Kepich

FIGURE 2-2-6 Sloped, concrete and gravel pad for equipment cleaning

To clean and sanitize equipment, follow the instructions below:

1. Move the equipment to the cleaning site.
2. Hook up the low pressure pump (small pump) to the water tank/
Use the low pressure pump to get most of the soil off the equipment.
3. Use the high pressure washer to finish cleaning the equipment.

Always clean the equipment under the following conditions:

- ◆ After a survey or after entering regulated land
- ◆ Under the terms of a compliance agreement
- ◆ Upon request from a farmer or landowner to clean the equipment
- ◆ When anyone enters, uses equipment, and plans to exit golden nematode-regulated land

NOTICE

Equipment **must** be cleaned before moving from field-to-field or when on an existing infested field and moving back onto the road.

- ◆ When well-drilling equipment has entered and plans to exit golden-nematode regulated land
- ◆ When a grower/farmer contacts the USDA about the sale of equipment used on golden-nematode regulated land
- ◆ When custom farming equipment is used on regulated land (equipment is moved from farm-to-farm, such as fertilizer applicators, lime applicators, combines, etc.)

- ◆ When drainage ditch digging equipment is used on regulated land (drainage ditches dug on GN infested land)



Vehicles, trucks, and all other farm equipment **must** be steam cleaned before being sold or removed from any golden nematode infested farm.

Pressure Washing Treatment

Use a pressure washer to clean tractors, tractor equipment, farm implements, cultivators, and pickup trucks first. Then clean hoses, boots, raincoats, and anything else that could potentially move golden nematode cysts from a regulated field to a non-regulated field.



Photo by Dan Kepich

FIGURE 2-2-7 Pressure washing with a single orifice nozzle



Photo by Dan Kepich

FIGURE 2-2-8 Pressure washing equipment and supplies

Steam Heat Treatment

Steam at a temperature of 212°F will destroy, in a short period of exposure, most pathogenic microorganisms of the common vegetative forms or the spore types when in the growing or vegetative state.

Steam Jet Method

The steam jet method can be used for sterilizing equipment, since this method takes advantage of the considerable latent heat liberated when steam condenses into water. If the necessary degree of heat is generated in all parts of the material, then the steam jet method is effective for quarantine purposes.

Live steam from a jet or nozzle is forced into or through a more or less loose and open mass of material in such amount and for such period required to raise the temperature of all parts of the mass to approximately 212°F.

See the *PPQ Treatment Manual* for more information about steam heat treatment at http://www.aphis.usda.gov/import_export/plants/manuals/ports/treatment.shtml.

Work Unit Clean-up

After the samples have been placed in the Work Unit rack room, then finish clean-up and sanitization of vehicles and prepare for the next survey day.

Crew Leader Responsibilities

After the samples are unloaded and placed in the Work Unit rack room, the crew leader will do as follows:

1. Supervise cleaning and sanitizing the survey transport vehicle used during the day.
2. Supervise or assist the restocking of supplies in the transport vehicle.
3. Make a copy of the day's completed *PPQ Form 312, Golden Nematode Survey*.
4. Give the completed PPQ Form 312 to the PHSS or PPQ technician at the end of each day. (The technician will give the form to the PHSS to review and make sure all blocks are completed. The PHSS will give the form to the laboratory leader at end of each day.)
5. Obtain the next day's maps from the PPQ technician.
6. Make sure the vehicle is clean and has been washed at a car wash to remove soil from the undercarriage.

Survey Crew Responsibilities

After unloading the samples from the vehicle and placing them in the Work Unit rack room, the survey crew will do as follows:

1. Sweep the rack room floor.
2. Clean and sanitize inside the vehicle(s). Thoroughly vacuum any carpeting in the vehicle to prevent soil contamination.
3. Prepare the transport vehicle for the next day's use.

2

Golden Nematode
Program Manual

Procedures

Survey

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Introduction

The *Survey* section of the *Procedures* chapter provides procedures for conducting systematic soil surveys, labeling samples, and sanitizing soil sampling equipment. Survey procedures apply to both golden nematode (GN) Race 1 (Ro1) and GN Race 2 (Ro2).

Surveys in New York State

The general guidelines listed in this section apply to **all** survey regions in the State of New York. All surveys will be conducted in accordance with this manual.

Routine soil surveys will **not** be conducted on land with less than a three-year potato history (potatoes planted three consecutive years) or on land with whole-field plantings of golden nematode-resistant potato varieties.

Exposed fields will be surveyed at a low level of detection (200,000 cysts-per-acre). Program personnel determine the intensity of the survey and the area of implementation.

Nonexposed fields will be surveyed either mechanically or manually. Mechanical surveys on nonexposed fields will be conducted at the 500,000 cysts-per-acre level. Manual surveys on nonexposed fields will be conducted using the 4 x 8 block method, which gives a detection level of 500,000 cysts-per-acre.

Do not routinely survey formerly-infested regulated fields that are planted in accordance with New York State regulatory requirements unless the prescribed crop rotation is violated.

Survey of Seed Potato Production Areas

All land in New York State that is used for the production of certified seed potatoes is to be surveyed annually to ensure freedom from golden nematode.

All seed land is to be surveyed following each crop of golden nematode susceptible potatoes.

Special sanitary procedures apply when conducting a seed potato production area survey. See [Cleaning and Sanitizing for Survey of Seed Potato Fields](#) on page 2-2-19 and [Special Preparations for Seed Potato Field Survey](#) on page 2-2-13.

Soil Surveys

Soil surveys are conducted using either manual or mechanical samplers. Prior to beginning the soil survey work, contact all growers involved in the survey and determine whether the growers have encountered any trouble spots in potato fields or tomato fields. See [Plant Damage](#) on page 2-1-6.

Field soil sampling is used for detection and delimiting purposes. The pattern and number of samples to be taken will vary depending upon the likelihood of infestation, the acreage involved, the personnel available, and other factors.

If surveying all potato or tomato fields is **not** possible, then selection should be based on crop history. Fields which have been planted to potatoes and/or tomatoes consecutively for the longest period of time should be selected first. There is little likelihood of finding nematode in fields planted to a host crop for less than three (3) consecutive years. If crop rotation is practiced on a field, then a longer period of time is required for the nematode to build up to a detectable level.

Survey of Commercial Potato Fields

Special sanitary procedures apply when conducting a survey of commercial potato fields. See [Cleaning Clothing, Equipment, and Supplies During Survey of Commercial Potato Fields](#) on page 2-2-19.

Sanitization

Every reasonable precaution **must** be taken to prevent the spread of golden nematode by program personnel or equipment. Particular care **must** be taken when working in golden nematode infested fields. Each person and piece of equipment involved in program activities of the golden nematode quarantine is a potential carrier of this pest. This includes equipment and materials entering any golden nematode infested field or land (such as gas or electric company trucks and equipment, telephone company trucks and equipment, cable company, etc.). In addition, vehicles, trucks, and all other farm equipment **must** be steam cleaned before being sold or removed from any golden nematode infested farm.

See [Sanitization](#) on page 2-2-18 for detailed instructions and requirements for cleaning clothing, boots, equipment, supplies, and vehicles before, during, and after conducting a survey.

Systematic Manual Soil Sampling

Upon arrival at the premises to be surveyed by systematic manual soil sampling, the inspector should do as follows:

1. Look over the land.
2. Determine the boundaries and the size and shape of the field.
3. Look at the field and determine the width and length.
4. Plan how the property should be surveyed.
5. Divide the property into a grid and record the grid on the field map or in the notebook.
6. Sample the field following the map grid pattern.
 - A. Completing sampling in a uniform method should provide the correct soil sample size for processing at the laboratory.
 - B. If golden nematode infestation is found, then returning to a specific block within the grid should be easier.



Photo by Stephen Kubber

FIGURE 2-3-1 Manual soil sampling

Continue with the instructions on the following pages for the specific survey type.

8-x-8 (8 x 8) Block Method

In the manual survey 8 x 8 block method, fields are divided into units of approximately 2,080 square meters (half an acre), usually 16-x-224 paces (1 pace = 2-1/2 feet long). The 8-x-8 block sampling method has 56 sample points. The soil sample bags should each contain 56 scoops of soil and weigh between 4 and 6 pounds.

1. Divide the field into units.
2. Determine the number of bags needed in the first tier (length of an edge of the field in a straight line), as follows
 - A. Pace the length of the field.
 - B. Divide the number of paces by 224 to get the number of sample bags required for each tier. If the remainder is over 80 paces, then add an additional bag to the tier.
 - C. Place the sample bags for the first tier, then take 16 paces and place the sample bags for the second tier, and continue pacing and placing bags for each consecutive tier.
 - D. If the last tier is less than 16 paces wide, then each soil sample bag for this tier will cover an area approximating the square area covered by the standard bags in the other tiers.
3. For the initial survey, sample each area in the grid pattern by collecting one scoop (or dip) of soil every eight paces and placing the soil in the sample bag.
4. For more intensive surveys, take one scoop or dip of soil at 4 x 8, 4-x-4, or 2-x-2 pace intervals.



Photo by Stephen Kubber

FIGURE 2-3-2 Sampling using the 4 x 8 sampling method

Simplified 8-x-8 Block Sampling Method

The simplified 8-x-8 sampling may also be used. Instead of dividing the survey field into blocks, distribute the collection bags along the edge of the field at intervals in multiples of 8 paces, so that each will cover as close to a half-acre as possible.

EXAMPLE For a field approximately 450 paces long, pacing the length of the field one time (one trip) and taking a soil sample (one scoop each 8 paces) yields one sample (8 paces per scoop = 56 scoops per sample).

The advantages of the simplified 8-x-8 Block Sampling Method are: (1) carrying the extra weight of several soil samples while completing the last is **not** necessary; and (2) indicating the location of the samples is simpler (show where the first and last samples were taken and the width between sample lines).

Modified 8-x-8 (4-x-8) Block Sampling Method

The modified block sampling method (4 x 8) is a variation of the standard 8-x-8 grid pattern. This modified method increases the sensitivity of the survey by doubling the number of sample points, and **does not** generate any additional samples per acre. Using the modified 8-x-8 (4-x-8) block sampling method, a complete sample will consist of 112 sample points.

The general procedure for the 4-x-8 modified sampling method is the same as the standard 8-x-8, **except** a sample is collected every 4 paces instead of every 8 paces.

Follow the steps below:

1. Divide the field into units.
2. Determine the number of bags needed in the first tier (length of an edge of the field in a straight line).
 - A. Pace the length of the field.
 - B. Divide the number of paces by 224. This gives you the number of sample bags required for each tier. If the remainder is over 16 paces, then add an additional bag to the tier.
 - C. Place the sample bags for the first tier, then take 16 paces and place the sample bags for the second tier, and continue pacing and placing bags for each consecutive tier.
 - D. If the last tier is less than 16 paces wide, then each soil sample bag for this tier will cover an area approximating the square area covered by the standard bags in the other tiers.

3. Collect one scoop every 4 paces and place the soil in the sample bag. Continue to maintain the 8-pace interval between sample lines (tiers).

Mechanical (Wheel) Soil Sampling

A tractor-mounted machine is available for collecting soil samples at predetermined intervals. The tractor's operating speed is determined by field conditions for both safe tractor operation and optimum sample collection.

Mechanical (wheel) soil sampling is taken by a tractor-mounted machine that has either two or three rotating wheels with probes which penetrate the ground to a maximum depth of 4 inches. The probes are removable, and the number of probes installed determines the spacing between soil sample points. The available selection for installation is 10, 20, 40, and 80 inches between points, with 8, 4, 2, and 1 probe, respectively, per wheel. Approximately one gram of soil is collected at each point and deposited into a premarked paper bag. Swath direction should be parallel to normal tillage, planting, and harvest operations. See [Figure 2-3-3](#) below.



Photo by Dan Kepich

FIGURE 2-3-3 Three-wheeled mechanical sampler

All mechanical equipment and probes **must** be cleaned prior to removal from the field and before entering the next field. (See [Sanitization](#) on page 2-3-3.)

Mechanical survey equipment which has been used on infested or exposed land **must never** be used on seed potato production land.

Figure 2-3-4 contains a selection guide for collecting samples by machine.

Cysts per Acre ¹	Number of Chisels/Wheels	Swath Width (in square feet)	Area per Sample Point	Pounds of Soil Per Acre ²
50,000	8	1.15	1.25	74.9
100,000	8	3	2.50	37.4
200,000	4	3	5	18.7
300,000	4	4.5	7.5	12.5
400,000	4	6	10	9.3
500,000	4	7.5	12.5	7.4
1,000,000	2	7.5	5	3.75

FIGURE 2-3-4 Selection guide for collecting soil samples by machine

- 1 Detection level based on sampling from top 4 inches, with vertical homogeneity of cysts assumed within the plow layer. Soil density assumed to be 86.09 lb. per square foot. Detection probability is 95 percent as determined by the Poisson approximation.
- 2 Based on one gram of soil per sample point.

Selected Area Soil Sampling

For areas where large acreage is involved and which are distant from known infestations, the preferred method may be sampling using a selected pattern.

With the selected area soil sampling method, samples are collected from the spots most likely to be infested, as follows:

- ◆ Dumping areas for debris from graders or storage debris
- ◆ Edges where equipment is turned during cultivation and plowing
- ◆ Entrances and exits
- ◆ Low spots

Take samples in strips at intervals which are perpendicular to the direction of cultivation. The number of soil samples taken per field will depend upon the size of the field, likelihood of infestation, program objectives, and other factors.

Grader Survey

The grader survey offers a low-cost survey method that can be used where limited resources will **not** permit a more intensive survey. Timing and frequency of soil collection depend on harvest activity, program resources, and survey objectives.



A grader survey is **not** recommended for essential early detection or delimiting purposes.

With the grader survey, collect standard size soil samples at regular intervals during the harvest season, from soil which accumulates as potatoes are being unloaded from harvest trucks at soil facilities.

Nursery Survey

Collecting soil samples using a nursery survey may present unique problems, especially with cold frames, greenhouses, nurseries, and plant beds.

Follow the instructions below:

1. Divide the nursery into a grid pattern either according to type of stock grown or according to the natural boundaries, such as roads and walkways. (See nursery survey grid example in [Figure A-1-7 on page A-15.](#))
2. Record the sampling grid on the map.
3. Collect the soil samples; and mark the each sample's origin on the sample's bag.
4. If collecting samples from piles of potting soil, then take a sample from each pile and mark the location of each sample's origin on the sample bag.

Peripheral Survey

Analysis of survey records (from previous surveys) indicates that over 90 percent of all known infestations have been recovered from a peripheral area of a field that would be encompassed within 64 paces (160 feet) from each side, and 224 paces (560 feet) from each end of the field.

If the central core of the field contains a low spot that receives drainage from other parts of the field, then the central core is tested.

If the central core of the field **does not** contain a low spot that receives drainage, then this core is **not** tested.

Survey Times and Types

Confirmation Survey

Confirm initial findings of infestation by a second (confirmation) survey of the property involved. This precaution is taken to preclude improper classification of properties.



The collection of additional samples (confirmation survey) is particularly important in the case of a positive find (golden nematode infestation) in a new county or State.

If multiple golden nematode cysts are recovered with a **minimum** of one viable cyst in two or more locations in areas of known infestation (such as Long Island, Livingston, Orleans, Seneca, Steuben, and Wayne counties in New York), then the confirmation survey may be omitted. However, the decision regarding the need for additional soil sampling will be left to the discretion of the appropriate Federal and State supervisory field personnel.

Where new county or new State records are involved, a confirmation survey is **mandatory**.

Preliminary identifications representing new county or State collections from Avoca, New York or Westhampton Beach, New York are confirmed by a nematologist in Beltsville, Maryland.

Post-crop Survey

The bulk of post-crop survey activities take place immediately after harvest to avoid interfering with normal post-harvest farming operations.

The principal sampling methods for post-crop survey are systematic manual soil sampling or mechanical (wheel) soil sampling.

Post Resistant-Variety Treatment Survey

With the post resistant-variety treatment survey, soil samples are taken from infested fields where two successive crop years of resistant varieties have been grown as the primary control treatment. Soil samples are collected following harvest of the second annual crop of resistant varieties after a field is found infested. This procedure is used as the primary control treatment.

Methods used for post resistant-variety treatment survey includes the manual survey or the mechanical (wheel) survey.

- ◆ Manual survey should be done using the 4-x-4 block method
- ◆ Mechanical (wheel) survey should be done at the 200,000 cyst per acre level

All cysts **must** be nonviable. If the post-resistant variety treatment survey is negative and the grower chooses to use crop rotation, then the field will be extensively surveyed again after the first-year susceptible crop varieties are grown.

If the tests confirm all cysts are nonviable after the extensive the follow-up survey and the approved crop rotation system is **not** violated, then further survey **does not** need to be conducted.



If there is any indication that approved cropping sequences are **not** being followed, then surveys should be resumed immediately.

Rested Field Survey

If requested by the farmer(s) and the land is to be removed from host-crop production during that year, then the land normally scheduled for fall survey (post-crop) in a particular year may be sampled in the spring of the same year.

Rested field survey methods include systematic manual soil sampling and mechanical (wheel sampling).

Survey to Release Land from Exposed Status



Exposed land is **not** eligible for a survey to release land from exposed status until both occur: 1) Five (5) years **after** the last viable infestation is known to have occurred on a particular grower's land; and (2) The required negative survey has been accomplished.

To establish eligibility for a survey to release land from exposed status, the exposed land **must** meet the following minimum criteria:

- ◆ Five years **must** have passed after the last viable infestation is known to have occurred on a particular grower's land. The five years are counted starting after the **required** negative survey has been accomplished; and
- ◆ Five host crops (potato) minimum **must** be planted on the exposed land before the survey can be considered.

The survey to release land from exposed status **must** be conducted at the 200,000 cyst per acre level or less, in the top 4 inches of soil, and **no** sooner than the fifth (5) host-crop year.

Surveys will be conducted after harvest to take advantage of soil mixing which occurs during harvesting operations. The survey method may be manual or mechanical (wheel). If a manual survey is used, then the 4-x-4 block method or 2-x-2 block method will give the desired level of detection. All surveys **must** be negative (negative survey).

Surveys for Surveillance

Surveys for surveillance purposes may be made prior to the fifth host-crop year.

Survey Outside Regulated Areas

Surveys may be conducted outside of golden nematode regulated areas, **except** in New York State where surveys are conducted in suspect areas. A biometrics survey of major growing areas may be made periodically.

Symptom Surveys

Symptom surveys are conducted in potato and tomato production areas throughout the United States.

Symptoms of golden nematode infestation include stunting, yellowing, and failing of crops (crop failure). Infestation symptoms occur in a spotty manner in the field. These spotty areas tend to elongate in the direction of cultivation due to the spread of golden nematode by machinery.

Surveys Outside of New York State

Conduct detection surveys on host cropland in designated golden nematode suspect areas outside the State of New York. If golden nematode infestation is found, then continue to follow the procedures in this manual.

Sample Collection Bag Transport



The integrity of the samples **must** be maintained at all times.

Sample Transport Vehicles

Each vehicle in which sample bags will be transported **must** be properly sanitized prior to placing sample bags in the vehicle. See [Cleaning Vehicles](#) on page 2-2-18.

Program vehicles for transporting samples **must** remain on the road, highway, or thoroughfare that is near, but **not** on the infested field property.

Seed Potato Soil Sample Transport Vehicle

Seed potato soil samples are **only** placed in vehicles¹ that have **never** been in infested areas or carried samples from infested areas.

If a program **does not** yet have a vehicle (van or truck) dedicated to seed potato soil sampling transport **only**, then another vehicle that has **never** been near an infested area may be used provided the interior and exterior has been completely sanitized with steam heat treatment. (See [Steam Treatment](#) on page 4-1-5.)

Loading Sample Collection Bags

The survey crew will place the soil samples into the program vehicles. Transport vehicles **must** remain off the survey property, and on the highway, road, or thoroughfare.

Load the sample bags into the transport vehicle (van or truck) as follows:

1. Place each sample bag in the vehicle in consecutive order (by bag number), either starting with the first bag (marked 1) and ending with the last bag (marked END), or reverse starting with the last bag (END) and ending with the first bag (1).

¹ Currently, one truck in Avoca is dedicated for seed sample collection transportation.

2. If there are sample bags from more than one collection, then keep each collection separate, and individually place the bags in consecutive order as stated above, on one side of the vehicle.
3. To prevent commingling of collections, either place a piece of cardboard or an empty space between the collections.
4. Transport the soil samples to the Work Unit in Avoca, New York for drying and examination.



Photo by Stephen Kubber

FIGURE 2-3-5 Single soil sample collection and supplies ready for transport to the Work Unit laboratory

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Laboratory, Rack Room, and Wash Room

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Introduction

The *Laboratory, Rack Room, Wash Room* section provides the Work Unit with the procedures for unloading and stacking the soil sample bags, washing the soil samples, examining the samples, and preparing the suspect cysts for positive identification.

Work Unit

Upon arrival at the Avoca Work Unit, each sample passes through the following three areas:

- ◆ Rack room
- ◆ Wash room
- ◆ Laboratory

Rack Room

The Work Unit rack room is climate-controlled with a dehumidifier and heater to assist with drying the soil sample bags. Up to 10,000 sample bags can be dried and stored in this room prior to being moved to the wash room for sample washing. Seed samples are stored on separate racks. Rack sections and shelves are each labeled with a rack letter and sample numbers to designate the bags stored on each shelf. See [Figure 2-4-1](#) below.



Photo by Debi Briggs

FIGURE 2-4-1 Rack number and shelf number label

Continue to [Step 1: Unload the Vehicles](#) on page 2-4-3.

Step 1: Unload the Vehicles



Maintain the integrity of each soil sample by keeping the bags in consecutive order by sample bag number while unloading from the vehicle(s) and carrying into the rack room.

Upon return to the USDA-APHIS-PPQ Work Unit facility from the sampling field, crew members will park the transport vehicle(s) (vans/trucks) in a row, and then unload the sample bags as follows:

1. Place the safety ladder at the racks where the sample bags will be stored for drying.
2. Line up personnel single file from the vehicle containing the sample bags to the laboratory rack room.
3. If the collection END bag was loaded last, then start unloading the highest-numbered bag (collection END bag), and pass each bag down the line. If the collection start bag (marked 1 in the lower left corner of the bag) was loaded last, then start unloading with this bag. Keep the collection together and in sequential order as the bags are being unloaded.
4. Place the collection END bag at the front of the rack shelf, and stack each bag in consecutive order behind the END bag.
5. If more than one collection was transported in the same vehicle, then finish unloading and stacking one entire collection before unloading the second collection.

