

Chrysanthemum White Rust (CWR) Eradication Protocol for Nurseries Containing Plants Infected with *Puccinia horiana* Henn

Introduction:

Puccinia horiana Henn is the causal agent of chrysanthemum white rust (CWR), an obligatory parasite which only grows and reproduces on twelve species of chrysanthemums. In countries where it is known to occur, CWR is a serious disease in nurseries. It may cause a complete loss of commercial chrysanthemum crops. The disease is indigenous to Japan, where it was first noted in 1895. It remained confined to Japan and China until 1963. Since 1964, *P. horiana* has spread rapidly on infected shipments of cut flowers and has become established in the Far East, Europe, Africa, Australia, Central America, and South America.

Plants for propagation, as well as cut flowers are considered primary pathway for the introduction of CWR. The detections of CWR on cut flowers from Mexico and Venezuela, where the disease now occurs, resulted in APHIS placing administrative restrictions on various cut flowers that are hosts to CWR. In 2003, numerous findings of CWR on cut flowers from the Netherlands also resulted in APHIS placing administrative restrictions on cut flowers from the Netherlands. Because of these findings from the Netherlands and the risk of introducing CWR from other countries where the disease is known to occur, APHIS regulates the entry of host plants and cut flowers.

CWR is not established in the United States but has been introduced, detected and eradicated in a number of locations. CWR has been detected and eradicated in California in 1991 and re-occurring incidences to 2005. There have been CWR incidences in commercial nurseries in New Jersey, Oregon, and Washington between 1995 and 1997. Additional incidences have been detected in backyards and hobbyist plantings in New York and New Jersey in 1997, and in nurseries in Rhode Island, Pennsylvania, and Delaware in 2004. If CWR were to become established within the United States, it would significantly damage the commercial horticulture and florist industries.

II. Intended Use:

CWR detections catalyzed the need for a standard protocol for use by state and federal regulators to respond to new finds of CWR in nurseries in the U.S. To ensure that there is consistency in responding to new infections of CWR, this eradication protocol describes the official activities performed within affected nurseries by USDA-APHIS in cooperation with state and county agriculture regulatory officials.

The goal of this protocol is to ensure that any infections are effectively and consistently addressed and eradicated. Early detection and reporting of potential CWR infections are critical to ensure that spread is contained and eradicated. The strategies employed in this protocol are similar to those in Canada and the European Union and other areas where eradications are being carried out.

The eradication of CWR is feasible due to the following salient characteristics of the pathogen:

- CWR has a limited host range;
- CWR fungal spores have a relatively short survival time;
- CWR has a poor dispersal mechanism; and
- CWR pathogen can survive only in green host tissue under very restrictive environments.

III. Definitions:

Containment Facility: A structure whose purpose is to prevent escape of material held within it, into the environment.

Emergency Action Notice (EAN): A Federal document stating notice under which emergency action will be taken to eliminate or mitigate pest risk; stipulations are binding until notice is rescinded by issuing authorities. Penalties may apply for violations of stipulations of the EAN. An EAN is issued under Federal authorities.

Exposed Plants: Are host plants located within one-meter radius of infected plants, or as deemed appropriate after an assessment of infected area and surrounding plants.

Free from: Of a consignment, field or place of production, without pests (or a specific pest) in numbers or quantities that can be detected by the application of phytosanitary procedures. (FAO, 1990, FAO-CEPM, 1994)

Hold Order: A signed official document or verbal order given by state regulatory officials, requiring that plant material suspected to be infected with CWR be held on site. Additional stipulation(s) may apply to Hold Order. This type of order is usually used while awaiting results of a suspect CWR sample and/or the issuance of an EAN.

Host Free: A place of production such as single plot, single green house or entire nursery without host material, including all host plants, leaves, roots, stems, flowers, host tissue debris, sprouts of host plants is a host free area.

Infected plants: Plants infected with, *Puccinia horiana*, Henn.

Nursery: Any location where host chrysanthemums plants and flowers are grown, propagated, stored, or sold.

Nursery/facility quarantine: Official confinement of regulated articles for observation and research or for further inspection, testing and/or treatment (FAO, 1990; revised FAO, 1995; CEPM, 1999). During this period the movement of host plants is regulated to eliminate or contain the movement of the pest. The quarantine period begins with the confirmation of CWR and continues until inspection, sampling, and testing reveals no further CWR within the regulated block or area. The quarantine may be communicated by an official Hold Order or EAN. A facility is not released from quarantine until all orders have been satisfied and officially rescinded.

Parallel Regulation: A parallel regulation is one which is imposed by a State or local plant regulatory authority and is substantially the same as a Federal regulation.

Regulated Area: An area, County, State, or portion of a state, in which nurseries produce and move chrysanthemum plants, plant parts, or cut flowers of chrysanthemum plants, and has been placed under specific regulations governing movement of said plants or plant parts due to CWR is a regulated area.

Suspected infected plants: Plants with visible symptoms like CWR infection but not yet confirmed positive for CWR by APHIS or State officials

IV. Trigger Events for Use of Protocol:

This protocol should be implemented by APHIS-PPQ and/or its State Plant Regulatory cooperators when the presence of CWR has been detected.

