NAPPO
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Organización Norteamericana de Protección a las Plantas
MEXICO - USA - CANADA

NAPPO Regional Standards for Phytosanitary Measures (RSPM)

RSPM 13
Guidelines to Establish, Maintain and Verify Karnal Bunt Pest Free Areas in North America

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Contents

Review

NAPPO Standards for Phytosanitary Measures are subject to periodic review and amendment. This standard was last reviewed in 2016. The next review date for this NAPPO Standard is 2020. A review of any NAPPO Standard may be initiated at any time upon the request of a NAPPO member country.

Approval

This Standard was approved by the North American Plant Protection Organization (NAPPO) Executive Committee on October 14, 2001, and revised on October 19, 2009. The current revision was approved on July 6, 2016, and is effective from this date.

Signed by:

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Implementation

No Implementation Plan is required.

Amendment Record

Amendments to this Standard will be dated and filed with the NAPPO Secretariat.

Distribution

This standard is distributed by the NAPPO Secretariat, to the Industry Advisory Group (IAG) and Sustaining Associate Members (SAM), the International Plant Protection Convention (IPPC) Secretariat, and to other Regional Plant Protection Organizations (RPPOs).

Introduction

Scope

The standard sets a general framework for the application of guidelines to establish, maintain, and verify Karnal bunt pest free areas (PFAs) in North America.

This standard recommends surveillance approaches, sampling and testing methodologies and restrictions on the movement of regulated articles. The standard also addresses non-compliance and the strength of corrective actions. This standard applies to seed and grain of wheat, triticale and other hosts and regulated articles. It also describes the role of the National Plant Protection Organization (NPPO) to ensure compliance with this standard. Bilateral agreements may be required to elaborate further on any of the items in this standard.

References

ISPM 4. 1995. *Requirements for the establishment of pest free areas.* Rome, IPPC, FAO.

ISPM 5. (Updated annually). *Glossary of phytosanitary terms.* Rome, IPPC, FAO.

ISPM 6. 1997. *Guidelines for surveillance.* Rome, IPPC, FAO.

ISPM 10. 1999. *Requirements for the establishment of pest free places of production and pest free production sites.* Rome, IPPC, FAO.

RSPM 5. (Updated annually). *NAPPO glossary of phytosanitary terms.* Ottawa, NAPPO.

RSPM 21. 2014. *A harmonized procedure for morphologically distinguishing teliospores of Karnal bunt from ryegrass bunt, rice smut and similar smuts.* Ottawa, NAPPO.

SAGARPA 2002. Establishing the national campaign for Karnal bunt of wheat. Norma Oficial Mexicana NOM-001-FITO-2001, Mexico.

USDA APHIS. 2007. Karnal Bunt Manual Appendix D - Laboratory Procedures https://www.aphis.usda.gov/plant_health/plant_pest_info/kb/downloads/kb-manual-appD.pdf

USDA-APHIS. 2005. Code of Federal Regulations 7 CFR § 301.89 Karnal Bunt Domestic Quarantine Regulations. http://www.ecfr.gov/cgi-bin/text-idx?SID=7b51cac3650de14f454f84c60f4ba6e7&mc=true&node=sp7.5.301.xx20&rgn=div6 (current as of June 22, 2016).

USDA-APHIS. 2010. Electronic Code of Federal Regulations 7 CFR § 319.59 Karnal Bunt Foreign Quarantine Notices. http://www.ecfr.gov/cgi-bin/text-

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Definitions

Definitions of phytosanitary terms used in this standard can be found in NAPPO RSPM 5 and in ISPM 5.

Background

Karnal bunt of wheat and triticale is caused by the fungus *Tilletia indica* Mitra, a seed-borne pathogen. The natural hosts of *T. indica* are wheat species (*Triticum* spp.) and triticale (*Triticosecale Wittn. Ex. A. Camus [Secale x Triticum]).* The planting of infected or infested wheat and/or triticale seed poses the greatest risk for introducing Karnal bunt. In addition, spores of the pathogen can potentially be carried by human mediated movement of host hay or straw, conveyances, used bags, farm equipment, or soil.

Unlike the rust pathogens of wheat, to date there is no firm evidence to suggest that Karnal bunt spores can be spread long distances by wind. As such, restrictions on the movement of infected or infested host material or other articles that might spread spores, as well as cleaning of agricultural machinery, especially threshing machines, are considered appropriate options to prevent the introduction of Karnal bunt from infested to non-infested areas.

Phytosanitary certification by an NPPO for the absence of Karnal bunt could be based on a Karnal bunt PFA. Any country has the sovereign right to establish a PFA. However, it is important that guidelines are established to ensure harmonization among NAPPO member countries in establishing, maintaining, and verifying Karnal bunt PFAs that will facilitate their recognition by trading partners.