The Crew Leader will record on the [Sample Storage Worksheet \(Rack Sheet\)](#), the date the collection is placed in the rack room, the collection bag number, the total number of samples in the collection, the soil type (mineral or muck), and the rack and shelf numbers where the collection is placed. The information on this sheet is used to identify the location of each sample bag while in the rack room. (See [Sample Storage Worksheet \(Rack Sheet\)](#) on page A-1-39 for an example of the worksheet.)

Step 2: Sanitize and Restock the Transport Vehicles

After all bags have been unloaded and placed in the rack room, then sanitize all vehicles used to transport samples from the field to the laboratory facility, as follows:

1. Move all vehicles used to transport samples from the field, away from the building.
2. Remove all supplies from the vehicle.
3. Vacuum the vehicle's interior (carpet, seats, sides, ceiling, floor, floor mats, and rear area).
4. Prepare a bucket of bleach water solution (1 part 5.25 percent hypochlorite to 10 parts water).
5. Wash and sanitize the entire interior with the bleach water solution and sponge wash the interior.
6. Wash and sanitize the supplies and equipment.



Important

At the end of each day's trip from the field, each vehicle **must** be cleaned, sanitized, and spotless even if the vehicle will be driven back to the same field for sampling the next day. This is done to avoid contamination.

7. Reload the sampling supplies and equipment into the transport vehicle.
8. Clean and sanitize the exterior of the water jugs, and then fill the jugs with water for the next day.

Step 3: Allow the Samples to Dry

Sample bags will remain on the racks in the drying rack room for approximately two months to dry, depending on the moisture content of the soil at the time of collection. Adjust the dehumidifier and thermostat as rack room humidity and temperature levels dictate. When heat is used, the temperature should be maintained at 60°-65°F. The soil and potential cysts **must** be dry to process.



Photo by Debi Briggs

FIGURE 2-4-2 Soil samples drying in the rack room

Muck Soil Samples

Muck soil is generally friable and dries quicker than mineral soil.

Mineral Soil

Mineral soil dries much more slowly and is more susceptible to hardening.

Sample Moisture Content

Determine whether the soil in each sample bag is dry enough for sample washing, as follows:

1. If the sample bag feels heavy, then this could indicate the soil is still too moist.
2. Check the outside of the bag for wrinkled, damp, or wet spots. If any are found, then this indicates the soil is too moist.
3. Return the bag to the exact location on there shelf where the bag was removed.

Sample Clumps or Hardening

After confirming the sample bag's contents are dry, feel the bag to determine if the soil has hardened or has clumps. The soil **must** be loose for processing in the sample washroom. To break up any clumps or hardness, do as follows:

1. Place the sample bag inside a 4-mil plastic bag, and secure closed to avoid contamination.
2. Place the sample bag on the concrete floor.
3. Take a rubber mallet and pound the sample bag to break up all the clumps and chunks of soil.

Step 4: Gather a Sample Collection from the Rack Room

After all the sample bags in a collection have cured (dried) on the racks and all clumps or hardened soil have been broken up, then the samples are ready for processing.

Two people (biological aides or biological laboratory technicians) are needed to gather the sample bags and record numbers. One removes sample bags from the shelves, and the other assigns and records beaker and sample numbers and stacks the bags onto the appropriate cart.

Complete this task as follows:

1. Gather the following materials:
 - ❖ Carts, flat-surface, different colors, **no** hooks (2)
 - ❖ Clipboards (2)
 - ❖ Markers, permanent, same colors as carts (2)
 - ❖ Safety ladder (1)
 - ❖ *Sample Storage* worksheets (from rack)
 - ❖ *Golden Nematode Laboratory Sample Processing Daily* sheets
2. If you need to remove sample bags from a high rack, then place the safety ladder at the rack and climb the ladder to remove the bags.
3. Place a cart, a marker (same ink color as the cart), and the clipboard with the *Golden Nematode Laboratory Sample Processing Daily* worksheet (that has been completed by the laboratory leader) for the collection to be removed. (See the example on [page A-1-3.](#))
4. Go to the shelf, look under the BEAKER NO. column (on the *Golden Nematode Laboratory Sample Processing Daily* worksheet), and verify the collection number listed on the sheet is the same as the collection number on the bag.
5. The collection END bag (look just above the bag number in the lower left-hand corner) should be at the front of the rack shelf. Remove the END bag first and hand to the second person.
6. On the pre-completed *Golden Nematode Laboratory Sample Processing Daily* worksheet, locate the collection number, bag number, and beaker number.

7. Write the pre-assigned beaker number in the center of the bag. See [Figure 2-4-3](#).



Photo by Dan Kepich

FIGURE 2-4-3 Sample beaker number (50), collection number (DEM-03), field name (38-B-40), sample bag number (24), and collection date (1/11)

EXAMPLE	For collection number DEM-03, sample bag 24 has been assigned to beaker number 50. Beaker number 50 is written in purple in the center of the sample bag.
----------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------

8. Place the bag in reverse consecutive order by Beaker No., onto the cart.
9. After completing each cart, wipe down the shelves and sweep and mop the floor.
10. If time allows after you gather the first cart, then get a second cart and repeat 1., through 8., above, **except** for the color.
 - A. Use a different color cart and marker for the second batch of sample bags.
 - B. After writing the beaker number on the bag, then place each bag in the second collection on the cart.
11. After all the samples have been processed (from the rack room, wash room, and laboratory), then all the racks will be thoroughly cleaned and sanitized.

Sample Wash Room

Sample washing is the process by which suspect golden nematodes are removed from the soil. Conduct sample processing daily. **Do not** wash more samples than can be read within three hours of washing and before the work day's end. Wash the soil samples using a Fenwick can washer (also known as a soil sample washing machine). See [Figure 2-4-4](#) below.



Photo by Dan Kepich

FIGURE 2-4-4 Fenwick can washers (soil sample washing machine) in sample wash room

Step 1: Gather Materials for Sample Washing

Gather the following materials for sample washing:

- ◆ Beakers, empty and numbered 1 through 50
- ◆ Bleach (hypochlorite)
- ◆ Bucket and mop
- ◆ Carts (2 flat surface, **no** hooks; each cart **must** be a different color)
- ◆ Lab sheet
- ◆ Pollen mask
- ◆ Respirator

- ◆ Rubber apron
- ◆ Rubber gloves
- ◆ Safety glasses
- ◆ Sieve, No. 20 mesh (top sieve)
- ◆ Sieve, No. 60 mesh (bottom sieve)
- ◆ Fenwick cans

There are two wash stations with two Fenwick cans each (total of four cans) for sample washing, so two people can process samples at a time. The collections **must** be kept separate during processing.



Be careful **not** to cross-contaminate the samples during processing.

Step 2: Prepare the Cleaning Solution

A bucket of bleach solution is needed to mop the floor during the day. First thing each morning, prepare a bucket of sanitizing solution by mixing in the bucket: 1 cup of bleach to 3 gallons of hot water.

Step 3: Wash Hands and Wear Proper Attire

Wear the proper attire. Put on a pollen mask, a rubber apron, rubber gloves, and safety glasses before entering the laboratory wash room.



Some people choose **not** to wear rubber gloves during processing, due to sensitivity. If you **do not** wear gloves, then be sure to wash your hands before, during, and after sample washing. Wash your hands at the end of one collection and before starting a different collection.

Wash your hands as follows:

- ◆ Before you begin sample washing
- ◆ Before putting on rubber gloves
- ◆ After emptying each sample bag
- ◆ After pushing sample bags down into trash bag
- ◆ After pushing the trash bag down into the trash can
- ◆ After closing and removing the trash bag from the trash can and wash room

When wearing gloves, wash the gloves as follows:

- ◆ Before you begin sample washing
- ◆ After emptying each sample bag

- ◆ After pushing sample bags down into a trash bag
- ◆ After pushing the trash bag down into the trash can
- ◆ After closing and removing the trash bag from the trash can and wash room

Step 4: Prepare the Sample Bags and Beakers for Sample Washing

Remove the sample bags from the cart in consecutive order, in groups of 25, and place them on the wash room counter in consecutive order.

EXAMPLE	Remove the sample bags numbered 1-25 from the cart, and place in them on the counter in consecutive order, starting with bag number 1.
----------------	----------------------------------------------------------------------------------------------------------------------------------------

Prepare sample bags and beakers as follows:

1. Carefully slice the top of each bag open with a knife, but **do not** dig down into the sample soil. Be especially careful when opening muck soil sample bags as the soil is very dry and can be dusty.
2. Wash your hands first, but **do not** hose them clean between opening the sample bags. Wash your hands again before picking up the sample beakers.
3. Select the beakers by the beaker number which corresponds with the sample bag number. Confirm that both the sample bag number and the beaker number are identical. See [Figure 2-4-5](#) below.



Photo by Debi Briggs

FIGURE 2-4-5 Beaker number confirmation

4. Take both the sample bag and the beaker to the Fenwick can washer.
 - A. To wash mineral soil samples, continue to *Step 5: Wash the Mineral Soil Samples* on page 2-4-14.
 - B. To wash muck soil samples, continue to *Step 6: Wash the Muck Soil Samples* on page 2-4-17.

Step 5: Wash the Mineral Soil Samples

The steps below are for washing mineral soil samples **only**.

Wash mineral soil samples as follows:

1. Turn the low water on so there will be a little water in the Fenwick can. See the large Fenwick can on the right in [Figure 2-4-6](#) below.
2. Open a soil sample bag; and slowly dump the soil into the Fenwick can.
3. Throw the empty sample bag into the trash can.
4. Turn the water on high; this roils and stirs the soil.



Photos (l) Michael Aita (r) Debi Briggs

FIGURE 2-4-6 Fenwick Can (l) and Sample Dumping (r)

5. Allow the high water to flow just up to the lip of the Fenwick can, then turn the high water off; this brings the soil up and gets everything to the top of the Fenwick can.
6. Keep the low water flowing all through the washing process.

7. As the debris comes up to the top of the Fenwick can, carefully hose and skim the larger debris from the can into the top No. 20 sieve. See [Figure 2-4-7](#).



Photos by Dan Kepich

FIGURE 2-4-7 Sieves and Skimming Debris

8. As the larger debris is skimmed off with the running water, the golden nematode cysts will float and come right up to the top. (You **cannot** see the cysts with the naked eye.) Gently skim off smaller debris (which may contain suspect nematode cysts) into the top No. 20 sieve.
9. Each sample **must** process for a minimum of two minutes. At this time you can start a second sample in the other can.
10. Thoroughly hose down the top screen and sieve sides to force everything remaining in the top sieve down into the lower, small No. 60 sieve (bottom screen). This forces the smaller material down onto the bottom sieve.



Do not mix the contents of the sample bags together.

11. Remove the top No. 20 screen from its holder and thoroughly clean the screen, then replace in its holder. Forcefully spray through the top screen into the bottom No. 60 screen to rinse all murkiness from the bottom (water running out of the bottom screen should run clear)
12. Take the hose and add clear water into the beaker until the water and flotsam is about 2 inches from the top.

13. Carefully rinse all material from the bottom screen into the beaker.
14. Thoroughly clean the bottom screen, then return to its holder.
15. Rinse your hands clean between every sample.
16. Prepare to start the next sample.

When processing mineral soil samples **only**, you can wash one sample and then start another in the second Fenwick can. While the first Fenwick can is filling with water, get a second sample bag and begin processing in the second Fenwick can. **Do not** mix the contents of sample bags together.



After each collection is washed, sanitize the Fenwick cans and sieves before starting a new collection.

Step 6: Wash the Muck Soil Samples

The steps below are for washing muck soil samples **only**. Washing muck soil samples is much more time-consuming due to the extremely dry nature of the soil.



Be extremely careful when processing muck soil samples. Muck soil can resist wetting.

Wash muck samples as follows:

1. Wear a pollen mask, a respirator, and a rubber apron.
2. Turn the low water on so there will be a little water in the Fenwick can. See the large Fenwick can on the right in [Figure 2-4-6 on page 2-14](#).
3. Open a soil sample bag carefully; slowly dump the soil into the Fenwick can; and keep the water on low while dumping the sample.
4. Throw the empty sample bag into the trash can.
5. Use the high-pressure water hose and slowly break up the soil.
6. Allow the low water level to flow just up to the lip of the Fenwick can; this brings the soil up and gets everything to the top of the Fenwick can.
7. As the debris comes up to the top of the Fenwick can, carefully hose and skim the larger debris from the Fenwick can into the top No. 20 sieve. See [Figure 2-4-7 on page 2-15](#).
8. As the larger debris is skimmed off with the running water, any golden nematode cysts that may be in the debris will float and come right up to the top. (You **cannot** see the cysts with the naked eye.) Gently skim off the smaller debris into the first No. 20 sieve. Each sample **must** process for a minimum of 2 minutes. During this time, you can start a second sample in the other Fenwick can. **Do not** mix the contents of the samples together.
9. Thoroughly hose down the top screen and sieve sides to force the remaining flotsam in the top sieve down into the lower (bottom) No. 60 sieve.
10. Remove the top screen and thoroughly clean.
11. Use the hose and carefully rinse material from the bottom screen into a beaker. Add clear water to the beaker until the level is about 2 inches from the top.

- 12. Remove the bottom screen from its holder; thoroughly clean; and return to its holder. Forcefully spray through the top screen into the bottom screen to rinse all murkiness from the bottom. Water should run clear out of the bottom screen.**
- 13. Rinse your hands clean between every sample.**
- 14. Prepare to start the next sample.**



After each collection is washed, sanitize the Fenwick cans and sieves before starting a new collection.

Step 7: Place the Beakers on the Laboratory Counter

Beakers are assigned numbers 1-50 to keep track of sample processing in the lab.

1. As each sample is washed and poured into the correct beaker, place the beaker on the laboratory counter. **Do not** mix the sample collections.



FIGURE 2-4-8 Sample beakers on a laboratory counter

2. After all sample washing is complete and all beakers have been moved from the wash room to the laboratory, then continue to [Step 8: Clean and Sanitize the Sample Washroom](#) on page 2-4-20.

Step 8: Clean and Sanitize the Sample Washroom

After each sample collection has been processed in the wash room and all sample beakers have been placed in the laboratory, thoroughly clean and sanitize the washroom and carts, as follows:

1. Remove the rubber apron, place the apron in the sink, and hose the apron clean.
2. Hose off the entire wash area. Spray the entire wash station with a 10% bleach solution (1 part 5.25% bleach to 9 parts water).
3. Make sure there is **no** dirt left on the sides and in the bottom of the sinks. Use the hose to rinse the sinks again to be sure.
4. Remove all dirt from the counters, and place the dirt in the wash room trash can.
5. Spray the countertops and backsplash with the bleach solution.
6. Wash the wash room floor with a mop and bleach solution.
7. Clean and sanitize the carts.
8. Wash your hands thoroughly.

Laboratory Sample Reading



Everything used in the laboratory **must** be clean to avoid contaminating the samples.

Step 1: Gather the Materials

Gather the following materials to read the samples and collect cysts:

- ◆ Ball point pen or thin permanent marker
- ◆ Beaker, tri-corner, 250 mL (holds small No. 60 sieve)
- ◆ *Golden Nematode Laboratory Sample Processing Daily* sheet
- ◆ Dissecting microscope
- ◆ Dissecting needle
- ◆ Laboratory aprons or coats, white
- ◆ Loop
- ◆ Microscope light, individual
- ◆ Paper towels
- ◆ Pen, ball point or thin permanent marker
- ◆ Parafilm
- ◆ Reading well, tri-section
- ◆ Sample beakers, 600 mL
- ◆ Small, No. 60 sieve
- ◆ Specialty microscope slide labels
- ◆ Spatula, 4-inch blade length
- ◆ Sponges
- ◆ Spray bottle with 10% bleach solution
- ◆ Spray bottle with soap solution
- ◆ Stainless steel click counter
- ◆ Squirt water bottle with spout
- ◆ Tape, scotch
- ◆ Vial labels
- ◆ Vials, plastic, 20 mL, with lids
- ◆ Water

Step 2: Set Up the Sample Reading Station

Gather the following materials for each sample reading station:

- ◆ Beaker, 600 mL, empty
- ◆ Dissecting microscope
- ◆ Dissecting needle
- ◆ Loop
- ◆ Microscope light, individual
- ◆ Reading well
- ◆ Spatula
- ◆ Squirt water bottle with spout

Place the items at each sample reading station. See [Figure 2-4-9](#) below.



Photo by Dan Kepich

FIGURE 2-4-9 Sample Reading Station

Step 3: Set Up the Golden Nematode Cyst Station

Gather the following materials for each golden nematode station:

- ◆ Parafilm
- ◆ Pen, ball point or thin-tip permanent marker
- ◆ Scotch tape
- ◆ Specialty microscope slide labels
- ◆ Vials, plastic, 20 mL, with lids

Place the items at each golden nematode station.

Step 4: Prepare for Sample Reading

Prepare for sample reading as follows:

1. Put on a clean, white laboratory coat.
2. Take a small No. 60 sieve and a tri-corner beaker to the sink.
3. Take the first sequentially-numbered beaker sample from the counter.



Samples **must** be read within three hours of washing. After about 3 hours, the cysts and flotsam **no** longer float; and will sink to the beaker's bottom.

4. Locate the *Golden Nematode Laboratory Sample Processing Daily* worksheet, and under BEAKER NO. find the collection number and the pre-assigned beaker number for the sample you will be reading. Place your initials on the sheet beside the beaker number.
5. After all beaker samples listed on the sheet have been read and initialed, place the completed sheet underneath the blank sheets on the clipboard. (The laboratory leader will collect the completed sheets weekly.)
6. Take the beaker to the sink. Slowly turn the beaker and pour the contents into the No. 60 sieve; make sure to remove all floating material and anything sticking to the sides of the beaker. Thoroughly clean the beaker.



Photo by Dan Kepich

FIGURE 2-4-10 Pouring a sample from a beaker into a small No. 60 sieve

7. Wash the laboratory counter and the sink with a clean sponge and water.

Step 5: Read the Samples

Read the samples as follows:

1. Use spatula to carefully remove material from the sieve and place the material into the reading well sections. Then use the water bottle and carefully rinse all remaining traces of material from the sieve and wash into the reading well.
2. Place the reading well with sampling material under the microscope.
3. Use the squirt bottle and slowly add water to the sample material in each section of the reading well so that any possible golden nematode cysts will float to the top, but **not** flow over. All cysts will float, whether viable (live) or non-viable (old, flattened, or dead).
4. Look into the microscope, and move the reading well around until just a little bit of white plastic is showing at the top upper left.
5. Start in the upper left corner, and use the dissecting needle to move the sample material around to examine the sample.



Photos by Dan Kepich

FIGURE 2-4-11 Flotsam Examination for Cysts

6. Move the reading well in small increments. Use a dissecting needle to move material around and examine the sample. Continue moving the reading well and probing the material until you have examined the entire sample in each section of the reading well.

7. Look for any round, spherical objects that appear to have a small spout or protrusion. Golden nematode cysts have a color range from golden, to shades of orange, to dark brown or black. See a microscopic view of golden nematode cysts in [Figure 2-4-12](#) below.



Photo by Zafar Handoo

FIGURE 2-4-12 Golden Nematode Cysts

8. If you locate a suspect golden nematode cyst, then continue to [Step 6: Remove the Cysts](#).
9. After you are finished examining the sample and have removed all suspect golden nematode cysts for identification, then dump the flotsam from the reading well into the empty beaker.
10. Take the small No. 60 sieve, tri-corner beaker, and reading well to the laboratory sink. Thoroughly clean each item, and make sure all material is removed.
11. Repeat each step above until all beaker samples have been examined.

Step 6: Remove the Cysts

All golden nematode cysts **must** be identified, whether they are considered to be viable or **not**. If you locate one or more golden nematode cysts when reading a sample, then do as follows:

1. Get one vial and a lid from the golden nematode station and take to the sampling station.
 - A. Use **only** one vial per sample, even if there are multiple cysts from the same sample.
 - B. **Do not** mix cysts from multiple samples into one vial.
2. Look under the microscope and use the loop to locate and isolate each golden nematode cyst.
3. Use the loop to remove the suspect golden nematode cyst(s) from the flotsam in the reading well; and place each cyst into the vial. Screw on the lid. See [Figure 2-4-13](#) below.



Photo by Dan Kepich

FIGURE 2-4-13 Golden Nematode Cyst Placement in Vial

5. Prepare a label using either a ballpoint pen or thin permanent marker to write the collection number, the sample bag number, the number of suspected golden nematode cysts found in the individual sample, and your initials. See the example in [Figure 2-4-14](#) below.

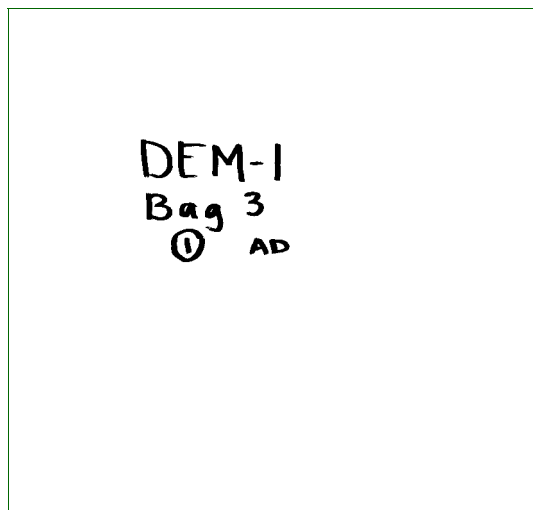


FIGURE 2-4-14 Example of a vial label

EXAMPLE	DEM-01 is the collection number; Bag 3 is the sample bag number; 1 is the number of suspect golden nematode cysts in the vial; and AD are the initials.
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6. Attach the label to the sample vial and cover the label with scotch tape.
7. Keep all sample vials from the collection together (**do not** mix collections).
8. Go to the *Golden Nematode Laboratory Sample Processing Daily* sheet, locate the BEAKER NO. (cysts were in), and record under COLL. NO. the number of cysts found.
9. Give the vial collection to the laboratory leader.
10. When cysts are found, at the end of the collection clean and thoroughly sanitize all laboratory equipment, sinks, and countertops before starting a new collection.