V. Regulatory Authority:

CWR is not established in the United States, and is a pest of quarantine significance (Title 7, Code of Federal Regulations (CFR) 319.37-2 (a), 319.37-5(c), requiring appropriate regulatory measures when found. The regulations in 7 CFR part 319 prohibit or restrict the importation of plants, plant parts, and related materials to prevent the introduction of plant pests and noxious weeds into the United States. The regulations in “Subpart–Nursery Stock, Plants, Roots, Bulbs, Seeds, and Other Plant Products,” §§ 319.37 through 319.37-14 (referred to below as the nursery stock regulations) restrict, among other things, the importation of living plants, plant parts, and seeds for propagation. Conditions governing the importation of cut flowers into the United States are contained in “Subpart--Cut Flowers” (§§ 319.74-1 through 319.74-4). Section 319.37-2 of the nursery stock regulations prohibits the importation of CWR-susceptible plant species from countries where the disease is established. Introduction of CWR from abroad through imported host material is regulated under 319.37-5(c) which states:

“Any restricted article (except seeds) of *Chrysanthemum* spp. (*chrysanthemum*), *Dendranthema* spp. (*chrysanthemum*), *Leucanthemella serotina*, or *Nipponanthemum nipponicum*, from any foreign place except Europe, Argentina, Brazil, Canada, the Canary Islands, Chile, Colombia, the Republic of South Africa, Uruguay, Venezuela, and all countries and localities located in part or entirely between 90° and 180° east longitude shall, at the time of arrival at the port of first arrival in United States, be accompanied by a phytosanitary certificate of inspection. The phytosanitary certificate of inspection must contain a declaration that such article was grown in a greenhouse nursery and found by the plant protection service of the country in which grown to be free from white rust of chrysanthemum (caused by the rust fungus *Puccinia horiana* P. Henn.) based on visual examination of the parent stock, the articles for importation, and the greenhouse nursery in which the articles for importation and the parent stock were grown, once a month for 4 consecutive months immediately prior to importation.”

Under the Plant Protection Act (7 U.S.C. 7701 et seq), the U.S. Secretary of Agriculture is authorized to take actions to eradicate pests that are not established in U.S. and are injurious to U.S. agriculture. Both Federal and State/County governments may cooperate in the eradication efforts.

VI. Communication/Notification

The inspector should immediately notify the State Plant Health Director (SPHD) and the State Regulatory Official (SPRO) of the State in which the suspected CWR detection is located. PPQ Laboratories will notify the Regional Office and the National Program Manager of CWR results. The National Program Manager will notify PIM. The Regional offices will notify the SPRO and SPHD. State Laboratories will notify the SPRO and SPHD of results. See [Appendix V, Resource and Contact List](#). PPQ will notify the regulatory officials of other states where facilities may be impacted by the trace back and trace forward investigations.

VII. Annual Nursery Survey

All nurseries handling chrysanthemum material should be periodically surveyed for CWR. In areas where CWR has been known to occur, two surveys should be conducted per year by trained personnel during periods of symptomatic expression. Survey results must be added to the National Agricultural Pest Information System (NAPIS) database.

VIII. Nursery with Infected Plants:

A. Emergency Action Notices (EAN)

Federal Emergency Action Notices (EAN) will be issued to the infected nursery. States may issue hold notices. The EAN will remain in place until the nursery has satisfactorily completed the required sanitation measures. Prior to issuance of any notice, the inspector will evaluate the exposure level of all areas of the nursery and determine areas for inclusion/exclusion under the EAN. This evaluation will clarify the status of the areas at-risk to be regulated, and determine the required sanitation measures for plant, cut flowers, and other products. Many nurseries have numerous growing areas; some are divided by walls; some are under the same roof but divided by space; some are divided by long distance within the grounds of the nursery. These and other factors may be included in the evaluation of spread of the disease.

B. Emergency Actions:

1. The Emergency Action Notification (EAN) will define treatments and required sanitation measures. Host plants within the nursery, for sale or under propagation will be inspected. Plants placed under EAN may not be removed from the nursery, from any holding area within the nursery, or moved within the nursery until they are found to be free of *P. horiana* Henn, or until the nursery is officially declared free-from *P. horiana* Henn and removed from quarantine status, or unless specifically approved by a State or Federal Regulatory Official.
2. Suspected Samples for official confirmation will be submitted to state identification authorities or United States Department of Agriculture.
3. Trace Forward Investigation. Initiate trace forward investigations. Identify shipments made prior to the discovery of *P. horiana* Henn. Notify your PPQ Regional Office of all interstate shipments made within the 15 days prior to the first positive detection of *P. horiana* Henn at the nursery. This includes all hosts plants in the nursery, not just those found infected.
4. Trace Back Investigation. Determine the origin of all infected host through trace backs. Trace back the plants to point of origin (propagator). Traceback nurseries should be

inspected and result provide to the relevant regulatory officials. Determine all sources of other chrysanthemum that have been introduced into the facility within the past eight weeks. This may include propagative and non-propagative chrysanthemum material, including potted plants, cut flowers for floral arrangements, cuttings and salesmen samples. Include such information in trace backs as determined necessary.

5. Cull piles. Record the location of any cull piles that may be contaminated with infected plant material. Check any cull piles for symptomatic plants, and plant material and sample if detected. Determine how the nursery disposes of culled plant material. (Refer to Destruction of Infested Plants, below and [Appendix IV](#) for information.)

6. Equipment. Determine if equipment used at this nursery is shared with other facilities or field areas. Are equipment sanitation procedures in place at this nursery?

7. Fungicides. Determine if fungicides are used on the plants at the nursery. If fungicides were used, then record the date, material, amount and application rate.

C. Eradication: All host plants within a nursery with infected plants will not be allowed to be moved for sale or to any other nursery until the infected nursery has been declared CWR-free. Within a nursery, all the infected plants showing symptoms as well as plants located within one meter radius of the infected plant/s shall be destroyed. All remaining host plants must receive three applications of myclobutanil or other fungicide with curative properties at 5-7 day (preferably 5-day) intervals. An inspection of all plants must be conducted between each application. Any infected plants as well as plants located within one meter radius must be destroyed. The final inspection must be performed 5-7 days after the third fungicidal application. If no signs of CWR are detected in the final inspection, plants will be released and facility is declared CWR-free.

If CWR infections are detected during the final inspection, the regulatory officials will assess the situation and determine remedial measures, including destruction of all CWR host material as well as putting into effect an eight-week host free-period at the nursery. An alternative to the eight week host-free period is a steam treatment of the nursery beds ([Appendix I](#)).

All costs associated with treatments and/or destruction shall be the responsibility of the owners of the infected CWR nursery. The treatments and destruction of host material will be monitored by the regulatory officials or their designee. Sanitary measures include but are not limited to: Bagging of plant debris in the nursery and removal for approved disposal; proper decontamination of tools and personnel moving between blocks, growing areas, greenhouses, and growing units, depending upon structure of the facility and the reduction of other risk factors.

Destruction of Infested Plants: (refer to [Appendix IV](#))

- Incineration
- Steam sterilization
- Composting as outlined in the California codified Integrated Waste Management Board regulations.

D. Cut Flowers: Nurseries growing plants for shipment as cut flowers will follow treatments and inspections for eradications (see C). However, after each fungicidal treatment, regulatory official(S) will assess if cut flowers can be harvested and sold. If the inspector determines that cut flowers can be harvested, the following conditions will apply:

- (a) 100% of the ready to harvest cut flowers will be inspected by regulatory officials before the flowers are cut.
- (b) Ready to harvest cut flowers with symptoms of CWR and any plants within 1 meter of infected plants shall be destroyed.
- (c) Remaining cut flowers without CWR symptoms may be harvested and sold until the next fungicidal treatment and assessment.

The cut flowers may not be used for propagative purposes. (It is recommended that cut flowers do not go to retail establishments that have a floral shop attached to a facility for chrysanthemum production. The buyer who has a floral shop connected to the chrysanthemum producing facility risks infecting their crop.) If symptomatic plants are still found, after three treatments of myclobutanil on the remaining plants, the inspector may also require appropriate mitigating measures such as an eight week host-free period, steam sterilization. (see section C).

E. Alternative Treatments: In lieu of treatments and inspections outlined in C and D, a nursery may voluntarily destroy all hosts plants and apply a steam treatment to the nursery. Or an eight week host free period at the nursery's cost or a steam sterilization nursery beds using the steam jet method.

Steam Sterilization of Nursery Soil:

An alternative to the 8 week host-free period is a steam treatment of the nursery beds using the steam jet method. Soil must be steamed at 70°C for a minimum 30 minutes and to a depth of 15 cm. Temperature must be measured at points farthest from the source of steam. Steam at a temperature of 70°C will destroy most pathogenic microorganisms, including CWR spores or their common vegetative forms, either in the growing or vegetative state. Moist, high temperature soil conditions reduce the duration of teliospore survival, so soil in plots or beds should be kept well watered during the pre-planting interval to aid in the destruction of any residual inoculums. The beds must be inspected by a State and/or USDA/APHIS official to ensure efficacy of the steam treatment (i.e., all green plant material has been destroyed). Repeat steam treatment after 48 hours to destroy any newly developed, germinating or remaining fungal spores.

F. Recommendations for Equipment and Personnel (Inspectors and Employees) in Nurseries with Infected Plants:

1. Access to infected areas and hold areas should be limited, as much as possible, to officials and employees. Everyone entering and leaving the nursery needs to scrape off loose soil from their shoes. Those working with, or in contact with suspected infected material (including plants), needs to wash hands using soap or approved disinfectant when appropriate.
2. Personnel should not have access to other parts of the nursery after entering the infected area on the same day.

3. Do not visit other nurseries in potentially contaminated work clothing and footwear. The nursery will take precaution to prevent the movement of infected plants, contaminated soil or debris with the visitor and workers.

G. Releasing the Nursery: Nurseries and their plants may be released from regulatory control by USDA-APHIS or designated official after this protocol has been followed, and *P. horiana* Henn infected plants are not found, all stipulations of EAN have been satisfied, and the EAN has been rescinded by regulatory officials.