Golden Nematode Cyst Identification

If a golden nematode identifier is available on site, then give the sample collection vials to the identifier.

If an on-site identifier is **not** available, then give the collection vials to the Golden Nematode Program director or designee, who will send the vials for identification, as follows:

1. Complete *PPQ Form 391, Specimens for Determination*.
2. Pack the vials in packing material and place in a sturdy parcel to prevent breakage in-transit and danger of pest dissemination. Enclose the completed PPQ Form 391 in the parcel.
3. Attach a shipping label identifying the contents to the outside of the parcel. Ship using overnight delivery to the following address:

Dr. Zafar A. Handoo
USDA-ARS Nematology Laboratory
Bldg. 011A, Room 159 BARC-West
10300 Baltimore Avenue
Beltsville, MD 20705-2350
Phone: 301/504-6666

Seed Sample Processing

Before processing seed samples, thoroughly clean and sanitize the entire laboratory, wash room, rack room, and all equipment. Process seed samples last, after all other samples have been processed.

Record of Infestation Folder

When a property is found to be infested with golden nematode, the laboratory leader will prepare two folders: an original record of infestation folder and a duplicate *Record of Infestation Folder*.

Fasten the following information inside **both** the original Work Unit's *Record of Infestation* folder and the field office's duplicate *Record of Infestation* folder:

- ◆ Maps
- ◆ *PPQ Form 391, Specimen for Determination*
- ◆ *PPQ Form 312, Golden Nematode Survey*
- ◆ Records of finds
- ◆ Records of **no** finds
- ◆ Records from previous surveys on the property
- ◆ Other important information

Maintain both the **original** and the duplicate field office folders as the historic record of the property and safeguard as such.

Maintain the **original** *Record of Infestation Folder* in the file at the Work Unit Office.

The Plant Health Safeguarding Specialist (PHSS) in charge of the regulated area will maintain the duplicate record of infestation folder in the field office.

3

Golden Nematode
Program Manual

Procedures

Regulatory Treatment and Certification

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Introduction

The *Regulatory Treatment and Certification* section provides a list of regulated articles in golden nematode (GN) quarantined areas; the conditions under which these regulated articles can be moved from the site of origin; the required certificate or permit that **must** accompany the regulated item for movement; and the procedures that PPQ Officers **must** follow to authorize movement of the regulated articles, and guidelines for releasing land from regulation. All regulatory procedures apply to both GN Ro1 and GN Ro2.

Regulated Articles

The following articles are regulated in golden nematode quarantined areas, and require a certificate or permit year-round:

- ◆ Compost, decomposed manure, humus, muck, peat, and soil; both separately or with other things



Important

Exemption to regulation: Soil samples shipped to approved laboratories **do not** require attachment of a certificate or permit. See the PPQ inspector for a list of approved laboratories.

- ◆ Ear corn, unshucked (**does not include** shucked ear corn)



Important

Exemption to regulation: If the unshucked ear corn has been harvested in bulk or directly into approved containers, and **not** exposed to infestation after cleaning or other prescribed handling, and if the corn and containers thereof have **not** come into contact with the soil, then unshucked ear corn is exempt from regulation unless notified otherwise by the inspector.

- ◆ Grass sod
- ◆ Hay, straw, fodder, and plant litter of any kind



Important

Exception to regulation: If hay, straw, fodder, and plant litter of any kind is moved in approved containers and **not** exposed to infestation after cleaning or other prescribed handling, then hay, straw, fodder, and plant litter are exempt from regulation unless notified otherwise by the inspector.

◆ Irish potatoes and other root crops

❖ Irish potatoes



Exception to regulation: If Irish potatoes are graded at an approved grader or washed free of soil, packaged in approved containers, and **not** exposed to infestation after cleaning or other prescribed handling, then Irish potatoes **other than** for seed are exempt unless otherwise notified by an inspector.

❖ Root crops **other than** Irish potatoes and sugar beets



Exception to regulation: If root crops **other than** Irish potatoes and sugar beets are moved in approved containers and **not** exposed to infestation after cleaning or other prescribed handling, then root crops **other than** Irish potatoes and sugar beets are exempt unless otherwise notified by an inspector.

◆ Plant crowns and roots for propagation

◆ Plants with roots (**does not** include soil-free aquatic plants)

◆ Small grains and soybeans

❖ Small grains



Exemption to regulation: If small grains have been harvested in bulk or directly into approved containers, cleaned to meet State seed sales requirements, and **not** exposed to infestation after cleaning or other prescribed handling and the containers have **not** come into contact with the soil, then small grains are exempt unless otherwise notified by an inspector.

❖ Soybeans **other than** for seed



Exemption to regulation: If soybeans **other than** for seed have been harvested in bulk or directly into approved containers and the soybeans **not** exposed to infestation after cleaning or other prescribed handling and containers have **not** come into contact with the soil, then soybeans **other than** for seed are exempt, unless otherwise notified by an inspector.

◆ True bulbs, corms, rhizomes, and tubers of ornamental plants

◆ Used crates, boxes, burlap bags, and other used farm product containers

◆ Used farm tools

◆ Used mechanized cultivating equipment and used harvesting equipment

◆ Used mechanized soil-moving equipment

◆ Any other products, articles, or means of conveyance of any character whatsoever **not** covered by the above, and determined by an inspector that they present a hazard for spread of golden nematode, and the person in possession thereof has been so notified

Special Procedures

Movement Under Limited Permit to Approved Destinations

Movement Within Quarantined States

Movement under limited permit (*PPQ Form 530, Limited Permit*) by PPQ to destinations within quarantined States **must** be approved by the appropriate State regulatory official or his designee.

Movement Outside Quarantined States

Movement under limited permit (*PPQ Form 530, Limited Permit*) to destinations in States **other than** the quarantined States **must** be approved by the PPQ Deputy Administrator or his designee in concurrence with the receiving State regulatory officials.

Shipments of regulated articles to offshore States, territories, or possessions of the United States shall be in accordance with the procedures outlined in this manual.

Shipment to Mexico or Canada

Shipment of regulated articles to Mexico or Canada shall be in accordance with the procedures outlined in this manual and any other requirement which may be specified by officials of Mexico or Canada.

Shipment to Foreign Countries

Shipment of regulated articles destined to other countries shall be made in accordance with import requirements of the destination country.

Certificates and Permits

PPQ Form 519, Compliance Agreement

Compliance agreements can be entered with persons who grow, handle, move or sell regulated land or articles from regulated land.

To enter a compliance agreement, the person **must** do the following:

- ◆ Review each stipulation of the compliance agreement with a PPQ inspector
- ◆ Agree to the terms of the agreement
- ◆ Follow the terms of the agreement
- ◆ Sign the agreement

Persons who may enter a compliance agreement with PPQ to clean equipment that is used or may have been used on, or entered regulated or suspected golden nematode infested land, would include the following:

- ◆ Auction houses and auctioneers
 - ❖ Compliance agreement to contact USDA of sale, especially of equipment used on GN land
 - ❖ PPQ PHSS will review the consignor's list of items before each auction, and treat the items to be offered for sale (equipment **cannot** be move before treated)
- ◆ Cable company
- ◆ Companies that apply fertilizer or lime on a regulated field
- ◆ Electric company
- ◆ Gas company
- ◆ Phone companies
- ◆ Towns and municipalities
- ◆ Miscellaneous
- ◆ Wind tower installation company

The PPQ inspector should review each compliance agreement on a yearly basis and update, modify, or remove the agreement as needed. Compliance agreements are valid for one year from the date of signing. A new compliance agreement **must** be signed every year.

Compliance Agreement Cancellation

If the PPQ inspector determines that the person who has entered into a compliance agreement has **not** complied with the conditions of the agreement, then the inspector may cancel the compliance agreement orally or in writing. (See 7CFR§301.85.)

See [PPQ Form 519, Compliance Agreement](#) on page A-1-25 for an example and information on completing this form.

PPQ Form 530, Limited Permit

PPQ Form 530, Limited Permit, is used to authorize movement of **noncertified**, regulated material to a specific approved destination for processing or treatment.

See [PPQ Form 530, Limited Permit](#) on page A-1-32 for an example and information on completing the permit.



Movement of noncertified regulated articles **must** be approved by the appropriate State Regulatory Official in the applicable State (if movement is within the quarantined State) and/or PPQ Deputy Administrator or designee and the receiving State regulatory official (if movement is outside the quarantined State).

See [Table 3-1-1 on page 3-1-7](#) to determine the regulated articles that require this permit.

PPQ Form 540, Certificate (of Federal or State Cooperative Domestic Quarantines)

PPQ Form 540, Certificate for Federal or State cooperative domestic quarantines, is used to certify specific regulated articles as free from golden nematode. See [PPQ Form 540, Certificate](#) on page A-1-36 for an example and information on completing the form.

See [Table 3-1-1 on page 3-1-7](#) to determine the regulated articles that require this certificate.

Certificate and Permit Requirements for Regulated Articles

To determine if a certificate or permit is required for regulated articles in golden nematode quarantined areas, see [Table 3-1-1](#) below.

TABLE 3-1-1 Certificate and Permit Requirements for Regulated Articles

If the article is:	And:	Then:
<ul style="list-style-type: none"> ◆ Bulbs (true) ◆ Corms ◆ Rhizomes ◆ Tubers of ornamental plants 	Certified free from golden nematode	ATTACH the required <i>PPQ Form 540, Certificate of Federal/State Domestic Plant Quarantine</i>
	Approved (by the appropriate State regulatory official or designee) for movement within the quarantined State as a noncertified, regulated article, to a specific destination for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Approved (by PPQ Deputy Administrator or designee in concurrence with receiving State officials) for movement to a State outside the quarantined State as a noncertified, regulated article, to a specific location for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Lacks the required <i>PPQ Form 540, Certificate</i> , or <i>PPQ Form 530, Limited Permit</i>	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.J.kepich@aphis.usda.gov
Compost, separate or mixed with other things	Certified free from golden nematode	ATTACH the required <i>PPQ Form 540, Certificate of Federal/State Domestic Plant Quarantine</i>
	Approved (by the appropriate State regulatory official or designee) for movement within the quarantined State as a noncertified, regulated article, to a specific destination for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Approved (by PPQ Deputy Administrator or designee in concurrence with receiving State officials) for movement to a State outside the quarantined State as a noncertified, regulated article, to a specific location for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Lacks the required <i>PPQ Form 540, Certificate</i> or <i>PPQ Form 530, Limited Permit</i>	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.J.kepich@aphis.usda.gov

TABLE 3-1-1 Certificate and Permit Requirements for Regulated Articles (continued)

If the article is:	And:	Then:
Corn, ear shucked	Certified free from golden nematode	ATTACH the required <i>PPQ Form 540, Certificate of Federal/State Domestic Plant Quarantine</i>
	Approved (by the appropriate State regulatory official or designee) for movement within the quarantined State, as a noncertified, regulated article, to a specific destination for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Approved (by PPQ Deputy Administrator or designee in concurrence with receiving State officials) for movement to a State outside the quarantined State, as a noncertified, regulated article, to a specific location for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Lacks the required <i>PPQ Form 540, Certificate</i> or <i>PPQ Form 530, Limited Permit</i>	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov
Corn, ear not shucked (unshucked)	<ul style="list-style-type: none"> ◆ Harvested in bulk or directly into approved containers (see <i>Authorized Pesticides</i> on page 3-1-19) ◆ Corn and containers have not come into contact with the soil ◆ Not exposed to infestation after cleaning or other prescribed treatment and other prescribed handling 	RELEASE; EXEMPT from regulation
	Not as described in the cell immediately above	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov
Fodder	<ul style="list-style-type: none"> ◆ Moved in approved containers ◆ Not exposed to infestation after cleaning or other prescribed handling 	EXEMPT from regulation unless notified otherwise by inspector
	◆ Not in approved containers or has been exposed to infestation after cleaning or prescribed handling	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov

TABLE 3-1-1 Certificate and Permit Requirements for Regulated Articles (continued)

If the article is:	And:	Then:
Grass sod	Certified free from golden nematode	ATTACH the required <i>PPQ Form 540, Certificate of Federal/State Domestic Plant Quarantine</i>
	Approved (by the appropriate State regulatory official or designee) for movement within the quarantined State as a noncertified, regulated article, to a specific destination for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Approved (by PPQ Deputy Administrator or designee in concurrence with receiving State officials) for movement to a State outside the quarantined State as a noncertified, regulated article, to a specific location for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Lacks the required <i>PPQ Form 540, Certificate</i> or <i>PPQ Form 530, Limited Permit</i>	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov
Grains, small	<ul style="list-style-type: none"> ◆ Harvested in bulk or directly into approved containers and have not come into contact with the soil after harvesting ◆ Not exposed to infestation after cleaning or other prescribed treatment 	EXEMPT
	◆ Not in approved containers or have been exposed to soil or to infestation after cleaning or prescribed handling	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov
Hay	<ul style="list-style-type: none"> ◆ Moved in approved containers ◆ Not exposed to infestation after cleaning or other prescribed handling 	EXEMPT unless notified otherwise by inspector
	Not in approved containers or has been exposed to infestation after prescribed handling	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov

TABLE 3-1-1 Certificate and Permit Requirements for Regulated Articles (continued)

If the article is:	And:	Then:
Humus, separate or mixed with other things	Certified free from golden nematode	ATTACH the required <i>PPQ Form 540, Certificate of Federal/State Domestic Plant Quarantine</i>
	Approved (by the appropriate State regulatory official or designee) for movement within the quarantined State as a noncertified, regulated article, to a specific destination for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Approved (by PPQ Deputy Administrator or designee in concurrence with receiving State officials) for movement to a State outside the quarantined State as a noncertified, regulated article, to a specific location for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Lacks the required <i>PPQ Form 540, Certificate</i> or <i>PPQ Form 530, Limited Permit</i>	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov
Irish potatoes, for seed	Certified free from golden nematode and not for shipment to Puerto Rico	ATTACH the required <i>PPQ Form 540, Certificate of Federal/State Domestic Plant Quarantine</i>
	From noninfested fields for shipment to Puerto Rico and certified free from golden nematode	1. May SHIP in new burlap bags 2. ATTACH the required <i>PPQ Form 540, Certificate of Federal/State Domestic Plant Quarantine</i>
	Approved (by the appropriate State regulatory official or designee) for movement within the quarantined State, as a noncertified, regulated article, to a specific destination for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Approved (by PPQ Deputy Administrator or designee in concurrence with receiving State officials) for movement to a State outside the quarantined State, as a noncertified, regulated article, to a specific location for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Lacks the required <i>PPQ Form 540, Certificate</i> or <i>PPQ Form 530, Limited Permit</i>	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov

TABLE 3-1-1 Certificate and Permit Requirements for Regulated Articles (continued)

If the article is:	And:	Then:
Irish potatoes, not for seed	<ul style="list-style-type: none"> ◆ Graded at an approved grader or washed free of soil ◆ Was not exposed to infestation after cleaning or other prescribed handling and is packaged in approved containers 	RELEASE; EXEMPT from regulation
	Not graded at an approved grader	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov
	Not washed free of soil or exposed to infestation after cleaning or other prescribed handling	
	Not packaged in approved containers	
	Is from noninfested fields for shipment to Puerto Rico	<ol style="list-style-type: none"> 1. May SHIP in new burlap bags 2. ATTACH the required <i>PPQ Form 540, Certificate of Federal/State Domestic Plant Quarantine</i>
	Is from noninfested fields for shipment to Puerto Rico, but lacks the required <i>PPQ Form 540, Certificate</i>	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov
Manure, decomposed; and separate or mixed with other things	Certified free from golden nematode	ATTACH the required <i>PPQ Form 540, Certificate of Federal/State Domestic Plant Quarantine</i>
	Approved (by the appropriate State regulatory official or designee) for movement within the quarantined State as a noncertified, regulated article, to a specific destination for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Approved (by PPQ Deputy Administrator or designee in concurrence with receiving State officials) for movement to a State outside the quarantined State, as a noncertified, regulated article, to a specific location for processing and treatment	
	Lacks the required <i>PPQ Form 540, Certificate</i> or <i>PPQ Form 530, Limited Permit</i>	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov

TABLE 3-1-1 Certificate and Permit Requirements for Regulated Articles (continued)

If the article is:	And:	Then:
Muck	Certified free from golden nematode	ATTACH the required <i>PPQ Form 540, Certificate of Federal/State Domestic Plant Quarantine</i>
	Approved (by the appropriate State regulatory official or designee) for movement within the quarantined State, as a noncertified, regulated article, to a specific destination for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Approved (by PPQ Deputy Administrator or designee in concurrence with receiving State officials) for movement to a State outside the quarantined State, as a noncertified, regulated article, to a specific location for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Lacks <i>PPQ Form 540, Certificate</i> or <i>PPQ Form 530, Limited Permit</i>	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov
Peat	Certified free from golden nematode	ATTACH the required <i>PPQ Form 540, Certificate of Federal/State Domestic Plant Quarantine</i>
	Approved (by the appropriate State regulatory official or designee) for movement within the quarantined State as a noncertified, regulated article, to a specific destination for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Approved (by PPQ Deputy Administrator or designee in concurrence with receiving State officials) for movement to a State outside the quarantined State as a noncertified, regulated article, to a specific location for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Lacks the required <i>PPQ Form 540, Certificate</i> or <i>PPQ Form 530, Limited Permit</i>	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov

TABLE 3-1-1 Certificate and Permit Requirements for Regulated Articles (continued)

If the article is:	And:	Then:
Plant crowns and roots for propagation	Certified free from golden nematode	ATTACH the required <i>PPQ Form 540, Certificate of Federal/State Domestic Plant Quarantine</i>
	Approved (by the appropriate State regulatory official or designee) for movement within the quarantined State, as a noncertified, regulated article, to a specific destination for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Approved (by PPQ Deputy Administrator or designee in concurrence with receiving State officials) for movement to a State outside the quarantined State, as a noncertified, regulated article to a specific location for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Lacks the required <i>PPQ Form 540, Certificate</i> or <i>PPQ Form 530, Limited Permit</i>	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov
Plant litter of any kind	<ul style="list-style-type: none"> ◆ Moved in approved containers ◆ Not exposed to infestation after cleaning or other prescribed handling 	EXEMPT from regulation unless otherwise notified by inspector
	Not in approved containers or has been exposed to infestation after cleaning or other prescribed handling	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov
Plants with roots	Certified free from golden nematode	ATTACH the required <i>PPQ Form 540, Certificate of Federal/State Domestic Plant Quarantine</i>
	Approved (by the appropriate State regulatory official or designee) for movement within the quarantined State, as a noncertified, regulated article, to a specific destination for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Approved (by PPQ Deputy Administrator or designee in concurrence with receiving State officials) for movement to a State outside the quarantined State, as a noncertified, regulated article, to a specific location for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Lacks the required <i>PPQ Form 540, Certificate</i> or <i>PPQ Form 530, Limited Permit</i>	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov

TABLE 3-1-1 Certificate and Permit Requirements for Regulated Articles (continued)

If the article is:	And:	Then:
Plants, aquatic with roots, and contain soil or soil is attached to roots	Certified free from golden nematode	ATTACH the required <i>PPQ Form 540, Certificate of Federal/State Domestic Plant Quarantine</i>
	Approved (by the appropriate State regulatory official or designee) for movement within the quarantined State as a noncertified, regulated article, to a specific destination for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Approved (by PPQ Deputy Administrator or designee in concurrence with receiving State officials) for movement to a State outside the quarantined State as a noncertified, regulated article, to a specific location for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Lacks the required <i>PPQ Form 540, Certificate</i> or <i>PPQ Form 530, Limited Permit</i> because other than as listed in one of the 3 cells immediately above	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov
	Soil-free (does not contain soil or no soil is attached to roots)	EXEMPT from regulation unless notified otherwise by inspector; EXIT this manual
Root crops. other than Irish potatoes and sugar beets	<ul style="list-style-type: none"> ◆ Not exposed to infestation after cleaning or other prescribed handling ◆ Moved in approved containers 	EXEMPT from regulation unless notified otherwise by inspector; EXIT this manual
	Not in approved containers	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov
	Has been exposed to infestation after cleaning or other prescribed handling	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov
Soil, separate or mixed with other things	Certified free from golden nematode	ATTACH the required <i>PPQ Form 540, Certificate of Federal/State Domestic Plant Quarantine</i>
	Approved (by the appropriate State regulatory official or designee) for movement within the quarantined State, as a noncertified, regulated article, to a specific destination for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Approved (by PPQ Deputy Administrator or designee in concurrence with receiving State officials) for movement to a State outside the quarantined State, as a noncertified, regulated article, to a specific location for processing and treatment	
	Lacks the required <i>PPQ Form 540, Certificate</i> or <i>PPQ Form 530, Limited Permit</i> because other than as listed in one of the 3 cells immediately above	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov

TABLE 3-1-1 Certificate and Permit Requirements for Regulated Articles (continued)


If the article is:	And:	Then:
Soil samples, for shipment to an approved laboratory	Shipped to an approved laboratory	EXEMPT from regulation; certificate or permit is not required
Soil samples, for shipment to other than an approved laboratory	Certified free from golden nematode	ATTACH the required <i>PPQ Form 540, Certificate of Federal/State Domestic Plant Quarantine</i>
	Approved (by the appropriate State regulatory official or designee) for movement within the quarantined State as a noncertified, regulated article, to a specific destination for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Approved (by PPO Deputy Administrator or designee in concurrence with receiving State officials) for movement to a State outside the quarantined State, as a noncertified, regulated article, to a specific location for processing and treatment	
	Lacks the required <i>PPQ Form 540, Certificate</i> or <i>PPQ Form 530, Limited Permit</i> because other than as listed in one of the 3 cells immediately above	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov
Soybeans	<ul style="list-style-type: none"> ◆ Harvested in bulk or directly into approved containers ◆ Not exposed to infestation after cleaning or other prescribed handling ◆ Soybeans and containers thereof have not come into contact with the soil 	EXEMPT unless notified otherwise by an inspector; EXIT this manual
	<ul style="list-style-type: none"> ◆ Not harvested in bulk or not harvested directly into approved containers ◆ Has been exposed to infestation after cleaning or other prescribed handling or soybeans or containers have come into contact with the soil 	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov
Straw	<ul style="list-style-type: none"> ◆ Moved in approved containers ◆ Not exposed to infestation after cleaning or other prescribed handling 	EXEMPT unless notified otherwise by inspector
	◆ Not in approved containers or straw	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov
	◆ Containers have been exposed to infestation after cleaning or other prescribed handling	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov
Sugar beets		<ol style="list-style-type: none"> 1. DO NOT MOVE (see <i>Sugar Beets</i> on page 3-1-22) 2. CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov

TABLE 3-1-1 Certificate and Permit Requirements for Regulated Articles (continued)

If the article is:	And:	Then:
Other than listed above	→	GO to Table 3-1-2, "Certificate and Permit Requirements for Used Containers and Used Equipment," on page 3-1-17

Approved Containers and Equipment

Containers and Vehicles Approved for Use Without Certification

Only the following types of containers are approved to be used for the purposes described in this manual (such as transporting shipping articles or samples):

- ◆ New paper bags
- ◆ New consumer packages of most material
 - ❖ **Cannot** be cloth
 - ❖ **Cannot** be burlap unless used for export shipment and approved by the importing country



All new burlap bags to be used for export **only** and approved by the importing country **must** be kept in storage in the United States prior to use and **must** be clearly marked and labeled "For Export".