IX. Environmental Survey:

It is recommended that a modified 400 m delimiting survey be conducted around each infected nursery. This survey can be conducted by walking through and carefully examining the survey area. The objective is to locate any obvious planting of chrysanthemums in the area and to inspect these chrysanthemums for the symptoms of CWR. Normally this survey should take no longer than one day; unless unforeseen difficulties arise. If the same nursery is found to be infected in two consecutive years, a more thorough survey of up to 800 m should be conducted.

Appendix I: Management Practices for Growing CWR-free Chrysanthemums

These Management Practices may help prevent the disease caused by *P. horiana*. Any nursery may incorporate these practices into their Standard Operating Procedures (SOP).

I. Exclusion:

Maintain production areas at less than optimum humidity for growth of CWR and reduce other cultural practices conducive to optimal CWR-growth conditions.

- Require specific sanitation protocol for personnel movement between greenhouses and growing areas. Enforce one-way movement of personnel from least restrictive to most restrictive areas of sanitation.
- Actively train personnel for identification of CWR symptoms and proper practices to guard against the spread of the disease.
- No over story or under story of known hosts should be grown on nursery grounds unless there is regular monitoring of those hosts.
- Confirm that host stock is propagated from materials originating on site or is received from shipping nurseries which are free from CWR.
- All incoming host plants (buy-ins, transfers), regardless of origin, should be visually inspected for symptoms of CWR by trained nursery personnel prior to being incorporated into the production area.
- Incoming host plants, propagative material, cuttings should be stored away from the main production area.
- Incoming cuttings should be treated with a maintenance fungicide before planting.
- The mother stock should be located away from the main production area, i.e., in a different structure with no connected air flow.

II. Prevention:

- Use an effective fungicide program for the control and prevention of CWR on susceptible host plants.
- Off load incoming shipments to an area that can be cleaned of the leafy debris. Sweep debris from the receiving pad and the delivery truck; collect debris and bag for disposal.
- Avoid product returns of nursery stock from a receiver in a quarantined area. If unavoidable, contact your State Regulatory Official (if in California, your County Agricultural Commissioner) prior to accepting the nursery stock return. One-way movement of plant material through nurseries regardless of known CWR-status may be required. Otherwise, have designated quarantine zone in the nursery that prevents returns from co-mingling with “clean” stock.
- If the infestations have been detected in a place of production, the fungicidal dip treatment of chrysanthemum cuttings before planting should be considered.

III. Monitoring:

- Nursery personnel should attend one or more CWR workshops available through State Agriculture Departments, and Universities in your state.
- All host buy-ins should be maintained separately from other hosts plants and periodically inspected for symptoms of the disease over the course of a growing season.
- Monitor host plants in surrounding area for symptoms of *P. horiana*.
- Identify sources of disease recognition fact sheets, and/or develop and distribute disease recognition fact sheets on host plants to educate all field nursery personnel.
- Record Keeping: Maintain accurate shipping documentation identifying product, amount, date and origin or receiver for the purpose of identifying trace backs and trace forwards.
- If the disease is found in the area surrounding a nursery, immediately contact Department of Agriculture in your state or your County Agriculture Commissioner.

Appendix II. Chrysanthemum White Rust Regulatory Incidence

If CWR is detected in a nursery, collection of the following information will be useful for trace-back or trace-forward investigations. Use attachments if necessary for topics with lengthy information.

I. Facility

Type of Inspection:

Routine plant inspection: Y or N _____

Regulatory trace-forward/trace back: Y or N _____

a. Name of Facility : _____

b. Location: _____

c. Owner: _____ General Manager: _____

d. Total acreage/area of Nursery & STR &/or GPS: _____

Please provide facility map identifying all mum areas:

e. Number of Greenhouses/blocks in production: _____

f. Number of plants: _____

g. Type(s) of operation (wholesale; retail; cut flower; research; plant diagnostics; tissue culture; breeding, rooting station, etc.).

h. List all other companies-facilities involved in production, sales and distribution of your mum product and additional nursery locations. (i.e., rooting stations; trial fields; contract growers; brokers).

i. List all sources of propagative mum materials both domestic and imported including tissue culture; breeding; research; and propagative. (include licensed/unlicensed varieties that are owned by facility; grown at off-shore facility and shipped back to U.S.A for production).

j. Are any of the following received from outside sources: un-rooted cuttings_____; rooted cuttings_____; and potted mum material_____: Cut-flowers_____: If so, list the sources.

k. Describe sanitation requirements for entry into nursery and for movement between greenhouses or other growing units.

l. List chemical regiments used in mum production in the facility. Give names of chemicals and intervals used.

II. Individual Chrysanthemum Growing Area or Greenhouse

The following information should be completed for each separate growing area or greenhouse type.

A. Identification of Greenhouse/Field:

1. Type of growing area and name of unit (i.e., glasshouse; drop-side greenhouse; shade house; indexing, breeding, production field, research; tissue culture, rooting station, etc.).
2. Who is the Growing area manager? _____
3. How many suspicious samples were collected by regulatory inspectors and submitted for identification to pathologist(s); (identify sites where samples were taken):
4. Was CWR found anywhere on/in this area? In this Nursery? During this regulatory incident? Action taken?
5. a. Is entry to greenhouse/unit restricted to authorized personnel and/or monitored? Who is authorized to enter?
 - b. How is area secured?