If free of soil and approved by an inspector, then the following containers may also be used to ship the regulated articles listed in this manual:

- ◆ Boxcars
- ◆ Crates
- ◆ Pallet boxes
- ◆ Trucks

Used Containers and Other Used Equipment

Certain other used containers and used equipment are regulated, but **must** have proper cleaning, sanitizing, and certification as required before use. Continue [Table 3-1-2](#), to determine the certificate and permit requirements for used containers and used equipment.

See [Used Farm Equipment](#), [Mechanized Soil Moving Equipment](#), [Used Containers](#), [Used Farm Tools](#), and [Other Similar Articles](#) on page 3-1-25 for cleaning and sanitizing instructions.

TABLE 3-1-2 Certificate and Permit Requirements for Used Containers and Used Equipment

If the item is:	And:	Then:
Containers: ◆ Burlap bags ◆ Boxes ◆ Crates ◆ Other used farm product containers	Certified free from golden nematode	ATTACH the required <i>PPQ Form 540, Certificate of Federal/State Domestic Plant Quarantine</i>
	Is not free of soil	GO to <i>Used Farm Equipment, Mechanized Soil Moving Equipment, Used Containers, Used Farm Tools, and Other Similar Articles</i> on page 3-1-25
	Exposed to infestation after cleaning	
	Approved (by the appropriate State regulatory official or designee) for movement within the quarantined State, as a noncertified, regulated article, to a specific destination for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Approved (by PPQ Deputy Administrator or designee in concurrence with receiving State officials) for movement to a State outside the quarantined State, as a noncertified, regulated article, to a specific location for processing and treatment	ATTACH <i>PPQ Form 530, Limited Permit</i>
	Lacks the required <i>PPQ Form 540, Certificate</i> or <i>PPQ Form 530, Limited Permit</i>	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov
Used farm tools	Cleaned free of soil and not exposed to infestation after cleaning or other prescribed handling	RELEASE; exempt from regulation
	Is not cleaned free of soil	1. CLEAN free of soil (see <i>Used Farm Equipment, Mechanized Soil Moving Equipment, Used Containers, Used Farm Tools, and Other Similar Articles</i> on page 3-1-25) 2. VERIFY items have been cleaned and sanitized 3. RELEASE
	Exposed to infestation after cleaning	1. CLEAN free of soil (see <i>Used Farm Equipment, Mechanized Soil Moving Equipment, Used Containers, Used Farm Tools, and Other Similar Articles</i> on page 3-1-25) 2. VERIFY items have been cleaned and sanitized 3. RELEASE

TABLE 3-1-2 Certificate and Permit Requirements for Used Containers and Used Equipment (continued)

If the item is:	And:	Then:
<ul style="list-style-type: none"> ◆ Used mechanized cultivating equipment ◆ Used mechanized harvesting equipment ◆ Used mechanized soil-moving equipment 	Cleaned free of soil and not exposed to infestation after cleaning or other prescribed handling	ATTACH the required <i>PPQ Form 540, Certificate of Federal/State Domestic Plant Quarantine</i>
	Is not cleaned free of soil	<ol style="list-style-type: none"> 1. CLEAN free of soil (see <i>Used Farm Equipment, Mechanized Soil Moving Equipment, Used Containers, Used Farm Tools, and Other Similar Articles</i> on page 3-1-25) 2. VERIFY items have been cleaned and sanitized 3. RELEASE
	Exposed to infestation after cleaning	
Other than a used article, product, or means of conveyance listed above or in Table 3-1-1 on page 3-1-7	Inspector determined the item presents a hazard of spreading golden nematode	CONTACT the Golden Nematode Program Director, Daniel Kepich, 607-566-2846, xt 2212, or daniel.j.kepich@aphis.usda.gov
	Is not hazardous to the spread of golden nematode as determined by inspector	EXEMPT from regulation

Sanitation and Treatment

Officers **must** follow the instructions in this manual as a basis for treatment or other procedures to be used in authorizing the movement of regulated articles. This manual serves as a basis for explaining such procedures to persons interested in moving articles affected by quarantine regulations.



Only the treatment procedures authorized in this manual may be utilized **without** special permission from the PPQ Deputy Administrator.

See the *PPQ Treatment Manual* for general instructions about regulatory fumigation. Specifications for authorized fumigants are included where necessary to guide proper treatment.

Officers will furnish complete information to anyone interested in moving regulated articles. Officers may aid shippers in the selection of authorized procedures. The shipper may select the procedure which appears to be most practical from the shipper's standpoint.

Sanitation

Various sanitation procedures **must** be followed from the time a field is identified as infested with golden nematode until the field is officially surveyed and confirmed negative for golden nematode to prevent the spread of the pest.

Procedures deemed appropriate by the officer will be implemented following each authorized activity on an infested field (see [Sanitization](#) on page 2-3-3).

Authorized Pesticides

Steam heat treatment is the established method of fumigating regulated articles. See T.406C & T.406D in the *PPQ Treatment Manual*. Methyl bromide is authorized for treatment of regulated articles for golden nematode. See [Figure 3-1-1](#).

Dosage	Temperature and Exposure Time	Reading
15 lb. per 1,000 square feet (ft.)	24 hours (hr.) @ 15.5° C (60° F) or above	180 grams (g) ounce (oz.) minimum concentration reading at 1/2 hour
		120 grams (g) ounce (oz.) minimum concentration reading at 24 hours
128 (g/m ³) (8 lb./1000 ft. ³) (grams/m ³ = oz./1000 ft. ³)	48 hours (hr.) @ 15.5° C (60° F) or above	100 g oz. minimum concentration reading at 1/2 hour
		75 g oz. minimum concentration reading at 24 hours
		50 g oz. minimum concentration reading at 48 hours

FIGURE 3-1-1 Methyl Bromide Fumigation at Normal Atmospheric Pressure (NAP)

Certification Period

Once the infested field is treated, the certification period lasts as long the treated area is protected from recontamination.

Approved Treatments

Irish Potatoes, Grade A or Grade B (Except Seed Potatoes)

Potatoes **must** be washed, brushed, or flumed to remove soil.



Grade A or B Irish potatoes from golden nematode infested fields **cannot** be moved **without** certification.

When Grade A or Grade B Irish Potatoes (**except** seed potatoes) meet the requirements below, the potatoes may be moved from golden nematode-regulated (but **not** golden nematode infested) areas **without** certification:

1. Fields that have received two years of a resistant variety treatment, followed by a negative post-treatment survey before the fields are replanted to potatoes.
2. Subsequent production from such fields would move as described below:
 - A. Potatoes will be free of soil, including soil clods, soil clumps, soil peds, aggregates, etc.
 - B. Shipping container will be free of soil.
3. Subsequent potato production from formerly-infested fields which have undergone successful resistant-variety treatment verified by intensive negative survey may move in accordance with procedures described above. See [Survey to Release Land from Exposed Status](#) on page 2-3-12.
4. Resistant varieties grown as a control treatment on infested fields **must** be graded and cleaned under the observation of an officer who will permit the movement of these potatoes when cleaned to the officer's satisfaction, and transported for consumption in approved containers (see [Approved Containers and Equipment](#) on page 3-1-16). In some instances, satisfactory cleaning may require washing, grading, and/or fluming.

Movement of Potatoes Under Limited Permit (Except Seed Potatoes)

Potatoes (**except** seed potatoes) may be moved under limited permit **only** as listed below.

Potatoes from Noninfested Fields

If one or more of the criteria described under *Approved Treatments* are **not** met, then potatoes from noninfested fields may be moved **only** under limited permit to an approved processing plant or marketing site.

Potatoes from Fields Found Infested After Planting

Potatoes from fields that are found infested after planting **must** be washed under direct supervision of an officer, and moved to an approved destination in approved containers under limited permit.

Ear Corn With Shucks Attached

If ear corn with shucks attached are harvested in bulk or directly into approved containers and **neither** the corn **nor** containers have come into contact with the soil, then the corn is eligible for movement **without** a certificate or permit (*PPQ Form 540, Certificate of Federal/State Domestic Plant Quarantines* or *PPQ Form 530, Limited Permit*).

Hay, Straw, and Plant Litter

Hay, straw, and plant litter movement shall be in approved containers in accordance with the conditions listed below:

- ◆ If free of soil, then hay, straw or plant litter is eligible for movement **without** a certificate or permit (*PPQ Form 540, Certificate of Federal/State Domestic Plant Quarantines* and *PPQ Form 530, Limited Permit* are **not** required)
- ◆ If such products are felt by a PPQ Officer to constitute a risk of moving golden nematode and the owner of the premise has been notified, then the PPQ Officer may do **either** of the following:
 - ❖ Require the product to be fumigated and a certificate to be attached (*PPQ Form 540, Certificate of Federal/State Domestic Plant Quarantines*)
 - ❖ Require the product to be moved under limited permit to an approved destination (*PPQ Form 530, Limited Permit*)

Plants With Roots, Bulbs, Corms, Rhizomes, Ornamental Plant Tubers, and Sod (Other than Tomato and Eggplant Transplants)

Movement of plants with roots (**other than** and **not** including tomato and eggplant transplants), bulbs, corms, rhizomes, ornamental plant tubers, and sod shall be in accordance with the conditions prescribed below:

- ◆ If from noninfested fields in regulated areas, then move the items under *PPQ Form 540, Certificate of Federal/State Domestic Quarantines* or *PPQ Form 530, Limited Permit* (see [Table 3-1-1 on page 3-1-7](#))
- ◆ If from infested fields or exposed fields, then the items **must** move under *PPQ Form 530, Limited Permit*, in accordance with the stipulations of the compliance agreement to an approved local nonagricultural destination (see *PPQ Form 519, Compliance Agreement* on page A-1-25)

Root Crops (Other than Irish Potatoes and Sugar Beets)

Movement of root crops (**other than** Irish potatoes and sugar beets) shall be in approved containers in accordance with the conditions prescribed below:

- ◆ If from noninfested fields in regulated areas, then the items are eligible for movement **without** a certificate or permit
- ◆ If from infested or exposed fields and a PPQ Officer judges such products constitute a risk of moving golden nematode and the owner of the premise has been notified in writing, then the PPQ Officer may do **either** of the following:
 - ❖ Require the product to be washed free of soil and the certificate (*PPQ Form 540, Certificate (of Federal or State Cooperative Domestic Quarantines)*) **must** be attached
 - ❖ Require the product to be moved under limited permit to an approved destination (*PPQ Form 530, Limited Permit*)

Sugar Beets

There is **no** known method of certifying sugar beets for movement from regulated areas. Sugar beets are **prohibited** from movement.

Small Grains

Small grains are eligible for movement under either of the following conditions:

- ◆ If harvested in bulk or directly into approved containers and **neither** the small grains **nor** the containers have come into contact with soil, then the small grains and containers are eligible for movement **without** a certificate
- ◆ If cleaned to meet State seed sales requirements, then small grains may be moved in new burlap bags **without** a certificate or permit

Soybeans (Other than for Seed)

When soybeans (**other than** for seed) are harvested in bulk or directly into approved containers and **neither** the soybeans **nor** the containers have come into contact with the soil, then soybeans are eligible for movement **without** a certificate or permit (*PPQ Form 540, Certificate of Federal/State Domestic Plant Quarantines* or *PPQ Form 530, Limited Permit*).

Soil

Limitations of Soil for Fumigation

Soil for fumigation should be friable and moist but **not** wet. Lids should be removed from small boxes containing soil, and individual sacks should be opened and then placed in a fumigation chamber as follows:

1. Level soil mass of bulk soil to a maximum depth of 30 centimeters (1 ft.).
2. Provide the required minimum headspace of 15 centimeters (one-half ft.).

Soil for Movement to Approved Non-agricultural Areas

Soil moving to approved non-agricultural areas (such as urban areas), is eligible for movement under *PPQ Form 530, Limited Permit*, in accordance with the stipulations of a compliance agreement (see *PPQ Form 519, Compliance Agreement* on page A-1-25).

Soil Samples, Bulk Soil, Potting Soil, and Bench Soil

After fumigation with methyl bromide, then soil samples, bulk soil, potting soil, and bench soil may be moved with *PPQ Form 540, Certificate* (for Federal or State cooperative domestic plant quarantines) attached.



Plants intended for use as feed or food crops (**except** tomatoes and strawberries) **cannot** be grown to maturity in soil that was fumigated with methyl bromide.

Dry Heat Fumigation of Soil Samples

Exposure time begins after the entire soil mass has been brought to the required temperature (see [Figure 3-1-2](#)).

Temperature	Exposure Time
105° C (221° F)	60 minutes
114° C (237° F)	45 minutes

FIGURE 3-1-2 Temperature for dry heat fumigation of soil samples

Steam Fumigation for Bench and Potting Soil



Only soil from sources that are **not** known to be infested or exposed may be approved.

If the source of the bench soil or potting soil has been approved in advance by a PPQ Officer/PHSS and the bench soil or potting soil is treated in accordance with the time and temperature shown in [Figure 3-1-3](#), then the bench or potting soil may be certified.

Type of Enclosure	Temperature	Exposure Time
Greenhouse benches or other containers	82.2° C (180° F)	1 hour ¹

FIGURE 3-1-3 Temperature and exposure for steam fumigation of bench and potting soil

- 1 Exposure time begins when the entire soil mass reaches 82.2° C (180° F) and **must** be maintained throughout the entire treatment.

Soil for Movement to Approved Laboratory

Soil moving to an approved laboratory **does not** require a certificate or permit.

Tomato and Eggplant Transplants

If tomato and eggplant transplants are from nonexposed fields in a regulated area, are washed free of soil as directed by a PPQ Officer, and are packaged in approved containers with a certificate (*PPQ Form 540, Certificate*) attached, then the transplants are eligible for movement to any destination.

There are **no** approved treatment procedures for tomato or eggplant transplants are from **infested** fields (treated or **not** treated). There are **no** approved treatment procedures for exposed fields.

Transplants from Greenhouse Establishments on Noninfested Property

Tomato and eggplant transplants may be produced and shipped with soil from greenhouse establishments on noninfested property, when as prescribed below:

- ◆ Source of the soil has been approved in advance by a PPQ Officer
- ◆ Approved soil has been treated with schedules as outlined in this manual; and **only** soil from sources that have **not** been known to be infested or exposed to golden nematode may be approved
- ◆ Required certificates **must** be attached for each shipment (see [Table 3-1-1 on page 3-1-7](#))

If grown in a soil-free medium, then tomato and eggplant transplants may also be moved; certificates (**must** be attached for each shipment.

Used Farm Equipment, Mechanized Soil Moving Equipment, Used Containers, Used Farm Tools, and Other Similar Articles

Movement of used farm equipment, mechanized soil moving equipment, used containers, and other similar articles from the regulated area shall be in accordance with the conditions described below.

Noncropland and Nonhost Cropland

Used farm equipment, used farm tools, used mechanized soil moving equipment, used containers and other similar articles have been used on noncropland and nonhost cropland are eligible for movement **without** treatment or certification. Equipment and articles are to be inspected and certified **only** when deemed necessary by a PPQ Officer.

Host Cropland

If all soil can be removed by cleaning the used farm equipment, used mechanized soil moving equipment, used farm tools, used containers, and other similar articles, then clean and certify using water or steam treatment.

If the soil **cannot** be removed by cleaning, then fumigate and certificate (*PPQ Form 540, Certificate (of Federal or State Cooperative Domestic Quarantines)*) equipment and articles listed above and used on golden nematode host cropland, as follows:

- ◆ If treated using water-under-pressure, then a single orifice nozzle and water **must** remove all soil and other debris
- ◆ If treated using steam (portable steam jennies or other steam equipment), then the steam **must** remove all soil and other debris



Steam may remove loose paint on equipment and is **not** recommended for use on machinery with conveyer belts or rubber parts.

All soil and debris **must** be removed. If in the judgment of the PPQ Officer equipment and articles **cannot** be adequately cleaned by water-under-pressure (pressure washing) or steam cleaning, then the equipment **must** be fumigated. Soil should be removed prior to fumigation. Particular attention **must** be paid to removing compacted soil. See [Figure 3-1-4](#) for fumigation dosage.

Dosage	Temperature	Reading
240 g/m ³ (15 lb./1000 ft. ³)	24 hours @ 15.5° C (60° F) or above	180 g oz. minimum concentration reading at 1/2 hour
		120 g oz. minimum concentration reading at 24 hours
128 g/m ³ (8 lb./1000 ft. ³)	48 hours @ 15.5° C (60° F) or above	100 g oz. minimum concentration reading @ 1/2 hour
		75 g oz. minimum concentration reading @ 24 hours
		50 g oz. minimum concentration reading @ 48 hours

FIGURE 3-1-4 Dosage, temperature, and reading for methyl bromide fumigation at normal atmospheric pressure (NAP), chamber or tarpaulin

Certification Period

Once fumigated, the certification period lasts as long the treated area is protected from recontamination.

Movement from Infested or Exposed Portions of Regulated Area

When the equipment and articles are cleaned to the satisfaction of a PPQ Officer and the required *PPQ Form 530, Certificate of Federal/State Domestic Quarantines*, is attached to the equipment and articles, then movement of the equipment from infested or exposed fields to nonexposed portions of the regulated area is permitted.

Inspection of Grader Stations

All grader stations under compliance agreement will be inspected to insure that stipulations of the compliance agreement are being followed on a schedule determined by the appropriate officer-in-charge. See [PPQ Form 519, Compliance Agreement](#) on page 3-1-5.

Guidelines for Releasing Land from Regulation

Land previously found infested with golden nematode that has **not** been fumigated under PPQ supervision may be released from regulations¹ if the land meets the criteria of one of the categories listed below:

- ◆ Category 1, non-agricultural land (20-year status)
- ◆ Category 2, non-agricultural land (less than 20-year status)
- ◆ Category 3, agricultural land

Category 1 Non-agricultural Land (20-year Status)

Category 1 non-agricultural land is land which was infested with golden nematode and which has been in non-agricultural status for 20 years. Category 1 land will be released from regulation upon a review of the records to determine that the land has been in non-agricultural status for the past 20 years.

Non-agricultural land includes the following:

- ◆ Highways
- ◆ Industrial areas
- ◆ Recreational land (such as golf courses, racetracks, riding academies, etc.)
- ◆ Residential areas (including home gardens)

Category 2 Non-agricultural Land (Less than 20-year Status)

Category 2 non-agricultural land is land which was infested with golden nematode and which has been in non-agricultural status for less than 20 years. Category 2 land may be released if construction for non-agricultural purposes has rendered the acreage nontillable.

Nontillable land acreage includes the following:

- ◆ Office buildings and parking complex
- ◆ Mall and parking complex
- ◆ Shopping center and parking complex

Category 3 Agricultural Land

Category 3 agricultural land, is land which has been planted to nonhost crops. Category 3 land would be released from regulations after being planted in nonhost crops for 20 years, followed by a

¹ Prior to 1959, infested land was removed from agricultural use because fumigation was **not** available.

negative soil survey on either a 4 x 4 sampling pattern or a mechanical sampler with a level of detection of 100,000 cysts per acre in the top 4 inches of soil.

Agricultural land planted to nonhost crops includes the following:

- ◆ Fallow fields
- ◆ Forage crops
- ◆ Grain fields
- ◆ Nurseries
- ◆ Sod farms
- ◆ Truck farms

Category 3 land is sampled because of the close association with and possible contamination by erosion, equipment, water, wind, etc.

Seed Potato Certification for Interstate Movement

Certification is **not** required for seed potatoes. Survey/soil sampling of all seed potato land is done **only** to confirm that the soil is free of golden nematode in New York. Work with the State of New York for all growers that have seed potatoes.

4

Golden Nematode
Program Manual

Procedures

Control

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Introduction

The *Control* section of the *Procedures* chapter provides information about non-chemical methods used to treat and control the spread of golden nematode, and to help eradicate golden nematode in infested areas.

Non-chemical Control

The following methods of non-chemical control are used to help prevent the spread of golden nematode:

- ◆ Federal and State regulations
- ◆ Steam heat treatment (of equipment)
- ◆ Survey
- ◆ Systematic use of resistant-varieties of potatoes to reduce golden nematode populations below detectable levels
 - ❖ Require growers are to plant resistant varieties on land treated since 1972
 - ❖ Require growers to plant resistant varieties on exposed land

Systematic Use of Resistant Potato Varieties

The primary authorized control mechanism is the mandated planting of approved golden nematode resistant varieties of potatoes. The use of host-plant resistance to reduce the population of golden nematode is a biological means of pest control. Golden nematode cysts hatch when stimulated by *Solanaceae* potato root exudates. The nematodes then penetrate the host plant roots and establish a feeding site.

With resistant potato varieties, juvenile nematodes exist on the roots in part because the nematode **must** feed on live cells in the potato plant's roots. The cells around the nematode's feeding site in the resistant roots die, and most of the nematodes die, too. Of the few surviving nematodes, reproduction is diminished and the offspring have a lowered rate of infestation.

See the list of potato varieties that are currently resistant to golden nematode in [Figure 4-1-1](#).