B. Construction or configuration of growing area:

1. a. Growing area - Open Field (not under any type of structure)
 - b. Enclosed Structure Construction (including shade houses)
2. Describe the airflow, what type of Air Intake and Exhaust system(s)?
Is humid air exhausted out of nursery block into environs or into other parts of the growing nursery?

Are individual sections of the nursery connected by the air ventilation system? Are houses ventilated; how & why? Are houses/areas maintained at a specified relative humidity? If so, what RH?
3. Are houses/area heated or cooled? What temperature(s) range & describe schedule:
4. If a cut flower grower; are houses subject to 12-hrs darkness during initiation of the flowering stage? If so, how is this accomplished and does it contribute to fungal growth conditions?

C. Sanitation Procedures:

1. Describe the sanitation procedures required of the employees having access to this area.
2. What chemicals, if any, are used for the decontamination procedures?
4. Have the environs and nursery landscape and/or neighboring properties contiguous with the Nursery been inspected for the presence of CWR host material and CWR infections? If yes, how far out?

5. How many times has the Nursery been inspected by State, County, and/or Federal inspectors during the past year? Are copies of the inspection reports available?

6. If this nursery is positive for CWR, provide invoices for all chrysanthemum materials sold or moved to other nurseries. Please include invoices for the time span one week prior to date CWR infection is estimated to have begun and for all plants considered exposed. Also, include information for disposal areas of infected plant material if different than already described above.

III. Regulatory and Phytosanitary Information

A. Identify the Positive infection triggering regulatory investigation (may be infected at this nursery or an infection in an associated nursery).

B. Has there been a CWR infection at this Nursery in the past? If so, when?

C. Is production area under inspection physically connected to another part(s) of the Nursery that handles chrysanthemum material in any capacity?

1. Is a retail outlet connected to the production nursery; either physically or under the same ownership? (i.e., contiguous spaces with retail shop and greenhouse connected; customers moving freely between areas, common air ducts, etc.)?

2. Do employees move freely between greenhouses, nursery, field blocks, retail outlet, etc? (for example, employees work in any/all areas of the nursery as needed in the course of a day as opposed to employees restricted from working in multiple areas of the nursery)

3. Describe preventative measures in place to stop fungal infections from spread between same entities listed in previous question. (this could be sanitation procedures already discussed, as well as additional physical barriers such as filters, etc. in place to prevent spores from spreading via air ducts).

4. Detail progression of plant material from start to finished product.

This may be a very simple progression or can be very complicated depending upon the Nursery's set-up.

Example 1: Plants begin as cells in tissue culture –grown to small plantlets – plantlets grown out in “contained glasshouse”– cuttings taken from plantlets and stuck in “increase house” – increase moved to production field – cuttings sent to : Wholesale nurseries as rooted and/or un-rooted depending upon order- shipped via company trucks with one stop over for repacking and distribution direct to client....

Example 2: The wholesale Nursery receives rooted cuttings from broker; sticks cuttings in pots; grows to 4-in pot size and sells retail on site.

5. List all sources of non-propagative mum material that may have been on premises in the past year (such as cut flowers; retail potted materials; diagnostics; R&D materials, etc.).

6. Is any mum material received under special permit(s)?

- USDA Departmental Permit -
- USDA Post entry Permit -
- USDA Containment Facility Permit -
- USDA Biotechnology Permit(s) -
- Other state of federal permits –

7. List chemical regiments used in mum production in the nursery. Give names of chemicals and intervals used.

8. Are spray records maintained and accessible to inspectors?

9. Are chemicals considered to be “curative” agents used in routine production as a “preventative” measure?

10. How are culls & plant debris disposed off site? At what intervals?

11. Is plant debris disposed immediately or left in greenhouse/field?

12. Does nursery/outlet utilize a “cull pile” and if so; where is the cull pile located and how long is it left before it is removed?

13. Does nursery “compost” its cuttings/culls?

14. Is chrysanthemum stock sold interstate and/or intrastate and is it exported? To whom is stock sold and in what form (un-rooted cuttings, rooted cuttings, potted plants; bare-root plants; cut flowers, etc.)?

15. Are sales invoices available for inspector(s) to view?

16. Does this Nursery propagate licensed/patented varieties of mums that are registered to other companies (can be for production or for R&D-only)? If so, list the varieties and the sources of each.

17. What other companies are licensed to sell your patented/licensed varieties?

18. Other information

Name of the Inspector(s)..._____ .Date _____

Telephone - Office: _____ Cell phone: _____

E-mail: _____

Copies of this report will be provided by the above individual to the following: (list officials receiving copy from inspector):

IV. Infected Property – EAN ACTIONS LOG

A. Date of EAN ACTION: _____

1. Date infected plants and exposed radius of plants destruction complete: _____

2. Date & Results of Inspection One after destruction of infected plants:

a. Were more infected plants found? If so, identify the location in the facility & include map.

b. Date additional plants destroyed: _____

c. Note any additional regulatory actions taken:

3. Date & Results of Inspection 2 after original destruction of infected plants: _____

a. Were more infected plants found? If so, identify the location in the facility & include map.

b. Date additional plants destroyed: _____

c. Note any additional regulatory actions taken:

4. Date & Results of Inspection 3 after original destruction of infected plants: _____

a. Were more infected plants found? If so, identify the location in the nursery & include map.

5. Is further regulatory action initiated?

a. Host-Free period for 8-weeks; date beginning: _____

b. Host-free with approved steam sterilization: _____

c. Host-free with another approved decontamination of soil to render it host-free (List method & who approved it):

6. Date nursery is approved to replant chrysanthemums in the regulated area: _____

7. Date EAN rescinded: _____

NOTES:

Name of the Inspector(s)..._____Date_____

Telephone - Office: _____ Cell phone: _____

E-mail: _____

Copies of this report will be provided by the above individual to the following: (list officials receiving copy from inspector):

Appendix III: Chrysanthemum Facility Routine Inspection Report

If CWR is detected in a nursery, collection of the following information will be useful in completing routine inspection report. Use attachments if necessary for topics with lengthy information.

Facility		
Name of Owner: Tel email	Manager: _____ tel Email: _____ No. of greenhouses/blocks in production: _____	Total acreage of nursery: Facility map of Mum Growing area No. of plants: _____
Location: Location of other Companies facilities involved in production of mums	Type of operation: wholesale.....retail.....Cutflower.....breeding..... rooting station.....Diagnostic.....tissue culture..... Are plants currently exported: Y N If yes, to what countries: To whom plants are sold in U.S.	List all sources of propagative material both domestic and imported Including tissue culture Varieties grown at the facility Is rooting done at this facility
Entry to the facility is secure and excludes any external source of <i>Puccinia horiana</i> from entering the facility: Y N Chrysanthemum plants are located within an enclosed greenhouse in pots during all stages of growth: Y N Chrysanthemum plants are located within an enclosed greenhouse in ground soil during all stages of growth: Y N Chrysanthemum plants are located outside in an open field during all stages of growth: Y N Is there complete separation between rooting station increase and production blocks? Y N Do employees work exclusively in rooting block, and production block greenhouses or increase block greenhouses during a single workday? Y N		
Greenhouse Construction or Configuration of Mum Growing Area		
Entry	Rooting green house is located away from production area and has single air tight entrance Y N Direct access to hand wash station(s), and protective clothing (aprons, lab coats, etc) prior to entering rooting green house: Y N If No, describe: Entry to rooting green house is restricted to authorized personnel: Y N If No, describe Are personal items stored before entry to greenhouse? Y N If no, describe:	
Sanitation: Describe Sanitation Procedure Required of Employees Having Access to Mum Growing Area		
Wash Stations:	There is a wash station/ sink prior to entering the production area: Y N Sink drains immediately to outside of rooting and production area: Y N	
Employee training:	There is a training program covering proper greenhouse procedures, including information on how <i>Puccinia horiana</i> spreads: Y N	

Protective clothing	Description: How Often? A list of trained personnel is maintained: Y N Access to Chrysanthemum production facilities is limited to trained and certified individuals: Y N Protective clothing routinely used: Y N Protective clothing dedicated to each greenhouse and removed before exiting: Y N Clothing is maintained free of debris, potting media, soil, or plant material: Y N Protective clothing washed in detergent weekly or replaced in the case of disposable aprons: Y N
Tools	Carts and collection baskets are cleaned of soil and plant debris: Y N Cutting tools used to cut flowers are cleaned when moving between green houses: Y N
Growing Chrysanthemum: Identify Greenhouse/field	
Type of growing area and name of unit	Plants are grown in: Glasshouse, drop-side green house, Shadehouse, indexing breeding, production field, research, tissue culture lab, rooting station, containment laboratory, other , List varieties grown with emphasis on those with special susceptibility to <i>Puccinia horiana</i> :
Numbers	Total planting acreage or number of potted plants: Plant density in growing ground (number of plants per meter) or pots per meter of bench space Number of separate houses on the property
Results of Inspection:	
<p>How many samples suspicious for CWR taken during survey?</p> <p>Laboratory results of samples submitted for CWR identification:</p> <p>Was 100% facility inspected; if no; when will inspectors return:</p> <p>Did APHIS or State Inspectors survey the facility prior to this inspection? Y N If “yes” , how many times has the Facility been inspected in the past 6months?</p> <p>Are copies of Inspection reports available? Y N</p> <p>. Does the greenhouse receive an annual inspection timed for optimum observation of the presence of CWR, or is the inspection a general one and non-specific for CWR? Specific_____ General_____</p> <p>Comments: _</p> <p>Inspector (s): _____ Date inspection Completed: _____</p>	
Air Flow	Type of Air intake and Exhaust system: Is humid air Exhausted out of nursery block into environment or into other parts of mum growing facility Are individual sections of the facility connected by the air ventilation system Relative humidity @ which Facility maintains growing site:

Appendix IV: Disposal of Infected Plant Material

Host material, including leaf litter, must not be removed from the facility as trash. The infected plant may be cut with a sharp knife near the root without any shaking and dispersing of the fungal spores. All plant debris including leaves, stems, flowers, roots, and any other plant parts will be removed and destroyed using one of the following methods. Other methods deemed proper by the regulatory authorities may be used.