Year Introduced	Potato Variety	Agency
1966	Peconic	Cornell University
1967	Wauseon	USDA-MD
1972	Hudson	Cornell University
1976	Atlantic	USDA-MD
1977	Campbell	Cornell University
1978	Campbell 13	Cornell University
1979	Belchip	USDA-MD ¹
1980	Highlat Russet	USDA-ARS ²
1981	Rosa	Cornell University
1982	Simcoe	Agriculture Canada
1984	Islander	University of Maine
1985	Elba	Cornell University
1985	Hampton	Cornell University
1985	Sunrise	University of Maine
1986	Donna	Agriculture Canada
1989	Kanona	Cornell University
1989	NemaRus	USDA-MD
1990	Alleghany	Cornell University
1990	Steuben	Cornell University
1991	Castile	Cornell University and USDA-MD
1991	LaBelle	Louisiana State University
1992	Coastal Chip	USDA
1992	Sparton Pearl	Michigan State University
1992	Michigold	Michigan State University
1993	Genesee (NY78)	Cornell University
1993	St. John's (AF838-5)	University of Maine
1993	Sunchip	USDA-MD
1995	Pike	Cornell University
1995	Andover	Cornell University
1997	Salem	Cornell University
1999	Keuka Gold	Cornell University
1999	Eva	Cornell University
1999	Amey	USDA-MD
2003	Marcy	Cornell University
2003	Sante	GN Ro1 and Ro2 resistant variety Germicopa, France
2004	Fabula	HZPC, Netherlands

FIGURE 4-1-1 List of Golden Nematode Resistant Potato Varieties

- 1 USDA in Beltsville, Maryland.
- 2 USDA-ARS in Palmer, Alaska.

Restrictions on Infested Property

When property is found to be infested with the golden nematode disease in the State of New York, then the owner or operator **must** enter into an agreement with the New York State Department of Agriculture and Markets. The agreement restricts the crops that may be grown to either varieties of potatoes that are resistant to golden nematode or to an approved non-host crop. A non-host crop is defined as any crop which is **not** in the *Solanaceae* family. (Potato, tomato, and eggplant are in the *Solanaceae* family).

EXAMPLE Non-host crops include alfalfa, carrots, corn, cucumbers, pumpkins, rye, and wheat.

Post-resistant Variety Treatment (PRVT)

If the golden-nematode infested land is to continue in potato production, then a minimum of two (2) successive crop years of golden nematode-resistant potato variety **must** be grown. Following harvest of the second crop, the field will be intensively surveyed in accordance with the procedures described in ***Post Resistant-Variety Treatment Survey on page 2-3-11***. All surveys **must** be negative for viability. If the survey is negative, then the farmer/grower may continue to grow either golden nematode-resistant varieties or non-host crops.

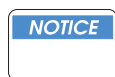
The farmer/grower may also enter into an approved pest management program agreement. See ***Pest Management Program***.

Crop Management Sequence

Pest Management Program

Farmers or growers may enter an approved pest management program that uses resistant varieties, non-host varieties, and susceptible varieties in a four-year crop rotation. See ***Systematic Use of Resistant Potato Varieties on page 4-1-1***.

Following two consecutive crop years of resistant varieties grown on infested land and a negative survey, growers may enter the crop rotation system at the resistant variety or non-host year.



The approved crop rotation system **cannot** be entered at the susceptible variety year under any case or circumstance.

If a farmer/grower chooses to enter the pest management program at year three (3) (non-host) and a susceptible variety is planted the following year, then the field **must** be surveyed after the susceptible variety is harvested in accordance with the survey procedures. If the survey is negative for golden nematode, then there is **no** need for conducting further on the land as long as the approved rotation system is followed.

An additional option is available for growers who wish to plant a non-host crop on an infested field without having to plant a resistant potato variety for two (2) years. With this option, the grower applies a single application of a registered fumigant at the legal dosage rate to the regulated property. The planting of potatoes or other host crops on this field is still **prohibited**.

Steam Treatment

Steam heat treatments can be performed at farm or warehouse locations. Steam treatment takes 1 hour and commodities can be released to the owner immediately after steam treatment. Steam treatment is **not** harmful to the environment and is noncorrosive. **No** special precautions are necessary for the transportation of steam treatment equipment.

The following items can be treated with steam heat before moving interstate from any regulated area:

- ◆ Used construction equipment **without** cabs
- ◆ Used containers
- ◆ Used farm equipment **without** cabs

Steam treatment is **not** recommended for equipment or vehicles with cabs due to possible damage to electrical or plastic components.

Treatment T406-d, Steam at NAP, Tarpaulin or Tent

Steam heat treatment T406-d, Steam at NAP, tarpaulin or tent, used farm equipment without cabs, construction equipment without cabs, and used containers **must** be conducted under the following minimum ambient air temperatures, which vary with the volume of the treatment enclosure:

1. Determine if the following temperature and volume requirements can be met:
 - A. If the treatment enclosure is 4,000 ft.³, then the minimum air temperature is 40°F.
 - B. If the treatment enclosure is greater than 4,000 ft. and less than or equal to 6,000 ft., then the minimum air temperature is 60°F.
 - C. If the enclosure is greater than 6,000 ft.³, then this treatment is **not** recommended.



If you **cannot** meet the temperature and enclosure volume requirements, then **do not** use this treatment.

Use **only** a steam generator approved by APHIS.

2. Assemble the articles to be treated.

- A. Articles to be treated should be placed as close together as possible.
 - B. Arrange articles to allow space for placement of the steam distribution manifold.
3. Place the steam distribution manifold pipe beneath the articles to be treated.
 - A. The steam distribution manifold should be assembled and placed beneath the articles to be treated in order to facilitate steam distribution.
 - B. A flexible steam introduction hose approximately 20 ft. in length, connects the steam generator to a 10 ft. long U-shape pipe capped at the ends, with 0.5 inch holes every 12 inches. The pipe serves as the steam distribution manifold.
4. Place temperature recording sensors on the article to be treated.
5. When the treatment is being conducted in enclosures 4,000 ft.³ or less, use at least 4 recording sensors in addition to the sensor on the steam generator. Place sensors in hard-to-treat cracks or crevices on the equipment or containers. Position sensors in the following locations:
 - A. Front high—near the top of the front of the equipment or load.
 - B. Center middle—midway from the top and bottom of the center of the equipment or load.
 - C. Center bottom—bottom of the center of the equipment or load; but if the equipment is flush with the floor, then at least 3 inches above the floor.
 - D. Rear bottom—bottom of the rear of the equipment or load on the left side; but if the equipment is flush with the floor, then at least 3 inches above the floor.
6. When the treatment is being conducted in enclosures greater than 4,000 ft.³ and less than or equal to 600 ft.³, then use at least 8 temperature recording sensors in addition to the sensor on the steam generator. Place sensors in hard-to-treat cracks or crevices on the equipment or containers. Position sensors in the following locations:
 - A. Front high—near the top of the left side of the front of the equipment or load.
 - B. Front low—bottom of the right side of the front of the equipment or load; but if the equipment is flush with the floor, then at least 3 inches above the floor.
 - C. Center high—near the top of the center of the equipment or load on the right side.

- D. Center middle—midway from the top and bottom of the center of the equipment or load.
 - E. Center low—bottom of the center of the equipment or load on the left side; but if the equipment is flush with the floor, then at least 3 inches above the floor.
 - F. Rear high—near the top of the rear of the equipment on the right side.
 - G. Rear middle—midway from the top and bottom of the rear of the equipment.
 - H. Rear low—bottom of the rear of the equipment or load on the left side; but if the equipment is flush with the floor, then at least 3 inches above the floor.
7. Enclose the article to be treated with a tarpaulin or tent.
 - A. If the equipment or containers will be moved into an enclosure (such as a tent), then placing the temperature sensors may be more practical after completing this step.
 - B. If a tarpaulin (6 mil plastic) is used instead of tent, then pad the sharp edges of the equipment or containers before covering with the tarp.
 - C. The front of the equipment or load and the front of the enclosure should face in the same direction.
 8. Place the steam generator at an open end of the enclosure and seal the enclosure.
 - A. Place the steam generator approximately 20 ft. from the front of the enclosure and connect the generator to a steam introduction line (hose).
 - B. Connect the steam introduction line to the steam distribution manifold pipe which is situated under the articles to be treated.
 - C. Seal the enclosure at the base, including the point at which the introduction line enters the enclosure. An airtight seal is **not** essential for steam treatment; and pinholes are acceptable.
 9. Steam heat the enclosure for 60 minutes after all temperature sensors reach a minimum of 140°F (60°C).



The maximum temperature should **not** exceed 160°F (71°C).

10. Record temperatures at least once every 2 minutes throughout the treatment.

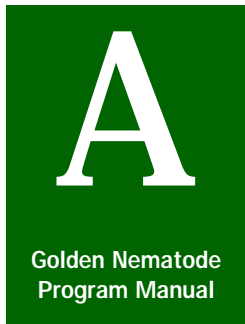
See the *PPQ Treatment Manual* for detailed steam heat treatment instructions.

Golden Nematode Race 2 (Ro2) Treatment

Special crop rotation procedures are required on land where golden nematode Race 2 (Ro2) has been detected. Grower options are very limited because Ro2 resistant potato varieties are still being developed. The Sante potato variety is resistant to both golden nematode Ro1 and Ro2.

Chemical Control

Chemical control procedures are **no** longer approved for routine program use in the State of New York.



Appendix A

Forms and Worksheets

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Introduction

The *Forms and Worksheets* appendix provides examples of the Golden Nematode Program logs and worksheets; PPQ forms, certificates, and permits; and instructions for completing and distributing the worksheets and forms.

Golden Nematode Laboratory Sample Processing Daily

GOLDEN NEMATODE LABORATORY SAMPLE PROCESSING DAILY							
BEAKER NO.	WEIGHT	COLL. NO.	BAG NO.	BEAKER NO.	WEIGHT	COLL. NO.	BAG NO.
1.	3.25	DEM-23	1	26.	4.0		14
2.	4.75		2	27.	4.25		15
3.	3.50		3	28.	4.50		16
4.	3.00		4	29.	4.50		17
5.	4.00		5	30.	4.0		18
6.	3.75		6	31.	4.50		19
7.	3.75		7	32.	4.75	END	20
8.	4.00		8	33.	3.75	DEM-04	1
9.	3.50		9	34.	4.0		2
10.	3.75		10	35.	3.50		3
11.	3.50		11	36.	3.75		4
12.	4.00	END	12	37.	4.0		5
13.	4.25	JCB-02	1	38.	4.0		6
14.	4.00		2	39.	4.0		7
15.	4.50		3	40.	4.25		8
16.	4.25		4	41.	4.0		9
17.	4.25		5	42.	3.75		10
18.	4.25		6	43.	3.75		11
19.	4.00		7	44.	3.75		12
20.	4.00		8	45.	4.0		13
21.	4.25		9	46.	4.25		14
22.	4.25		10	47.	4.0		15
23.	4.25		11	48.	3.50		16
24.	4.50		12	49.	3.50		17
25.	4.25		13	50.	3.25		18

FIGURE A-1-1 Example of Golden Nematode Laboratory Sample Processing Daily

Purpose

The *Golden Nematode Laboratory Sample Processing Daily* worksheet is used by the laboratory leader to assign beaker numbers to the sample collections; to complete other forms; to reconcile samples with a positive or negative determination; and to determine who made the determination on a particular bag or beaker.

The worksheet is also used by biological laboratory technicians to record the beaker numbers assigned on the sheet to the sample bags in each collection before processing.

Instructions

The worksheet is first written in advance of processing a sample collection from the information on PPQ Form 312. The worksheet is next used to record sample weight as each sampled is being weighed, and then during sample collection lab processing, to record the lab results. Continue to **Table A-1-1 on page A-1-5** to complete the *Golden Nematode Laboratory Sample Processing Daily* sheet.

TABLE A-1-1 Instructions for Completing Golden Nematode Laboratory Sample Processing Daily Sheet

Block	Completed by	Instructions
BEAKER NO.	Laboratory leader	<p>This column is pre-numbered 1-50 on the front side of the sheet, and 1-50 on the back side of the sheet to match the beaker numbers 1-50 used throughout sample processing to track samples. If there are more than 50 sample beakers in a collection, then once sample in beaker 50 is processed, then start again with a sample beaker number 1</p> <ol style="list-style-type: none"> 1. TAKE the <i>Sample Storage Worksheet (Rack Sheet)</i> from the rack room shelf 2. GO to the collection that is ready for sample processing 3. ENTER the collection number in the first blank BEAKER NO. block
WEIGHT	Laboratory leader	<ol style="list-style-type: none"> 1. WEIGH the sample bag 2. LIST the weight
COLL. NO.	Biological laboratory technician	<ol style="list-style-type: none"> 1. If you have collected and placed all the cysts in vials, then GO to the BEAKER NO. column and LOCATE the sample bag collection number and beaker number 2. CONFIRM the actual beaker sample you are reading and the sample bag collection number listed under BEAKER NO. are the same 3. ENTER under COLL. NO., the number of cysts collected for identification
BAG NO.	Laboratory leader	<ol style="list-style-type: none"> 1. FIND the sample bag collection number listed in the BEAKER NO. block 2. GO to the <i>Sample Storage Worksheet (Rack Sheet)</i> under COLLECTION to FIND the same collection number; and FIND under NO. OF SAMPLE the number of samples in the collection 3. GO to the <i>Golden Nematode Laboratory Sample Processing Daily</i> worksheet in the BEAKER NO. column and LOCATE the sample bag collection number 4. GO across the row to the BAG NO. column, ENTER a 1, and continue entering the sample bag numbers until you have listed every bag in the collection <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>EXAMPLE There are 18 sample bags in the collection DEM-02. The collection number is listed in BEAKER NO. <i>Block 9</i>, List sample bag number 1 in the BAG NO. block across from BEAKER NO. 9, and ENTER 2 across from BEAKER NO. 10., and CONTINUE until you enter an 18 under the BAG NO. block across from BEAKER NO. 26.</p> </div> <ol style="list-style-type: none"> 5. If there are more than 50 bags in a collection, then START a new <i>Golden Nematode Laboratory Sample Processing Daily</i> worksheet and place a 2 in upper right corner of sheet and continue numbering by starting again with Beaker No. 1

Distribution

Distribute the completed *Golden Nematode Laboratory Sample Processing Daily* worksheet as follows:

1. The biological laboratory aide, etc., clips each completed sheet beneath the blank sheets on the clipboard.
2. The laboratory leader removes the completed sheets weekly and files them in the *Golden Nematode Sample Processing Daily* file in the laboratory.
3. The laboratory leader submits the *Golden Nematode Sample Processing Daily* file to the laboratory supervisor weekly.

Purpose

The *Golden Nematode Regulatory Cleaning Activity* worksheet is used to keep track of pieces of equipment (farming, utility) that are cleaned using water-under-pressure (pressure washing).

Instructions

The *Golden Nematode Regulatory Cleaning Activity* worksheet is completed for a one-week period by the person doing the actual pressure washing (officer, technician, or tractor operator) in field.

TABLE A-1-2 Instructions for Completing Golden Nematode Regulatory Cleaning Activity Worksheet

Block	Instructions
Date Requested	List the date the request to clean equipment is received
Date Cleaned	List the date the equipment is cleaned
Grower/Operator	List the farmer's or operator's name
Type of Equipment	List the equipment and quantity cleaned
Cleaned by	List the name of person pressure washing the equipment
Location Moved From	List the field address and/or field number where the equipment being cleaned is moved from
Location Moved To	List the field address and/or field number where the cleaned equipment is being moved to
Remarks	List any special information, such as the certificate number, etc.

Distribution

The completed *Golden Nematode Regulatory Cleaning Activity* worksheet is distributed as follows:

1. Weekly, the person who does the water-under-pressure (pressure wash) cleaning and completes the worksheet gives the form to the PPQ Officer for the area.
2. The PPQ Officer for the area gives the completed forms to the PPQ Supervisor.

Purpose

The *Golden Nematode Survey Data* worksheet is used to collect and record information during the interview with the grower or farmer prior to conducting the survey.


Instructions

The *Golden Nematode Survey Data* worksheet is completed by the PPQ Plant Health Safeguarding Specialist (PHSS) or designee (PPQ technician), during the pre-survey interview with the farmer/grower. The PHSS will review and give the worksheet to the laboratory leader. The laboratory leader will then compile the information from each PHSS into a master document and review. Follow the instructions in **Table A-1-3 on page A-1-10** to complete the form.

TABLE A-1-3 Instructions for Completing Golden Nematode Survey Data Worksheet

Block		Instructions
1	COUNTY	LIST the name of the county where land to survey is located
2	YEAR	LIST the year the survey will be conducted
3	GROWER	LIST the name of the grower or the name of the farm where the survey will be conducted
4	DATE	LIST the date the interview is being conducted and this questionnaire is completed
5	TOTAL ACRES IN POTATOES	LIST the total number of acres planted to potatoes
6	TOTAL ACRES (RESISTANT VARIETIES)	LIST the total number of acres planted to resistant varieties of potatoes
7	TOTAL ACRES TO SURVEY	LIST the total number of acres to survey Formula: Total acres of potatoes - Total acres/resistant varieties = Total acres to survey

TABLE A-1-3 Instructions for Completing Golden Nematode Survey Data Worksheet (continued)

Block	Instructions
FIELD NUMBER	<ul style="list-style-type: none"> ◆ If there is a historical record, then OBTAIN the field number from the file and LIST the field number (prior to survey/questionnaire interview or before survey) ◆ If there is no historical record, then leave blank
NON-EXPOSED ACRES	◆ LIST the number of acres surveying as non-exposed (to golden nematode); if land is not regulated then enter the number of acres as non-exposed; and if none, then leave blank
EXPOSED ACRES	<p>LIST the number of exposed acres. If none, then leave blank</p> <div style="display: flex; align-items: center;">  <div style="border: 1px solid black; padding: 5px; background-color: #e0f2f1;"> <p>Important</p> <p>If a grower has acreage elsewhere that is regulated, then all the grower's acreage is counted as exposed acres.</p> </div> </div>
SEED ACRES	If any acreage is planted to seed potatoes, then LIST the number of acres; otherwise leave blank
Ro2 ACRES	If the land or field had a previous positive find for Ro2 golden nematode, then LIST the total acres; otherwise leave blank
POST RV TREATMENT ACRES	If the acreage is planted to resistant variety (RV) potatoes, then LIST the number of acres (survey the first year after RV harvest); otherwise, leave blank
1ST SUSCEPTIBLE AFTER TREATMENT ACRES	If the acreage is planted to a non-resistant variety the first year after resistant variety (RV) treatment 2-3 years previous, then LIST the number of acres; otherwise leave blank
MECH 200K	If a mechanical survey 200K (3 wheels, 4 probes each) is recommended, then PLACE an X in this block; otherwise leave blank
MECH 500K	If a mechanical survey 500K (2 wheels, 4 probes each) is recommended, then PLACE an X in this block; otherwise leave blank
MAN 4 X 8	If a manual survey 4 x 8 block method is recommended, then PLACE an X in this block; otherwise leave blank
NOTES	<p>LIST any other relevant information</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>EXAMPLE Field DEM-02 planted 1/3 RV potatoes; 1/3 susceptible potatoes; 1/3 corn.</p> </div>

Distribution

The PHSS will distribute the completed *Golden Nematode Survey Data Worksheet* as follows:

1. GIVE a copy to the supervisor before the survey begins.
2. Keep the original for the program file.

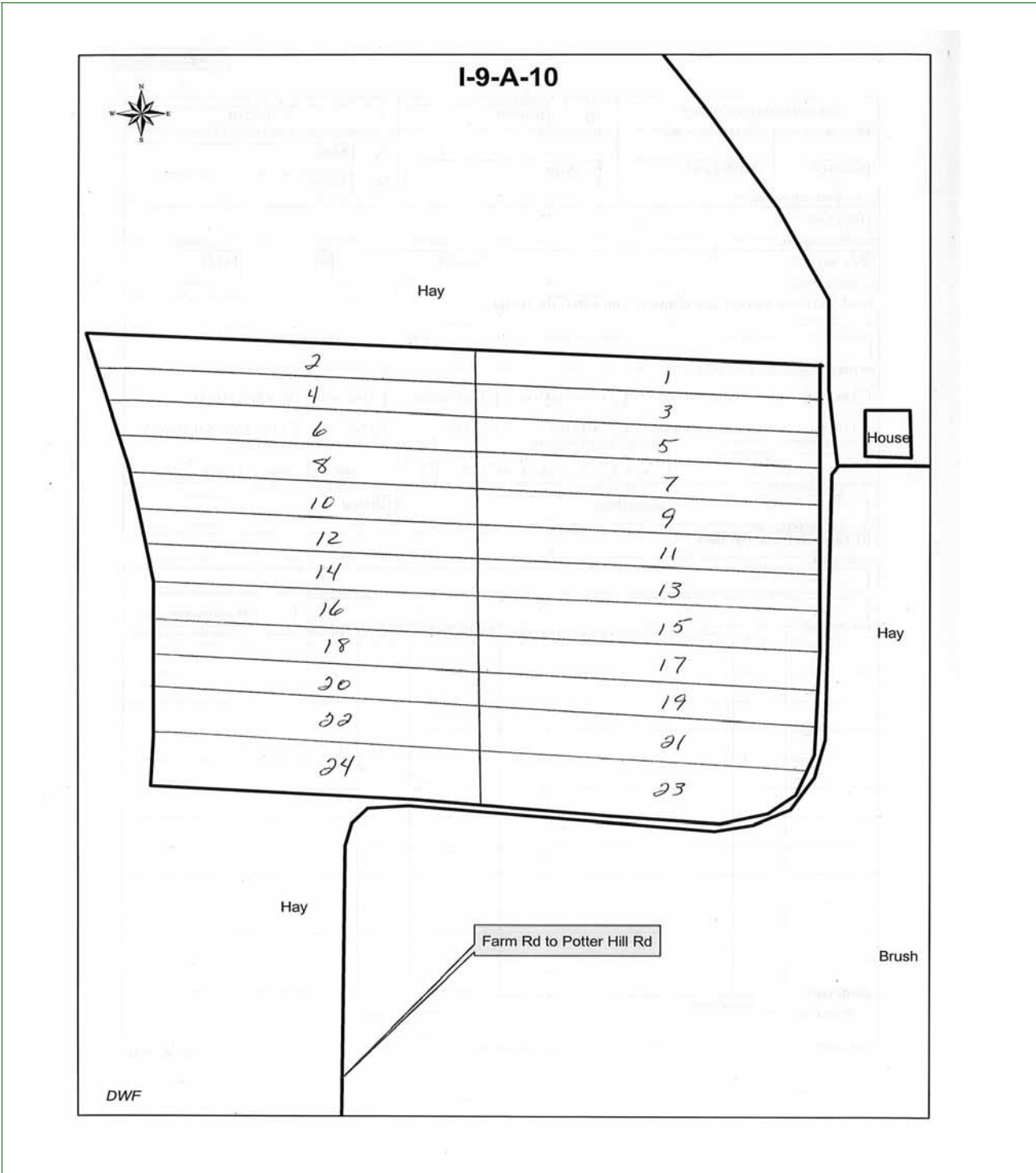


FIGURE A-1-5 Example of GIS image of a survey site (ArcView)