- Incineration (burning to ash): Infected plants, all leaf debris may be disposed of by incineration at a facility or other location. Off nursery movement must be properly safeguarded. Burning may be through open burning or in an incinerator.
- Burial: Infected plants, all leaf debris may be bagged, buried and covered with two inches of soil.
- Steam sterilization: Dry heat or steam commonly heated to internal temperatures of 212° F (100° C) for 30 minutes followed by burial in a landfill.
- Composting method as outlined in the California codified in California Integrated Waste Management Board regulations: Title 7, Division 7, Chapter 3.1 Article 7, Section 17868.3 (b) and (c) located at <http://www.ciwmb.ca.gov/Regulations/Title14/ch31a5.htm#article7>.

Appendix V: List of Contacts

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Diagnostic Authority	Dr. Mary Palm	301-504-5327	Mary.Palm@usda.gov
National CWR Management Plan - Review Team - USDA/APHIS/PPQ - Riverdale, MD			
	Vedpal S. Malik	301-734-6774	Vedpal.S.Malik@usda.gov
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USDA/APHIS/PPQ - Western Region			
	Helene R. Wright, CA SPHD	916-930-5500	Helene.R.Wright@usda.gov
	Roeland J. Elliston, CO	970-494-7572	Roeland.J.Elliston@usda.gov
<i>Alternates</i>	Timothy J. McNary, CO	970-494-7570	Timothy.J.McNary@usda.gov
	Ted Boratynski, Brawley, CA	760-344-1152	Theodore.N.Boratynski@usda.gov
USDA/APHIS/PPQ - Eastern Region			
	Paul L. Hornby, SOSO, FL	352-331-3990	Paul.L.Hornby@usda.gov
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	V. A. Kemmerer, PPQ FL	239 931-5900	V-Anne.Kemmerer@usda.gov
	Mary Mahaffey NC	919-855-7297	Mary.E.Mahaffey@aphis.usda.gov
	Billy Newton NC	919-855-7355	William.M.Newton@aphis.usda.gov
USDA/ARS:	Morris Bonde,	301-619-2860	bondem@ncifcrf.gov
The National Plant Board (NPB)	Ken Rauscher	919-733-3933	bill.dickerson@ncmail.net
States Department of Agriculture - States Plant Regulatory Officials			
California	Nick Condos	916-653-1440, FAX: 916-654-0986	ncondos@cdfa.ca.gov
Washington	Brad White	360-902-2071	ccampbell@agr.wa.gov
Oregon	Kathleen Johnson	503-986-4661	jgriesba@oda.state.or.us
<i>Alternate</i>	Dan Hilburn	503-986-4663	dhilburn@oda.state.or.us
Florida	Connie Riherd	352-372-3505, Ext: 108	riherdc@doacs.state.fl.us
Ohio	Tom Harrison	614-728-6399	tharrison@odant.agri.state.oh.us
South Carolina	Jack Jackson	864-646-2131	hjcksn@clemson.edu
Industry- East Coast	Joe Begley, Yoder Brothers, Inc., FL	941-728-2535 Ext: 254, Cell: 941-872-2093	Begleyj@Yoder.com
Industry- West Coast	Dave Pruitt, Sea Coast Greenhouses, Inc., Encinitas, CA	760-753-4435, Cell: 760-801-9164	dave@seacoastflowers.com
	Dave Niklas, Clackamas Greenhouses, Inc. Aurora, OR	503-678-1270	dniklas@aol.com
Industry Associations	Craig Regelbrugge, American Nursery and Landscaping Association, Washington, DC	202-789-2900,	cregelbrugge@anla.org
	Lin Schmale, Society of American Florists, Alexandria, VA	703-838-5232	lschmale@safnow.org

Appendix VI: Cut Flowers and plants that are hosts of CWR

Accepted name of susceptible species	Synonyms	Common Name
<u>Chrysanthemum arcticum</u> L. ¹	<u>Arctanthemum arcticum</u> (L.) Tzvelev and <u>Dendranthema arcticum</u> (L.) Tzvelev	Arctic chrysanthemum and arctic daisy
<u>Chrysanthemum boreale</u> (Makino) Makino ^{1,2}	<u>Chrysanthemum indicum</u> L. var. <u>boreale</u> Makino and <u>Dendranthema boreale</u> (Makino) Ling ex Kitam.	
<u>Chrysanthemum indicum</u> L. ^{1,2,3}	<u>Dendranthema indicum</u> (L.) Des Moul.	
<u>Chrysanthemum japonense</u> Nakai ^{1,2}	<u>Dendranthema japonense</u> (Nakai) Kitam. and <u>Dendranthema occidentali-japonense</u> Kitam.	Nojigiku
<u>Chrysanthemum japonicum</u> Makino ^{1,2}	<u>Chrysanthemum makinoi</u> Matsum. & Nakai and <u>Dendranthema japonicum</u> (Makino) Kitam.	Ryuno-giku
<u>Chrysanthemum ×morifolium</u> Ramat. ^{2,4}	<u>Anthemis grandiflorum</u> Ramat., <u>Anthemis stipulacea</u> Moench, <u>Chrysanthemum sinense</u> Sabine ex Sweet, <u>Chrysanthemum stipulaceum</u> (Moench) W. Wight, <u>Dendranthema × grandiflorum</u> (Ramat.) Kitam., <u>Dendranthema ×morifolium</u> (Ramat.) Tzvelev, and <u>Matricaria morifolia</u> Ramat.	Florist's chrysanthemum, chrysanthemum, and mum
<u>Chrysanthemum pacificum</u> Nakai ¹	<u>Ajania pacifica</u> (Nakai) K. Bremer & Humphries and <u>Dendranthema pacificum</u> (Nakai) Kitam.	Iso-giku
<u>Chrysanthemum shiwogiku</u> Kitam ¹	<u>Ajania shiwogiku</u> (Kitam.) K. Bremer & Humphries and <u>Dendranthema shiwogiku</u> (Kitam.) Kitam.	Shio-giku
<u>Chrysanthemum yoshinaganthum</u> Makino ex Kitam ²	<u>Dendranthema yoshinaganthum</u> (Makino ex Kitam.) Kitam.	
<u>Chrysanthemum zawadskii</u> and <u>Herbich</u> subsp. <u>Yezoense</u> (Maek.) Y. N. Lee ¹	<u>Chrysanthemum arcticum</u> subsp. <u>maekawanum</u> Kitam, <u>Chrysanthemum arcticum</u> var. <u>yezoense</u> Maek. [basionym], <u>Chrysanthemum yezoense</u> Maek. [basionym], <u>Dendranthema yezoense</u> (F. Maek.) D. J. N. Hind, and <u>Leucanthemum yezoense</u> (Maek.) Á. Löve & D. Löve	
<u>Chrysanthemum zawadskii</u> and <u>Herbich</u> subsp. <u>zawadskii</u> ¹	<u>Chrysanthemum sibiricum</u> Turcz. ex DC., nom. inval., <u>Dendranthema zawadskii</u> (Herbich) Tzvelev, and <u>Dendranthema zawadskii</u> var. <u>zawadskii</u>	
<u>Leucanthemella serotina</u> (L.) Tzvelev ³	<u>Chrysanthemum serotinum</u> L., <u>Chrysanthemum uliginosum</u> (Waldst. & Kit. ex Willd.) Pers., and <u>Pyrethrum uliginosum</u> (Waldst. & Kit. ex Willd.)	Giant daisy or high daisy

<u>Nipponanthemum nipponicum</u> (Franch. ex Maxim.) Kitam ²	<u>Chrysanthemum nipponicum</u> (Franch. ex Maxim.) Matsum. and <u>Leucanthemum nipponicum</u> Franch. ex Maxim.	Nippon daisy or Nippon-chrysanthemum
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1 Water, J.K. "Chrysanthemum White Rust," EPPO Bulletin, No. 11, pp. 239-242 (1981).

2 Hiratsuka, N. "Three species of Chrysanthemum rust in Japan and its neighboring districts," Sydowia, Series 2, Supplement 1, pp. 34-44 (1957).

3 Dickens, J.K. kl., "The resistance of various cultivars and species of chrysanthemum to white rust (*Puccinia horiana* Henn.)," Plant Pathol, No. 17, pp. 19-22 (1968).

4 Yamada, S., "Experiments on the epidemiology and control of chrysanthemum white rust caused by *Puccinia horiana*," Annals of the Phytopathological Society of Japan, No. 20, pp. 148-154 (1956).

Appendix VII: Prohibited Articles

Prohibited article (includes seeds only if specifically mentioned)	Foreign places from which prohibited	Plant pests existing in the places named and capable of being transported with the prohibited article
Chrysanthemum spp. (chrysanthemum).	Andorra, Argentina, Australia, Belarus, Bosnia and Herzegovina, Brazil, Brunei, Bulgaria, Canary Islands, Chile, China, Colombia, Croatia, Hungary, Iceland, Japan, Korea, Latvia, Liechtenstein, Lithuania, Macedonia, Malaysia, Mexico, Moldova, Monaco, New Zealand, Peru, Poland, Republic of South Africa, Romania, Russia, San Marino, Slovakia, Slovenia, Switzerland, Taiwan, Thailand, Tunisia, Uruguay, Venezuela, Yugoslavia; the European Union (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and United Kingdom); and all countries, territories, and possessions of countries located in part or entirely between 90° and 180° East longitude.	<i>Puccinia horiana</i> P. Henn. (white rust of chrysanthemum).
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Dendranthema spp. (chrysanthemum).	Andorra, Argentina, Australia, Belarus, Bosnia and Herzegovina, Brazil, Brunei, Bulgaria, Canary Islands, Chile, China, Colombia, Croatia, Hungary, Iceland, Japan, Korea, Latvia, Liechtenstein, Lithuania, Macedonia, Malaysia, Mexico, Moldova, Monaco, New Zealand, Peru, Poland, Republic of South Africa, Romania, Russia, San Marino, Slovakia, Slovenia, Switzerland, Taiwan, Thailand, Tunisia, Uruguay, Venezuela, Yugoslavia; the European Union (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and United Kingdom); and all countries, territories, and possessions of countries located in part or entirely between 90° and 180° East longitude.	<i>Puccinia horiana</i> P. Henn. (white rust of chrysanthemum).