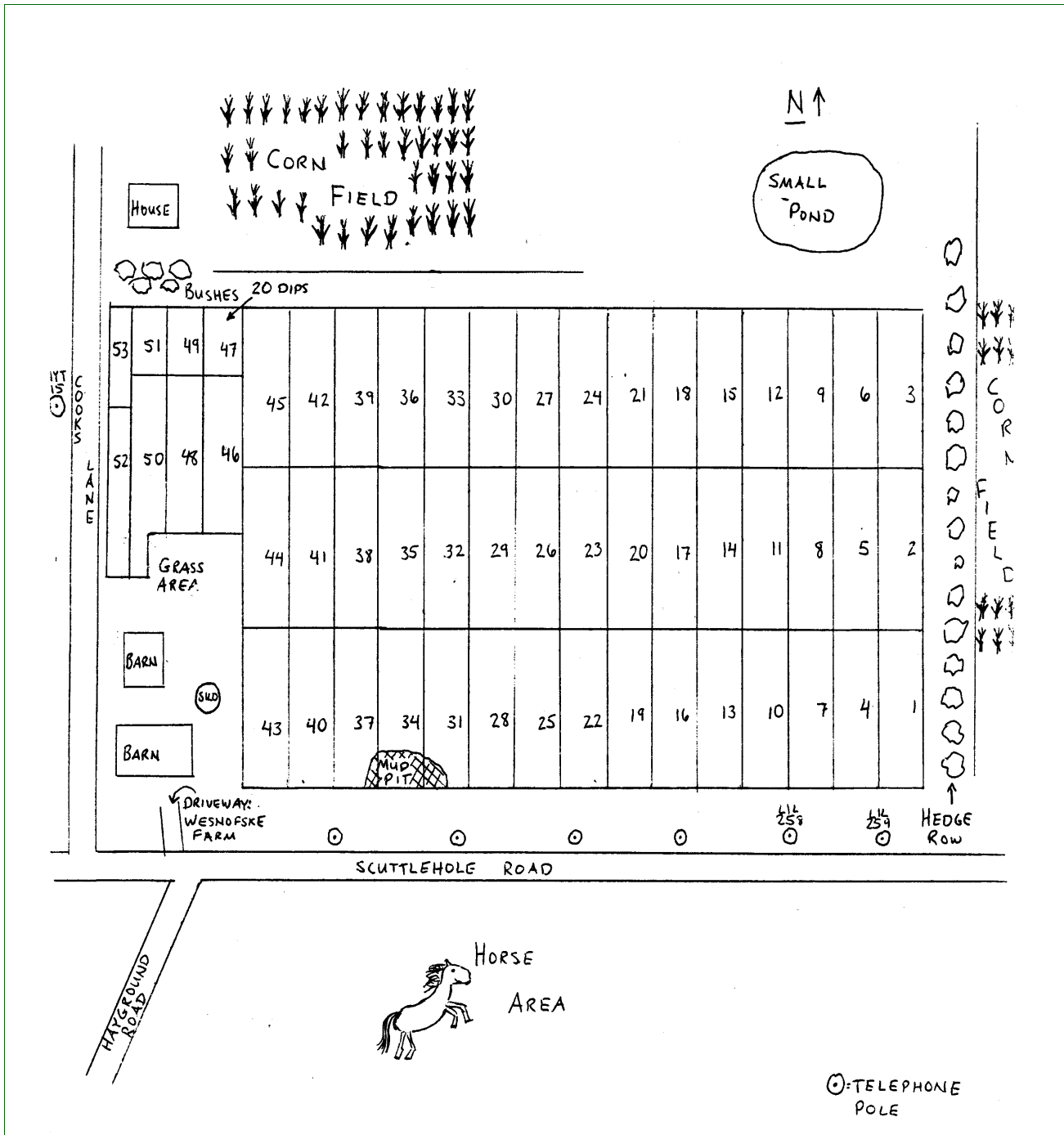


FIGURE A-1-6 Example of hand-drawn diagram of a sample collection grid

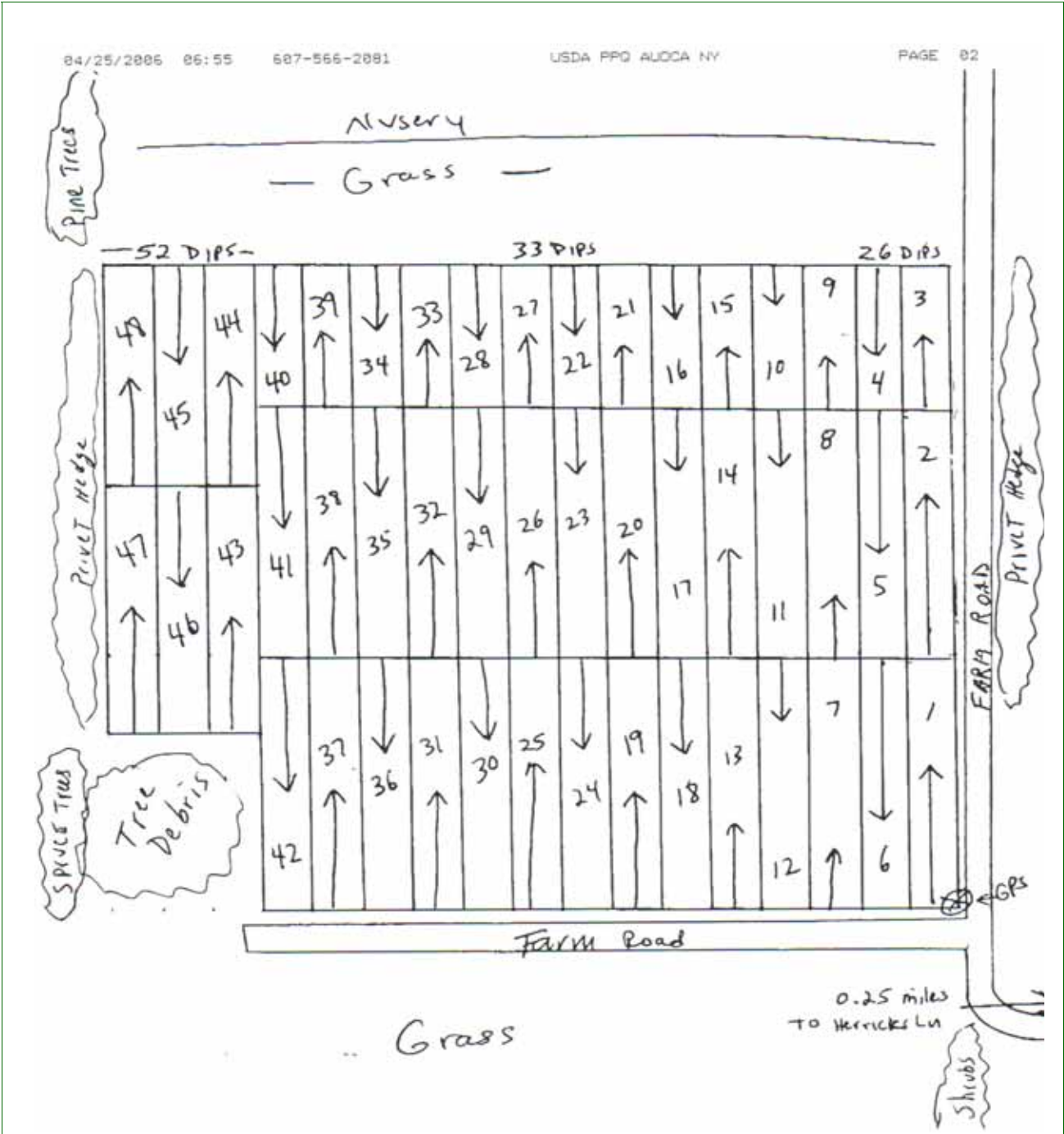


FIGURE A-1-7 Example of a hand-drawn nursery survey with grid

Purpose

PPQ Form 312, Golden Nematode Survey, is used to document information collected during field surveys for golden nematode. A map of the property inspected is placed on the reverse side of the form. The map is important for locating and returning to the same field in the event that golden nematode is found or further survey is needed.

Instructions

The collecting officer or crew leader completes the upper half of the front side and the reverse side of PPQ Form 312. Work Unit personnel complete the lower half of the front side.

The crew leader completes the remaining information in the field when conducting the survey. The PHSS reviews the completed PPQ Form 312.

Prior to going to the survey site, the PHSS or technician will obtain a GIS map of the survey site (Google Maps Satellite), and add the GPS reading NW (latitude/longitude) on the field map. Attach the map to the reverse side of PPQ Form 312.

If a satellite map is **not** available, then the crew leader will draw a simple diagram of the property and indicate NW on the map. This diagram is important for locating and returning to the same field in the event golden nematode is found or further survey is needed. The rough sketch should include enough landmarks, telephone pole numbers, and road names so that the field may be easily located. See the GIS example in **Figure A-1-5** on page A-1-13, and the hand-drawn maps in **Figure A-1-6** on page A-1-14 and **Figure A-1-7** on page A-1-15.

During the actual sample collection, the crew leader uses the map to indicate the number of dips taken from first row and last row of each field sampled.

Continue to **Table A-1-6** on **page A-1-23** and follow the instructions for completing the form.

TABLE A-1-4 Instructions for Completing PPQ Form 312, Golden Nematode Survey

Block		Completed by	Instructions
1	STATE	Crew leader or tractor driver	If not preprinted, then LIST the State where the collection was made
2	COUNTY	Crew leader or tractor driver	LIST the county where the samples were taken
3	TOWNSHIP	Crew leader or tractor driver	LIST the name of the township where the samples were taken
4	DATE OF SURVEY	Crew leader or tractor driver	LIST the date of the survey; and if the survey was conducted more than one day, then LIST the start and end dates
5	COLLECTION NUMBER	Crew leader or tractor driver	LIST the collection number
6	FIELD NUMBER	Crew leader or tractor driver	LIST the field number (see the historical files or maps in the Work Unit files)
7	LATTITUDE/LONGITUDE OF ENTRANCE POINT	Crew leader or tractor driver	LIST the latitude and longitude of entrance to the field (GPS coordinates) North and West
8	NAME OF FARM OPERATOR	Crew leader or tractor driver	LIST the name of the farmer or grower where the collection was made
9	MAILING ADDRESS	Crew leader or tractor driver	LIST the farm operator's mailing address
10	FIELD LOCATION	Crew leader or tractor driver	WRITE a short narration of the location of the field on the property; and may also LIST odometer readings for mileage directions
11	TYPE OF SURVEY	Crew leader or tractor driver	PLACE an X in all the appropriate boxes to indicate the type of survey conducted
12	NO. SAMPLES	Crew leader or tractor driver	LIST the total number of sample bags taken in the collection
13	MANUAL SURVEY PATTERN	Crew leader or tractor driver	PLACE an X in the appropriate manual survey pattern box (8x8, 4x8, 4x4, or 2x2)
14	MECHANICAL SURVEY PATTERN	Crew leader or tractor driver	PLACE an X in the box to indicate the method of mechanical survey taken (100K, 200K, or 500K)
15	NO. ACRES SURVEYED	Crew leader or tractor driver	LIST the quantity of acres surveyed

TABLE A-1-4 Instructions for Completing PPQ Form 312, Golden Nematode Survey (continued)

Block		Completed by	Instructions
16	POTATO VARIETY	Crew leader or tractor driver	<ul style="list-style-type: none"> ◆ If the field was planted to potatoes, then list the variety ◆ If the field was not planted to potatoes, then leave blank
17	SOIL TYPE	Crew leader or tractor driver	LIST the type of soil in the survey (mineral or muck)
18	NAMES OF COLLECTORS	Crew leader or tractor driver	LIST the names of the crew members collecting samples
19	REMARKS	Crew leader or tractor driver	LIST any remarks related to the area survey area
	INITIAL (first survey ever)	PPQ Officer or laboratory leader	<ul style="list-style-type: none"> ◆ If this is the first survey ever conducted on this field, then PLACE an X in the block ◆ If this is not the first survey ever conducted, then leave blank
	POSITIVE SAMPLE NUMBER	PPQ Identifier	Identifier with official golden nematode identification authority completes
	CYSTS	PPQ Officer or laboratory leader	LIST the number of cysts found
	IDENTIFICATION NO. OF SLIDES AND VIALS FILED	PPQ Identifier	LIST the identification number of any slides and vials filed
20	DETERMINED BY	PPQ Identifier	Identifier with official golden nematode identification authority completes this block
21	DATE	PPQ Officer or Laboratory leader	ENTER date PPQ Officer or laboratory leader signs the form

Distribution

Distribute the completed PPQ Form 312 as follows:

1. File the original in the program folder.
2. If the field is confirmed as infested, then file a copy in the *Infested Field* folder.
3. Give a copy to the supervisor.

PPQ Form 333, Cyst Nematode Field Survey Log

CYST NEMATODE FIELD SURVEY LOG			COUNTY Washington		STATE NY		
			PERIOD 7/7 - 7/11/2008		NAME OF INSPECTOR Sam Smith		
COLLECTION NUMBER	COLLECTION DATE	OPERATOR	FIELD NUMBER	MECHANICAL		MANUAL	
				Samples	Acres	Samples	Acres
		THO-1	II 3-A-4	30	13		
		THO-2	II 3-B-18	130	64		
		THO-3	II 3-C-48	58	27		
		DEZ-1	I-5-A-3	10	5		
TOTAL →				228	109		

PPQ FORM 333
JUNE 2007

USDA-APHIS

FIGURE A-1-8 Example of PPQ Form 333, Cyst Nematode Field Survey Log

Purpose

The *PPQ Form 333, Cyst Nematode Field Survey Log*, is a summary of survey collections made by county during a specific period of time. A separate log is maintained weekly for each county in which surveys are conducted.

Instructions

The *Cyst Nematode Field Survey Log* is completed by the crew leader or the tractor driver. For each county, gather the completed *Golden Nematode Laboratory Sample Processing Daily* sheets for the specified time period and the completed *PPQ Form 312, Golden Nematode Survey* sheets for the specified time period. Continue to [Table A-1-5](#) to complete the *Cyst Nematode Field Survey Log*.

TABLE A-1-5 Instructions for Completing Cyst Nematode Field Survey Log

Block	Completed by	Instructions
County	Crew leader or tractor driver	SEE PPQ Form 312 and LIST the county where the surveys have been conducted
State	Crew leader or tractor driver	SEE PPQ Form 312 and LIST the State where the surveys have been conducted
Period	Crew leader or tractor driver	LIST the begin and end dates covered on the log
Inspector	Crew leader or tractor driver	LIST the name of the PPQ inspector
Collection Number	Crew leader or tractor driver	LIST the collection number from each PPQ Form 312
Collection Date	Crew leader or tractor driver	LIST the date each collection was made
Operator	Crew leader or tractor driver	LIST the name of the tractor operator (if mechanical survey) or the name of the person(s) conducting the manual survey
Field Number	Crew leader or tractor driver	LIST each field number in the survey
Mechanical Samples/Acres	Crew leader or tractor driver	If a mechanical survey, then LIST the number of samples collected and acres sampled from each field number for each collection If not a mechanical survey, then leave blank
Manual Samples/Acres	Crew leader or tractor driver	If a manual survey, then LIST the number of samples collected and acres sampled from each field number for each collection; If not a manual survey, then leave blank
TOTAL	Crew leader or tractor driver	1. ADD the number of samples collected and LIST the total 2. ADD the acres surveyed for all the collections, and LIST the total

Distribution

Give the completed *PPQ Form 333, Cyst Nematode Field Survey Log* to the laboratory supervisor periodically, and at the end of the survey.

PPQ Form 391, Specimens for Determination

This report is authorized by law (7 U.S.C. 147a). While you are not required to respond your cooperation is needed to make an accurate record of plant pest conditions. *See reverse for additional OMB information.* **FORM APPROVED OMB NO. 0579-0010**

**U.S. DEPARTMENT OF AGRICULTURE
 ANIMAL AND PLANT HEALTH INSPECTION SERVICE
 SPECIMENS FOR DETERMINATION**

Instructions: Type or print information requested. Press hard and print legibly when handwritten. Item 1 - assign number for each collection beginning with year, followed by collector's initials and collector's number. Example (collector, John J. Dingle): 83-JJD-001.
Pest Data Section - Complete Items 14, 15 and 16 or 19 or 20 and 21 as applicable. Complete Items 17 and 18 if a trap was used.

FOR IIBIII USE
 LOT NO. _____
 PRIORITY _____

1. COLLECTION NUMBER: 05-ENJ-001 I-11-D-5

2. DATE: MO 01 DA 03 YR 05

3. SUBMITTING AGENCY: State Cooperator PPQ Other _____

4. NAME OF SENDER: Edward N. Jones

6. ADDRESS OF SENDER: 8237 Kanona Road, Avoca, NY, ZIP 14809

5. TYPE OF PROPERTY (Farm, Feedmill, Nursery, etc.): Farm

7. NAME AND ADDRESS OF PROPERTY OR OWNER: ABC Farms, R.D. #2, Arkport, NY, COUNTRY/COUNTY Steuben

8. REASON FOR IDENTIFICATION ("X" ALL Applicable Items):
 A. Biological Control (Target Pest Name)
 B. Damaging Crops/Plants
 C. Suspected Pest of Regulatory Concern (Explain in REMARKS)
 D. Stored Product Pest
 E. Livestock, Domestic Animal Pest
 F. Possible Immigrant (Explain in REMARKS)
 G. Survey (Explain in REMARKS)
 H. Other (Explain in REMARKS)

9. IF PROMPT OR URGENT IDENTIFICATION IS REQUESTED, PLEASE PROVIDE A BRIEF EXPLANATION UNDER "REMARKS".

10. HOST INFORMATION: NAME OF HOST (Scientific name when possible): Solanum tuberosum

11. QUANTITY OF HOST PLANTS AFFECTED (Insert figure and indicate Number Percent): 15 acres

12. PLANT DISTRIBUTION: LIMITED SCATTERED WIDESPREAD

13. PLANT PARTS AFFECTED: Leaves, Upper Surface Leaves, Lower Surface Petiole Stem Trunk/Bark Branches Growing Tips Roots Bulbs, Tubers, Corms Buds Flowers Fruits or Nuts Seeds

14. PEST DISTRIBUTION: FEW COMMON ABUNDANT EXTREME

15. INSECTS NEMATODES MOLLUSKS

NUMBER SUBMITTED	LARVAE	PUPAE	ADULTS	CAST SKINS	EGGS	NYMPHS	JUVS.	CYSTS
ALIVE								
DEAD								

16. SAMPLING METHOD: Soil sample

17. TYPE OF TRAP AND LURE: Samples

18. TRAP NUMBER: Soil Samples 16, 18, 19, 20, 30

19. PLANT PATHOLOGY - PLANT SYMPTOMS ("X" one and describe symptoms): ISOLATED GENERAL

20. WEED DENSITY: FEW SPOTTY GENERAL

21. WEED GROWTH STAGE: SEEDLING VEGETATIVE FLOWERING/FRUITING MATURE

22. REMARKS: PROMPT determination requested; detection outside quarantine area. New Township Record, Fremont Township, Steuben County, New York

23. TENTATIVE DETERMINATION: 50 Globodera rostochiensis cysts, viable and nonviable. DET: E. N. Jones

24. DETERMINATION AND NOTES (Not for Field Use)

SIGNATURE _____ **DATE** _____

FOR IIBIII USE
 DATE RECEIVED _____
 NO. LABEL SORTED PREPARED _____
 DATE ACCEPTED _____
 RR _____

PPQ FORM 391 (AUG 02) Previous editions are obsolete.

This is a 6-Part form. Copies must be disseminated as follows:
 PART 1 - PPQ PART 2 - RETURN TO SUBMITTER AFTER IDENTIFICATION PART 3 - IIBIII OR FINAL IDENTIFIER
 PART 4 - INTERMEDIATE IDENTIFIER PART 5 - INTERMEDIATE IDENTIFIER PART 6 - RETAINED BY SUBMITTER

FIGURE A-1-9 Example of PPQ Form 391, Specimens for Determination

Purpose

In the Golden Nematode Program, *PPQ Form 391, Specimens for Determination*, is submitted along with specimens sent for positive or negative identification from the golden nematode surveys.

In addition, *PPQ Form 391* is also used for other domestic collections (other special survey programs, export certification, local and individual collections, and warehouse inspections).

Instructions

Follow the instructions in [Table A-1-6](#) to complete PPQ Form 391.

TABLE A-1-6 Instructions for Completing PPQ Form 391, Specimens for Determination

Block	Instructions
1	<p>COLLECTION NUMBER</p> <p>1. ASSIGN a collection number for each collection as follows: last 2 digits of the current year - collector's initials - 3-digit number, starting with 001</p> <p>2. CONTINUE consecutive numbering for each subsequent collection</p> <p>EXAMPLE In 2008, Samuel A. Jones collected his first specimen for determination of the year. His first collection number is 08-SAJ-001.</p> <p>3. ENTER the collection number</p>
2	DATE ENTER the date of the collection
3	SUBMITTING AGENCY PLACE an X in the PPQ block
4	NAME OF SENDER LIST the sender's or collector's name
5	TYPE OF PROPERTY LIST the type of property where the specimen was collected (farm, feed mill, nursery, etc.)
6	ADDRESS OF SENDER List the sender's or collector's address
7	NAME AND ADDRESS OF PROPERTY OR OWNER List the name and address of the property where the specimen was collected
8A-8H	REASONS FOR IDENTIFICATION PLACE X in the SURVEY block
9	IF PROMPT OR URGENT IDENTIFICATION IS REQUESTED, PLEASE PROVIDE A BRIEF EXPLANATION UNDER "REMARKS" LEAVE blank; ENTER remarks in <i>Block 22</i>
10	HOST INFORMATION NAME OF HOST If known, ENTER the scientific name of the host
11	QUANTITY OF HOST If applicable, ENTER the number of acres planted with the host
12	PLANT DISTRIBUTION PLACE an X in the applicable box
13	PLANT PARTS AFFECTED LEAVE blank

TABLE A-1-6 Instructions for Completing PPQ Form 391, Specimens for Determination (continued)

Block		Instructions
14	PEST DISTRIBUTION FEW/COMMON/ABUNDANT/EXTREME	PLACE an X in the appropriate block
15	INSECTS/NEMATODES/MOLLUSKS	PLACE an X in the NEMOTODES box to indicate type of specimen
	NUMBER SUBMITTED	ENTER the number of specimens submitted as ALIVE or DEAD under the appropriate stage (i.e., CYSTS)
16	SAMPLING METHOD	LIST "Soil sample"
17	TYPE OF TRAP AND LURE	LIST "Samples"
18	TRAP NUMBER	LIST the soil sample numbers
19	PLANT PATHOLOGY-PLANT SYMPTOMS	If applicable, check the appropriate box; otherwise LEAVE blank
20	WEED DENSITY	LEAVE blank; not applicable
21	WEED GROWTH STAGE	LEAVE blank; not applicable
22	REMARKS	If PROMPT or URGENT identification is required, indicate and give a brief explanation
23	TENTATIVE DETERMINATION	LIST the quantity of suspected golden cysts being sent; and DET: [initials and last name] for tentative determination
24	DETERMINATION AND NOTES (Not for Field Use)	LEAVE blank; will be completed by the official identifier

Distribution

Distribute the completed PPQ Form 391 as follows:

1. Retain *Part 1* at the Work Unit file.
2. Send *Parts 2, 3, 4, and 5* along with the specimens to the official golden nematode identifier.
3. Place *Part 6* in the program file.
4. If confirmed as a non-infested field (negative survey), then file *Part 2* in the county file folder. If the field is numbered with a Roman numeral, file in the field folder (i.e., Upstate NY).
5. If confirmed as an infested field (positive survey), then attach PPQ Form 391 to PPQ Form 312, and file in the *Infested Field* folder.

PPQ Form 519, Compliance Agreement


<p>According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control numbers for this information collection are 0579-0054, 0088, 0129, 0198, 0238, 0257, 0306, 0310. The time required to complete this information collection is estimated to average 1.25 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.</p>		<p>FORM APPROVED OMB NUMBER 0579-0054/0088/0129/0198/0238/0257/0306/0310</p>
UNITED STATES DEPARTMENT OF AGRICULTURE ANIMAL AND PLANT HEALTH INSPECTION SERVICE PLANT PROTECTION AND QUARANTINE		COMPLIANCE AGREEMENT
1. NAME AND MAILING ADDRESS OF PERSON OR FIRM Federal Nematode Laboratory One Special University Ithaca, New York 14850		2. LOCATION Certainty Farm 8109 Farm Lane Absolute, NY 17111
3. REGULATED ARTICLE(S) Soil samples for analysis		
4. APPLICABLE FEDERAL QUARANTINE(S) OR REGULATIONS GOLDEN NEMATODE - 7CFR 301.85		
5. I/WE AGREE TO THE FOLLOWING: <ol style="list-style-type: none"> All shipments of soil must be in a sturdy, leakproof container which will preclude spillage or pest escape in transit and while samples are awaiting processing. Packages should be labeled "Contents - Soil Samples." Used shipping containers must be decontaminated by one of the treatments approved for soil (see 4., on the attached page). Soil samples will not be reshipped to other laboratories unless such a laboratory has a valid permit and compliance agreement for imported soil, or a valid compliance agreement for domestic soil. <p>(continued)</p>		
6. SIGNATURE 	7. TITLE Assistant Professor	8. DATE SIGNED 07-13-07
The affixing of the signatures below will validate this agreement which shall remain in effect until cancelled, but may be revised as necessary or revoked for noncompliance.		9. AGREEMENT NO. SAK07GN
		10. DATE OF AGREEMENT July 13, 2007
11. PPQ/CBP OFFICIAL (NAME AND TITLE) Ima Jones, PHSS	12. ADDRESS U.S. Department of Agriculture, APHIS Plant Protection and Quarantine 8237 Kanona Road Avoca, NY 14809 607/566-2212	
13. SIGNATURE		
14. U.S. GOVERNMENT/STATE AGENCY OFFICIAL (NAME AND TITLE) Robert Flowers SR. Horticultural Inspector	15. ADDRESS Anyhow State Department of Agriculture and Markets Division of Plant Industry PO Box 57 Directly, NY 17111	
16. SIGNATURE		
PPQ FORM 519 (MAY 2007)		

FIGURE A-1-10 Example of PPQ Form 519, Compliance Agreement

GOLDEN NEMATODE QUARANTINE
7 CFR 301.85
New York State Part 127

The civil divisions and parts of civil divisions described below are designated as Golden Nematode Regulated Areas:

- (a) Cayuga County – the towns of Montezuma and Mentz
- (b) Genesee County – the towns of Elba and Byron.
- (c) Livingston County – the towns of Avon, Caledonia, Geneseo, Groveland, Leicester, Lima, Livonia, Mount Morris, West Sparta, and York.
- (d) Nassau County – the entire county.
- (e) Orleans County – the towns of Barre and Clarendon.
- (f) Seneca County – the town of Tyre.
- (g) Steuben County – the towns of Prattsburgh and Wheeler; that area known as “Arkport Muck” located in the town of Dansville and bounded by a line beginning at a point where the Conrail right-of-way (Eric Lackawanna Rail Road) intersects County Road 52 (known as Burns Road), then north and northeast along County Road 52 to its junction with New York Route 36, then south and southeast along New York Route 36 to its intersection with the Dansville Town Line, then west along the Dansville Town Line to its intersection with the Conrail right-of-way, then north and northwest along the Conrail right-of-way to the point of beginning; and the farm located in the town of Cohocton on the north side of County Road 5 (known as Brown Hill Road), and 0.2 mile west of the Junction of County Road 5 with County Road 58 (known as Wager Road).
- (h) Suffolk County – the entire county
- (i) Wayne County – the town of Savannah.

A map showing the location of the above listed regulated areas is provided with this agreement for reference. A State or Federal Inspector should be consulted if there is any question regarding location of GN regulated areas.

FIGURE A-1-11 Example of PPQ form 519, Compliance Agreement Attachments (page 1)

GOLDEN NEMATODE QUARANTINE

Regulated Articles

7 CFR 301.85

New York State Part 127

The Following Regulated Articles Require a Certificate or Permit Year-Round as Indicated:

1. Soil, compost, humus, muck, peat, and decomposed manure, separately or with other things. Soil samples shipped to approved laboratories do not require attachment of a certificate or permit.*
2. Plants with roots, except soil-free aquatic plants.
3. Grass sod.
4. Plant crowns and roots for propagation.
5. True bulbs, corms, rhizomes, and tubers, of ornamental plants.
6. Irish potatoes and other root crops. Irish potatoes (other than that for seed) are exempt** if graded at an approved grader or washed free of soil, and packaged in approved containers, unless otherwise notified by an inspector. Potatoes from non-infested fields may be shipped to Puerto Rico in new burlap bags. Root crops (other than Irish potatoes and sugar beets) are exempt** if moved in approved containers, unless otherwise notified by an inspector.
7. Small grains and soybeans. Small grains are exempt** if harvested in bulk or directly into approved containers, and if the small grains and containers thereof have not come into contact with the soil; or, if they have been cleaned to meet State seed sales requirements. Soybeans (other than for seed) are exempt** if harvested in bulk or directly into approved containers, and if the soybeans and containers thereof have not come into contact with the soil.
8. Hay, straw, fodder, and plant litter of any kind. Hay, straw, fodder, and plant litter are exempt** if moved in approved containers, unless otherwise notified by an inspector.
9. Ear corn except, shucked ear corn. Unshucked ear corn is exempt** if harvested in bulk or directly into approved containers, and if the corn and containers thereof have not come into contact with the soil.
10. Used crates, boxes, and burlap bags, and other used farm products containers.
11. Used farm tools. Used farm tools, are exempt** if cleaned free of soil.
12. Used mechanized cultivating and used harvested equipment.
13. Used mechanized soil-moving equipment.
14. Any other products, articles, or means of conveyance, of any character whatsoever, not covered by the above when it is determined by an inspector that they present a hazard of spread of golden nematode and the person in possession thereof has been so notified.

*Information as to approved laboratories may be obtained from an inspector.

**Exemption applies only if there has been no exposure to infestation after cleaning or other prescribed handling

FIGURE A-1-12 Example of PPQ form 519, Compliance Agreement Attachments (page 2)

GOLDEN NEMATODE QUARANTINE
COMPLIANCE AGREEMENT
7 CFR 301.85
New York State Part 127

Stipulations

I/We of, _____ agree to the following:

1. There will be no seed potato production for own use or resale.
2. Farm equipment, construction equipment, vehicles, and containers used in Golden Nematode regulated areas will not be moved unless a state or federal inspector deems the equipment does not present a risk of spread of Golden Nematode (GN.) Equipment determined to have no risk of Golden Nematode infestation is permitted to move without treatment. This determination will be made by the State or Federal Inspector.
3. Equipment used on all farm operations, prior to being sold, given away, or moved to any location outside of the quarantined area will be treated under the supervision of a State or Federal Inspector. This includes custom applicators, rental equipment, demonstration equipment, borrowed equipment, etc.
Notification shall be given as far in advance as possible (a minimum of 48 hours) before the planned move. Determination whether the equipment requires any treatment will be made by a State or Federal Inspector.

If the Inspector determines that treatment is needed, the treatment will be:

- (a) washing with water under pressure;
 - (b) steam treatment;
 - (c) methyl bromide fumigation;
 - (d) any combination of (a), (b) or (c).
4. The Inspector will be notified of any new land acquired for host crop production, and the selling or leasing of any Quarantined land to other parties.
 5. All fields Regulated for GN are to be posted with Quarantine signs, provided by NY State. All traffic will be controlled by the landowner, and is subject to cleaning & treatment as determined by the Inspector.
 6. Burlap or cloth bags are prohibited as containers for shipping potatoes or other GN host crops.
 7. A Permit is required for movement of all potatoes grown within the Quarantine to other states. A list of all consignees to which potatoes from infested fields are shipped, and their addresses, will be provided to the Inspector. Unless consignees are also under Compliance Agreement, potatoes from infested fields are only eligible for movement if they have been washed, brushed or graded and all excess soil removed to the satisfaction of the Inspector. The Inspector will be notified prior to grading and washing of potatoes from any infested fields.

FIGURE A-1-13 Example of PPQ form 519, Compliance Agreement Attachments (page 3)

8. The Inspector will be notified of any new grader stations or storage barns, where grader debris and wash water effluent will be disposed on approved non-agricultural sites. Currently these approved facilities are limited to the following:

Site	Location	GPS

9. Designated areas will be provided and maintained for the purpose of washing used farm equipment. This area will consist of either pavement, a thick layer of coarse gravel or other material which will allow waste water to adequately drain into an approved area. The road leading away from the sanitation area or pad will be kept free from excessive soil buildup to prevent recontamination of cleaned farm equipment. Currently these approved areas are limited to the following:

Location	GPS

10. Pressure washing and steam treatment of used farm equipment will be provided at no cost to the grower or equipment operator. The USDA is not liable for damages to equipment due to official USDA treatments.

A State or Federal Inspector should be consulted if there is any question regarding these Stipulations.

FIGURE A-1-14 Example of PPQ form 519, Compliance Agreement Attachments (page 4)

Purpose

PPQ Form 519, Compliance Agreement, is completed by the PPQ Officer/Plant Health Safeguarding Specialist for the area of coverage.

Instructions

PPQ Form 519, Compliance Agreement on page 3-1-5 for specific information. Follow the instructions in [Table A-1-7](#) to complete the form.

TABLE A-1-7 Instructions for Completing PPQ Form 519, Compliance Agreement

Block		
1	NAME AND ADDRESS OF PERSON OR FIRM	LIST the name and address of the person or firm with whom the agreement is made
2	LOCATION	LIST the location of the land
3	REGULATED ARTICLES	LIST the name of the regulated article EXAMPLE Soil samples for analysis.
4	APPLICABLE FEDERAL QUARANTINE(S) OR REGULATIONS	LIST "Golden Nematode 7CFR§301.85"
5	I/we agree to the following	LIST the terms of the agreement
6	SIGNATURE	Person authorizing agreement SIGNS
7	TITLE	Person signing <i>Block 6</i> LISTS title
8	DATE SIGNED	LIST the date signed
9	AGREEMENT NO.	LIST the agreement number
10	DATE OF AGREEMENT	LIST the date the agreement is signed
11	PPQ/CBP OFFICIAL	LIST the name and title of the PPQ Official authorized to execute the agreement
12	ADDRESS	If the agreement is made with the USDA in New York, then ENTER the following information: U.S. Department of Agriculture, APHIS Plant Protection and Quarantine 8237 Kanona Road Avoca, NY 14809 607/566-2212
13	SIGNATURE	PPQ Official SIGNS
14	U.S. GOVERNMENT/STATE AGENCY OFFICIAL	LIST the name and title of the agency official entering the agreement

TABLE A-1-7 Instructions for Completing PPQ Form 519, Compliance Agreement (continued)

Block		
15	ADDRESS	1. ENTER the address of the State agency 2. If the State of New York, then the agency is: New York State Department of Agriculture and Markets Division of Plant Industry PO Box 57 Little Valley, NY 14755
16	SIGNATURE	State agency official SIGNS

Distribution

Distribute *PPQ Form 519* and attachments as follows:

1. Give a copy to person signing the agreement.
2. Send a copy to the State Official.
3. Place the original in the PPQ county file *Compliance Agreements* folder.

PPQ Form 530, Limited Permit

Information requested is needed to determine if a permit can be issued (7 CFR 301).
 Form Approved: OMB NO. 0579-0088.
 See reverse side for additional information.

U.S. DEPARTMENT OF AGRICULTURE
 ANIMAL AND PLANT HEALTH INSPECTION SERVICE
 PLANT PROTECTION AND QUARANTINE

LIMITED PERMIT

This permit authorizes the movement of the NONCERTIFIED articles described below to a specified destination for limited handling, utilization, or processing, or for treatment. The movement of such articles is regulated by Federal or State cooperative domestic plant quarantines.

No. 0-087501

1. DATE ISSUED **May 5, 2008** 2. VOID AFTER **May 11, 2008**

3. NAME OF CONSIGNOR
John T. Jones


4. SHIPPING POINT
3571 Jefferson Pike

5. NAME AND ADDRESS OF CONSIGNEE
Crispy Thin Potato Chips
3711 Smith Lane
Smithsburg, MD 21874

6. VEHICLE LICENSE NO. & STATE **G 12394 MD** 7. R.T. CAR INITIALS

8. DESCRIPTION

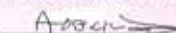
A. Quantity	B. Article	C. Remarks
2000#	Potatoes	Consignee under compliance agreement

9. SIGNATURE OF ISSUING OFFICER


ENDORSEMENT

The above described shipment was received by the designated consignee, and was handled in the manner approved under the provisions of all applicable Federal or State cooperative domestic plant quarantines.

10. DATE RECEIVED
May 6, 2008

11. SIGNATURE OF DESTINATION OFFICER


PENALTY FOR MISUSE OR ALTERATION (7 USC 163)

PPQ FORM 530 (APR 89)
Previous edition obsolete. PART 1 - CONSIGNEE'S COPY

FIGURE A-1-15 Example of PPQ Form 530, Limited Permit

Purpose

PPQ Form 530, Limited Permit, is issued or authorized to be issued by the inspector (PPQ Officer) to allow the interstate movement of **noncertifiable** regulated articles to a specified approved destination for limited handling, utilization, processing, or treatment.

Instructions



Important

Movement of noncertified regulated articles **must** be approved by the appropriate State Regulatory Official in the applicable State and/or the PPQ Deputy Administrator or designee.

See [Special Procedures](#) on page 3-1-4 for specific information. Complete PPQ Form 530 as shown in [Table A-1-8](#) below.

TABLE A-1-8 Instructions for Completing PPQ Form 530, Limited Permit

Block		Instructions
1	DATE ISSUED	LIST the date the permit is issued (usually same date articles are treated)
2	VOID AFTER	LIST the date the permit expires. The permit is usually valid for 7 days (but not more than 30 days, depending the PPQ Officer's judgment); the equipment must be safeguarded to prevent contamination
3	NAME OF CONSIGNOR	LIST the name of the consignor (person selling or moving the equipment)
4	SHIPPING POINT	LIST the address where the equipment is being sent

TABLE A-1-8 Instructions for Completing PPQ Form 530, Limited Permit

Block		Instructions
5	NAME AND ADDRESS OF CONSIGNEE	LIST the name and address of the consignee at destination of shipment (person receiving the shipment)
6	VEHICLE LICENSE NO. & STATE	LIST the license plate number and State of the vehicle transporting the equipment from the consignor to the consignee
7	R.R. CAR INITIALS & NO.	If the equipment is being shipped by rail, then LIST the initials and number of railroad car If not being shipped by rail, then leave this block blank
8	DESCRIPTION	Blocks A-C below
A	Quantity	LIST the amount of the article(s) being shipped
B	Article	LIST the name of the article
C	Remarks	LIST relevant comments; if none, then leave blank
9	SIGNATURE OF INSPECTING OFFICER	Issuing PPQ Officer SIGNS
10	DATE RECEIVED	PPQ Officer at the consignee location state SIGNS
11	SIGNATURE OF DESIGNATION INSPECTOR	PPQ Officer at destination (consignee's shipping point) SIGNS

Distribution

The issuing PPQ Officer will distribute *PPQ Form 530, Limited Permit*, as follows:

1. SEND the original *Part 1*-consignee's copy (pink) along with the article(s) being shipped.
2. Give the *Part 2* (yellow) copy to the destination PPQ Officer.
3. Keep the white copy (issuing officers copy) for the program file.

PPQ Form 540, Certificate

FORM APPROVED
 OMB NO. 0579-0088

Information requested is needed to determine if a permit can be issued (7 CFR 301).
 See reverse side for additional information.

E317301

U.S. DEPARTMENT OF AGRICULTURE
 Animal and Plant Health Inspection Service
 Plant Protection and Quarantine
CERTIFICATE

This certificate must be surrendered to the consignee at destination of shipment.

The articles described below are certified under all applicable Federal or State cooperative domestic plant quarantines.

1. DATE ISSUED July 16, 2008	2. VOID AFTER July 23, 2008	
3. NAME OF CONSIGNOR William Farmer		
4. SHIPPING POINT 215 Main Street, Johnson City, NY 55555		
5. NAME & ADDRESS OF CONSIGNEE Joseph Jones 3947 State Road, Clayton, PA 44444		
6. VEHICLE LICENSE NO. & STATE 839 211Z New York	R.R. CAR INITIALS & NO.	
8. DESCRIPTION		
A. Quantity	B. Article	C. Remarks
1	Cultivator	
1	Bulldozer	
9. SIGNATURE OF ISSUING INSPECTOR <i>Phong B. Bode</i>		
PENALTY FOR MISUSE OR ALTERATION (7 USC 163)		

PPQ FORM 540 (APR 89) Previous edition obsolete. PART 1—CONSIGNEE

FIGURE A-1-16 Example of PPQ Form 540, Certificate (Federal/State cooperative domestic plant quarantines)

Purpose

PPQ Form 540, Certificate (Federal or State cooperative domestic quarantines), is used by the Golden Nematode Program to certify that the regulated articles (listed on the form) have been treated and are certified free from golden nematode **only**.

Ex: farmer sells tractor PPQ steam cleans and certifies has been treated.

Instructions

This permit is issued by a PPQ Officer. Complete PPQ Form 540 as shown in [Table A-1-9](#).

TABLE A-1-9 Instructions for Completing PPQ Form 540, Certificate

Block		Instructions
1	DATE ISSUED	LIST the date the permit is issued (usually same date articles are treated)
2	VOID AFTER	LIST the date the permit expires. The permit is usually valid for 7 days, but can be longer (but not more than 30 days) or more depending the PPQ Officer's judgment on the situation. The equipment must be safeguarded to prevent contamination
3	NAME OF CONSIGNOR	LIST the name of the consignor (person selling or moving the equipment)
4	SHIPPING POINT	LIST the address where the equipment is being sent
5	NAME AND ADDRESS OF CONSIGNEE	LIST the name and address of the consignee at destination of shipment (person receiving the shipment)
6	VEHICLE LICENSE NO. & STATE	LIST the license plate number and State of the vehicle transporting the equipment from the consignor to the consignee
7	R.R. CAR INITIALS & NO.	If the equipment is being shipped by rail, then list the initials and number of railroad car If not being shipped by rail, then leave this block blank
8	DESCRIPTION	Blocks A-C below
A	Quantity	LIST the amount of the article(s) being shipped
B	Article	LIST the name of the article
C	Remarks	LIST relevant comments; if none, then leave blank
9	SIGNATURE OF INSPECTING OFFICER	Issuing PPQ Officer signs

Distribution

The issuing PPQ Officer will distribute the completed *PPQ Form 540, Certificate*, as follows:

1. Send the *Part 1* (White) original with the article(s) being shipped to the destination. The certificate (*Part 1*) **must** be delivered to the consignee at destination of shipment.
2. Mail the *Part 2* (Green) copy to the State Plant Health Director of the destination State (where the article is shipped).
3. Keep the *Part 3* (White) copy for the program file.

Sample Storage Worksheet (Rack Sheet)

AVOCA SAMPLE STORAGE

DATE	COLL NO.	# OF SAMPLES	SOIL TYPE	SECTION	SHELF #	DATE	COLL NO.	# OF SAMPLES	SOIL TYPE	SECTION	SHELF #
10/5	JED-3	23	Mineral	I	2-6						
10/6	AMO-6	37	Mineral	I	7,8						
10/6	AMO-5	28	Mineral	I	10						
10/11	JLS-4	81	Mineral	I	22-25						
10/12	JLS-3	40	Mineral	I	7-9						
10/13	MZK-11	36	Mineral	I	27						
10/13	MZK-12	46	Mineral	I	28,29						

FIGURE A-1-17 Example of Sample Storage Worksheet (Rack Sheet)

Purpose

The *Sample Storage Worksheet (Rack Sheet)* is used to record and track each collection from when the sample bags are brought into the Work Unit facility, to being placed on the shelves, to being moved from the rack room to the sample wash room for processing.

Instructions

The laboratory technician or PPQ Officer completes the *Sample Storage Worksheet (Rack Sheet)* upon each's collection's arrival at the Work Unit rack room. After all samples in the collection listed on the sheet are dried and ready to be moved to the wash room, then the laboratory leader will transfer the information to the *Golden Nematode Laboratory Sample Processing Daily* and draw a line through the collection on the rack sheet. Follow the instructions in [Table A-1-10](#) to complete this worksheet.

TABLE A-1-10 Instructions for Completing Sample Storage Worksheet

Block	Completed by	Instructions
DATE	Crew leader	LIST the date the collection is placed in the rack room
COLL NO.	Crew leader	LIST the collection number (listed on the top row of the sample bag (field number)
# OF SAMPLES	Crew leader	LIST the number of sample bags in the collection (located on the lower left of the bag; number indicated with END
SOIL TYPE	Crew leader	<ul style="list-style-type: none"> ◆ If the type of soil in the sample collection is mineral, then LIST "Mineral" ◆ If the type of soil in the sample collection is muck, then LIST "Muck"
SECTION	Crew leader	LIST the rack number where the collection is stacked in the rack room
SHELF #	Crew leader	LIST the shelf number(s) where the collection is stacked in the rack room

Distribution

Distribute the *Sample Storage Worksheet (Rack Sheet)* as follows:

1. Keep the sheet on the rack room clipboard while the samples are drying.
2. After the collections listed on the worksheet have been moved to the wash room for processing, then place the rack sheet in the file.

Steam Heat Treatment

USDA-APHIS-PPQ Steam Heat Treatment

Date _____
Work Unit _____
USDA Officer _____

Owner of Equipment _____
Article Treated _____
Serial Number _____
Location _____

Temperature _____ Weather Conditions _____

Boiler Start Time _____
Steam Start Time _____

Begin recording time of treatment when article being treated reaches a temperature of 140 Degrees F.

Treatment Start Time _____
Treatment End Time _____

Use Omega temperature recorder to document treatment. Set to record temperature at 5 minute intervals.
If any probe falls below 140 degrees F, add treatment time so that all probes show minimum of 140 degrees F
for total time of 1 hour.

Attach Temperature Record Strip.

Signature _____

Certificate Number _____

FIGURE A-1-18 Example of Steam Heat Treatment Worksheet

Purpose

The *Steam Heat Treatment* worksheet is used to document articles treated with steam heat.

Instructions

The *Steam Heat Treatment* worksheet is completed by the PPQ Officer who conducts the treatment. If the article treated is leaving New York State and the conditions are met, then issue a PPQ Form 540, Certificate.

TABLE A-1-11 Instructions for Completing Steam Heat Treatment Worksheet

Block	Instructions
Date	LIST the date the steam heat treatment is conducted
Work Unit	LIST the name of the Work Unit conducting the treatment
USDA Officer	LIST the name of the PPQ Officer conducting the treatment
Owner of Equipment	LIST the name of the owner of the article(s) being treated
Article Treated	LIST the article treated
Serial Number	LIST the serial(s) number of the article(s) treated
Location	LIST the address where the treatment is conducted
Temperature	LIST the outdoor (weather) temperature at the time of treatment
Weather Conditions	LIST the weather conditions while treatment is being conducted
Boiler Start Time	LIST the time you turn on the steam unit
Steam Start Time	LIST the time the unit started producing steam
Treatment Start Time	LIST the time the actual steam heat treatment began
Treatment End Time	LIST the time the steam heat treatment ended
Signature	PPQ Officer completing the steam heat treatment SIGNS
Certificate Number	If a certificate is requested or the equipment is leaving the State (of New York) after proper treatment, then LIST the certificate number on PPQ Form 540; otherwise leave blank

Distribution

Distribute the completed Steam Heat Treatment worksheet as follows:

1. Keep the original worksheet as follows for the files.
2. Give a copy to the supervisor.

Purpose

The *Weekly Summary Record* is a weekly accounting to show how many collections were made during the week, collection numbers, the number of samples, where the samples were collected, and the number of positive or negative golden nematode identifications,

Instructions

The *Weekly Summary Record* is completed by the laboratory supervisor.

TABLE A-1-12 Instructions for the Weekly Summary Record

Block	Instructions
PERIOD	LIST the start and end dates for the week reported
COLLECTION	LIST the collection number
METHOD	LIST the survey method used (manual or mechanical)
MDN	LIST the field number surveyed
OPERATOR	LIST the name farmer where the survey was conducted
SAMPLES	LIST the quantity of samples in the collection
ACRES	LIST the number of acres surveyed
POSITIVE/NEGATIVE	LIST the number of positive finds and the number of negative finds
COUNTY	LIST the county where the survey was conducted
DATE	LIST the date the samples were collected

Distribution

Give the completed the *Weekly Summary Record* to the director and send a copy to the supervisor.

B

Golden Nematode
Program Manual

Appendix B

Emergency Aid and Safety

Contents

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Pesticide Application Re-entry Period	page B-1-1
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Signs and Symptoms of Poisoning and Emergency Aid and Medical Treatment for Some Fumigants Used by APHIS	page B-1-7

Introduction

The *Emergency Aid and Safety* appendix covers safety precautions, emergency first aid, and safety for some fumigants. The information in this appendix is from the USDA-APHIS-PPQ *Treatment Manual*. See http://www.aphis.usda.gov/import_export/plants/manuals/ports/treatment.shtml for the more information.

Pesticide Application Re-entry Period



All survey personnel must be mindful that the land on which they work may have a re-entry period due to a recent pesticide application.

Prior to the survey, before a survey crew takes soil samples from a farm field, the Plant Health Safeguarding Specialist (PHSS) or PPQ Technician should contact the property owner and ask if there is a re-entry period in effect due to pesticide application.

Fumigant Safety Precautions

Fumigants are generally toxic when inhaled or spilled on skin or clothing.

You **must** carefully read the label of each product used in the treatment of golden nematode before using the product. Review ***Fumigant Monitoring*** before applying any pesticide.

If an accident should occur, then immediately follow and implement the First Aid measures listed on the label of the pesticide being used.

Safety Procedures

Follow specific precautions listed on the label of each fumigant to be used.

Hazards of each fumigant vary with the following:

- ❖ Relative toxicity of each fumigant
- ❖ Dosage rate and concentration
- ❖ Enclosure size
- ❖ Enclosure tightness
- ❖ Physical condition of employee (allergies, heart condition, respiratory ailments, etc.)

Guidelines for Using Fumigants Safely

Review and follow the guidelines below:

1. Know the characteristics of the fumigants you are working with.
2. Have the proper equipment to carry out the fumigation.
3. Be familiar with the emergency aid that would be required should an accident occur.
4. If there is any chance of exposure to highly-toxic fumigants, then wear protective equipment as follows:
 - ❖ Face shield or respirator should be used when liquids are being transferred and there is a possibility of splattering
 - ❖ Gloves should be impermeable to the liquid fumigant being used
 - ❖ Rubber aprons should be long enough to prevent legs from being exposed
5. Dispensers for measuring the amount of fumigant should have shatter-proof shields.
6. The area surrounding the fumigation enclosure should be well-aerated. Operators should be located upwind from treatment.
7. If necessary to stay in the treatment area, then the air should be monitored to determine whether harmful levels of fumigant are present.
8. Under **no** circumstance should an inspector be exposed to concentrations above minimum safe standards.

9. A self-contained breathing apparatus (SCBA) is required at all fumigation sites and should **always** be readily available in case an emergency develops.
 - A. You **must** have a medical evaluation and clearance to use SCBA equipment. The evaluation **must** be performed by a physician or licensed health care professional.
 - B. You **must** follow OSHA standards for respirator use (see *APHIS Health and Safety Manual*, Chapter 11, Section 3).
10. Use of SCBA respirators are **mandatory** for all PPQ Officers who are within 30 feet of tarpaulin fumigation or when TLV is exceeded (5 ppm for methyl bromide).
11. If warranted by supervisor's consultation with local medical authorities, then persons working regularly with toxic fumigants should have blood tests and physical examinations.
12. A first-aid kit equipped with the proper materials should be readily available at the treatment site.
13. Telephone numbers of local hospitals, doctors, and poison control centers should be prominently displayed.
14. Learn to recognize the signs and symptoms of fumigant poisoning. Training should be given to each inspector.
15. Supervisors should be aware of the signs of fatigue. The risk of accidents increases in tired employees.
16. **Do not** eat, drink, smoke, or carry tobacco in areas where fumigants are being used.

Fumigant Monitoring

Fumigant	Route of Entry	Detector Unit or Monitoring Device	Source of Exposure
Chloropicrin	Inhalation	None	<ul style="list-style-type: none"> ◆ Application of liquid ◆ Leakage from enclosure ◆ Aeration
Methyl bromide	Inhalation; skin	<ul style="list-style-type: none"> ◆ Gas detector tubes ◆ Halide detector ◆ T/C unit 	<ul style="list-style-type: none"> ◆ Cylinder connection ◆ Leaks in tarpaulin, applicators, aeration
Phosphine (from aluminum phosphide)	Inhalation	Gas detector tubes	<ul style="list-style-type: none"> ◆ Application of pellets ◆ Leakage from enclosure ◆ Aeration
Sulfuryl fluoride (Vikane)	Inhalation	T/C Unit	<ul style="list-style-type: none"> ◆ Applicator and cylinder connections ◆ Leakage from enclosure ◆ Aeration

FIGURE B-1-1 Fumigant Monitoring via Route of Entry, Monitoring Device, and Exposure Source

Emergency Action

Self (You)

If you are exposed to a fumigant, then immediately move away from the contaminated area. Notify your co-workers of the danger and that you have been exposed. Onset symptoms may be delayed with some fumigant. Notify your supervisor promptly of the details.

If liquid fumigants have spilled on your skin or clothing, then immediately remove the contaminated clothing and gently wash your skin with large quantities of soap and water. **Do not** use abrasive cloths or brushes. Be sure to clean the area under your fingernails and toenails with soap and water. You may also rinse contaminated skin with rubbing alcohol.



Dangerous vapors will be produced by the liquid fumigant during evaporation from skin and clothing.

Contaminated Clothing

After you have removed your contaminated clothing, be sure **not** to use or wear the clothing again until the clothing has been thoroughly aired, washed, and dried. Properly dispose of any clothing that has been damaged by the fumigant.

Co-worker

If chemical intoxication due to exposure is suspected at any time, then do as follows:

1. Immediately move the victim out of the exposed area and into fresh air.



Do not enter a contaminated area **without** a proper respirator, even to effect rescue.

2. If there is evidence of respiratory weakness, then give artificial respiration. Oxygen can be beneficial. Artificial respiration, when needed, takes precedence over all other first aid (see **First Aid Rescue Breathing**).
3. If symptoms suggest immediate care is needed, then call a physician.
4. Keep the patient warm, comfortable, and quiet as possible.
5. If convulsions occur, then use gentle restraint to prevent injury.

First Aid Rescue Breathing

If you believe a person has stopped breathing, give first aid rescue breathing immediately. Ask someone else to get medical help.

1. Is the person breathing?



To find out, place the person on his/her back and put your ear close to his/her mouth. If the person is breathing you will see his/her breath, and see his/her chest rise and fall. If the person is **not** breathing, then continue to 2., Open the airway.

2. Open the airway.



If the person has stopped breathing, then lift up his/her neck with one hand and push down on the person's forehead with the other hand. This opens the airway and the person may start to breathe. If the person doesn't breathe, then begin rescue breathing at once.

3. Start rescue breathing.



Keep one hand under the person's neck so that his/her chin is tilted backward and the chin is up. Pinch the nostrils shut using the fingers of your other hand. Take a deep breath and cover the person's mouth completely with your own. Blow air into his/her mouth. When the person's chest moves up, move your mouth away and let the person's chest go down by itself. Repeat this procedure every 5 seconds. **Do not** stop until the person starts breathing or medical help arrives.

FIGURE B-1-2 First aid rescue breathing

Signs and Symptoms of Poisoning and Emergency Aid and Medical Treatment for Some Fumigants Used by APHIS

Fumigant	Signs and Symptoms	Emergency Aid	Medical Treatment
Chloropicrin	<ul style="list-style-type: none"> ◆ Powerful irritant that affects all body surfaces ◆ Lacrimation, vomiting, bronchitis, pulmonary edema ◆ Inhalation causes anemia, weak and irregular heartbeat, recurrent asthmatic attacks 	<ul style="list-style-type: none"> ◆ Artificial respiration ◆ Oxygen if available 	<p>Symptomatic—oxygen</p> <p>Sample analysis might be helpful in diagnosis and prognosis</p>
Methyl Bromide	<ul style="list-style-type: none"> ◆ Central nervous system depression ◆ Nausea, fever, pulmonary edema ◆ Confusion, delirium, mania, staggering, tremors, visual disturbances ◆ Abdominal pain, convulsions, coma ◆ Onset may be delayed 4-12 hours ◆ On skin, severe irritation, blisters, dermatitis 	<ul style="list-style-type: none"> ◆ Artificial respiration ◆ Oxygen if available ◆ Do not use mechanical resuscitation ◆ If fumigant contacts skin, wash 15 minutes with large amounts of water ◆ If fumigant contacts clothing, vapors may be released in toxic quantities 	<p>Symptomatic—artificial respiration</p> <p>Analysis of breath and blood may help in diagnosis and prognosis</p> <p>For nausea accompanied by vomiting, give intravenous glucose-bearing vehicles</p>
Phosphine (from aluminum phosphide)	<ul style="list-style-type: none"> ◆ 2,000 ppm in air is rapidly fatal; death may be delayed several days ◆ Chest pain, headache, dyspnea, restlessness, vomiting ◆ Convulsions, coma, paralysis ◆ Low blood pressure, slow heart rate 	<ul style="list-style-type: none"> ◆ Artificial respiration ◆ Oxygen if available 	<p>Symptomatic—oxygen</p> <p>Control convulsions with sedatives</p> <p>Restore fluid balance with glucose and saline</p>
Sulfuryl Fluoride	Central nervous system depression; excitation may follow	<p>Place patient in fresh air, face downward, with head slightly below level of lungs, and keep the water warm</p> <p>If breathing stops, give artificial respiration</p>	First symptoms expected are those of respiratory irritation and central nervous system depression—treat symptomatically

FIGURE B-1-3 Signs and symptoms of fumigant poisoning and emergency aid and medical Treatment



Appendix C

Maintenance of the Manual

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Introduction

This appendix contains information about revisions to manuals, procedures, and user's responsibilities for maintaining the *Golden Nematode Program Manual*.

Golden Nematode Program Manual

The *Golden Nematode Program Manual* is available on the Manuals Unit Web page:

http://www.aphis.usda.gov/import_export/plants/manuals/domestic/downloads/gnpm.pdf

Policy for Maintaining the *Golden Nematode Program Manual*

If paper copies of the manual are used, then each work location **must** have at least one designated individual to maintain each manual. Failure to maintain each manual according to procedures prescribed herein is likely to substantially reduce the effectiveness of the programs the manuals support.

Revisions to Manuals

PPQ's Manuals Unit issues revisions by e-mail transmittal memo that identifies and either contains an Adobe Acrobat pdf copy of the pages to be added or replaced or refers the manual user to the Manuals Unit Web site to download a pdf copy the updated section of the manual.

Immediate Updates

Transmittal memos for immediate updates usually contain the following information:

- ◆ Transmittal number (used to track updates)
- ◆ Purpose of the immediate update
- ◆ Supersede statement (if applicable)
- ◆ List of the updated pages
- ◆ Page numbers containing revisions

New Editions

New editions of manuals are scheduled at fixed intervals—barring budgetary constraints—about every 4 years or when the percentage of updated pages exceeds 30 percent of the entire manual.

Supersede Statements

Supersede statements identify existing official documents that are **no** longer valid or are inaccurate because they have been incorporated into a manual. Supersede statements are included in transmittals (e-mail or memorandum) and are critical from a legal standpoint.

The PPQ Manuals Unit is obligated to identify all existing official documents that are superseded. If manual users accessed outdated information that was **not** formally superseded, then the Agency may be liable.

Keeping the Manual Current

There are two ways to track revisions to your manual: control data and transmittal memos.

Control Data

The manual has control data positioned at the bottom of each page. This control data contains the month, year, and transmittal number. New editions of manuals **always** start with -01. The transmittal number increases by 1 for each manual update.

EXAMPLE

07/2008-01
PPQ

- ◆ 07/2008 is the month and year the manual was issued
- ◆ 01 is the transmittal number

Responsibilities of Manual Users

Electronic copies of each manual are revised and maintained by the Manuals Unit and are available on the PPQ Manuals Unit Web site.

If your work location requires that you print and maintain a hard copy from the posted electronic copy, then continue below.

Maintain the Paper Copy

To maintain the *Golden Nematode Program Manual* paper (hard) copy effectively and to enhance professionalism, the manual **must** be kept up-to-date. If you fail to keep the manuals at your work location updated, you run the risk of making a decision that provides the opportunity for an outbreak of an exotic disease. Your diligence is a crucial part of this process.

When you receive each transmittal and update, do the following:

1. Read the transmittal memo e-mail and pages that are part of the transmittal to understand the purpose of the revision. **Except** for changes to the Index, List of Figures, and List of Tables, all revisions are marked with a change bar as located to the left of this sentence.
2. Add new pages or remove and replace outdated pages with the revised pages on the same day you receive the transmittal.
3. If required locally, then print a copy, and numerically file the transmittal e-mail or memorandum.
4. If you have missed a transmittal, then check the Manuals Unit Web site and print a copy for your manual.

Address and Copy Count Changes

Paper copies of some manuals are mailed from the APHIS Printing, Distribution, and Mail Branch located in Riverdale, Maryland. If you receive a paper (hard) copy, then be sure to communicate, through proper channels, changes to the work address and copy counts for the mailing list.

When updating mailing lists, **always** provide the following information:

- ◆ Distribution code
- ◆ Access code from a label used to mail the manual (line of letters and numbers directly above the address on the label), for changes and deletions
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Additional Manuals and Revision Copies

If the manual and revisions are issued in paper (hard) copy, then you may order additional manuals or revisions. **Always** provide the following information:

- ◆ Organization name
- ◆ PO Box or street address, include room or suite number
- ◆ City, State, and nine-digit zip code
- ◆ Contact person's name, phone number, and FAX number
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Glossary

Definitions, Terms, and Abbreviations

certificate. A document issued or authorized to be issued by an inspector to allow the interstate movement of regulated articles to any destination.

compliance agreement. A written agreement between a person engaged in growing, handling, or moving regulated articles, and the Plant Protection Programs, wherein the former agrees to comply with the requirements of this subpart identified in the agreement by the inspector who executes the agreement on behalf of the Plant Protection and Quarantine Programs as applicable to the operations of such person.

exposure period. Time required for the soil to become free of fumigant. The duration of the exposure period is influenced by both temperature and soil moisture. The higher the temperature, the shorter the fumigation time. The cooler the temperature, the longer the fumigation time.

delimiting survey. Survey conducted to establish the boundaries of golden nematode infestation in a field or property.

detection survey. Survey conducted to determine whether a field or land is infested with golden nematode.

farm tools. An instrument worked or used by hand (such as hoes, rakes, shovels, axes, hammers, and saws).

fluming. An old cleaning process where potatoes are run down a flume to remove soil from the potatoes without the use of water. **Not** commonly used today, but still an option for growers to use.

generally infested area. Any part of a regulated area **not** designated as a suppressive area in accordance with 7CFR§301.85.2

golden nematode. The nematode known as the golden nematode (*Globodera rostochiensis*), in any stage of development.

infestation. The existence of golden nematode or the existence of circumstances that make it reasonable to believe that the golden nematode is present.

inspector. Any employee of the Plant Protection and Quarantine Programs, Animal and Plant Health Inspection Service, U.S. Department of Agriculture, or other person, authorized by the Deputy Administrator to enforce the provisions of the Quarantine and regulations.

interstate. Movement from any State into or through any other State.

limited permit. A document issued or authorized to be issued by an inspector to allow the interstate movement of noncertifiable regulated articles to a specified destination for limited handling, utilization, or processing for treatment.

mechanized cultivating equipment. Mechanized equipment used for soil tillage, including tillage attachments for farm tractors (tractors, disks, plows, harrows, planters, and subsoilers).

mechanized harvesting equipment. Mechanized equipment used for harvesting purposes (combines, potato conveyors, harvesters, and hay balers).

mechanized soil-moving equipment. Equipment used for moving or transporting soil (draglines, bulldozers, dump trucks, road scrapers, etc.).

mineral soil. Soil consisting primarily of mineral (such as sand, silt, and clay) material.

monoculture. A single crop planted on a farm or in a region or county.

moved, movement, move. Shipped, deposited for transmission in the mail, otherwise offered for shipment, received for transportation, carried, or otherwise transported, or moved, or allowed to be moved, by mail or otherwise.

muck soil. Soil consisting primarily of organic matter.

person. Any individual, corporation, company, society, association, or other organized group of any of the foregoing.

regulated area. Any quarantined State or any portion thereof, listed as a regulated area in 7CFR §301.85-2(a) or otherwise designated as a regulated area in accordance with §301.85-2(b).

regulated article. Any article described as regulated in 7CFR§301.85.

resistant variety treatment. Planting a golden nematode resistant variety of potatoes which controls the golden nematode population in the same manner as a chemical treatment. Although the nematode is caused to hatch by the resistant potato plants, the nematode is unable to survive.

restricted destination permit. A document issued or authorized to be issued by an inspector to allow the interstate movement of regulated articles **not** certifiable under all applicable Federal domestic plant quarantines to a specified destination for **other than** scientific purposes.

sanitize. Disinfect.

Ro1. Race 1; the traditional golden nematode strain.

Ro2. Race 2; new golden nematode biotype.

sample. In the Golden Nematode Program, a small portion of soil (mineral or muck in New York) that is collected for processing.

scientific permit. A document issued by the Deputy Administrator to allow the interstate movement to a specified destination of regulated articles for scientific purposes.

soil. That part of the upper layer of earth in which plants can grow.

State. Any State, territory, or district of the United States, including Puerto Rico.

suppressive area. That portion of a regulated area where eradication of infestation is undertaken as an objective as designated under 7CFR §301.85-2(a).

T/C Unit (thermal conductivity). Device used to measure gas concentration levels in tarpaulins and chambers.

tier. Length of an edge of the field in a straight line.

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