A Karnal bunt PFA can occur naturally or can be achieved through eradication programs. A PFA is usually delimited by recognizable geographical or political boundaries. In the absence of physical barriers to prevent the possible introduction of Karnal bunt from adjacent infected areas, a buffer zone may be defined. The size of the PFA (and its buffer zone, if required) and the strength of the phytosanitary measures will depend on the geographical distribution of the pest, its prevalence and level of damage, and on the particular characteristics of the area.

Prior to establishing a Karnal bunt PFA, the NPPO should verify that it has met the requirements of this standard and the relevant International Standards for Phytosanitary Measures, in particular ISPM 4: 1995.

Requirements

The NPPO is responsible for the establishment, maintenance and verification of a PFA. Other public officers and private individuals and organizations may participate in the delivery of the program under the authority of the NPPO. The NPPO plays a role in documentation requirements, surveillance, consultation resulting in termination/ reinstatement of a PFA and implementation of corrective actions in the event of detection of Karnal bunt.

1. Establishment of a Karnal bunt PFA

The NPPO of the country seeking recognition of a Karnal bunt PFA should provide documentation on the following, when available:

1.1 Geographic description of the PFA

The delimitation of the Karnal bunt PFA should include its location and geographic coordinates illustrated by maps that indicate its limits. A description of prevailing climatic conditions, cultivated host material and how the PFA is isolated from areas with Karnal bunt should also be provided. Additionally, the following should be provided:

- A description of areas with Karnal bunt near the PFA indicating their distance from Karnal bunt quarantined areas, level of infection (if that assessment is made), cultivated hosts, affected area or size of field, geographic coordinates, and climatic conditions.
- Whether there is a buffer zone between the PFA and the affected areas, its size, geographic boundaries, cultivated crop species as well as a description of the reasons of why it was established. The size of this buffer zone will need to be determined on a case by case basis, taking into account the relevant factors which could impact on the introduction of Karnal bunt (see ISPM 4: 1995 and ISPM 10: 1999 for further information on the establishment of PFAs).
- A list of controls or points of verification of movement and illustrate these by maps that indicate actual limits/boundaries, as well as any major landmarks, roads, sea ports, airports, etc.

1.2 Production information

- Information on agronomic practices such as crop rotations, tillage practices and pesticide applications, among others.
- The location of wheat for grain and seed production as well as triticale, if required.
- Acreage/hectares/volume of wheat and triticale.
- Location of commercial storage and processing facilities (if applicable) to determine sampling methodology, if required.

1.3 Movement of regulated articles

- *Tilletia indica* should be officially listed as a quarantine pest. Phytosanitary import requirements and restrictions on the national movement of regulated articles are required to prevent the introduction of Karnal bunt into a PFA.
- An appropriate inspection program should be established for the regulated articles which could include sampling and testing, verification of documents, confirmation of treatments when required, or quarantine actions, and in some cases, the use of control points for verification.
- Only Karnal bunt free seed may be moved into and planted in the PFA.

1.4 Surveillance

Two types of surveillance are possible to establish a Karnal bunt PFA. These are 1) general surveillance and 2) specific surveys (as defined in ISPM 4: 1995). General surveillance is a process whereby information on particular target pests is gathered from many sources wherever it is available and as specified in ISPM 6: 1997 and provided for use by the NPPO. Specific surveys are procedures by which NPPOs obtain information on target pests on specific sites in an area over a defined period of time. These surveys may include official delimiting and detection surveys which should follow a plan approved by the NPPO.

These types of surveys can be used separately or in combination for the establishment of a Karnal bunt PFA as recommended in the following situations; the selected sampling frequency should provide an adequate level of detection.

1.4.1. In countries where Karnal bunt has never been detected:

- Data obtained from general surveillance may be sufficient to demonstrate a PFA. The NPPO should refer to ISPM 6: 1997.

1.4.2. In countries where Karnal bunt exists:

- In areas where Karnal bunt has never been detected
    - In order to initially establish a Karnal bunt PFA in geographically separated areas (defined by physical or political boundaries): detection surveys at points of aggregation or fields should be conducted for 3 consecutive years or for up to 6 years if areas are surveyed on alternating years with negative results at the specified sampling frequency (see 1.5.4 below)
- In areas where Karnal bunt has been detected
    - Affected fields must be under surveillance for a total of 5 years (the years need not be consecutive) before a PFA can be established. Within this 5 year period the harvested grain must be sampled and tested for Karnal bunt annually. Five

years of negative test results is required at the sampling frequency indicated - see section 1.5.3.

- If planted to a host crop, the field must be seeded with Karnal bunt free seed. Alternatively, affected fields that do not produce a host crop that can be sampled and tested must undergo a form of tillage at least once during the production year in order for this year to be included towards the 5-year surveillance requirement.

1.5 Sampling and testing methodology

Each country may select and use sampling methodologies and diagnostic testing approved by the NPPO. The sampling must be based on criteria to ensure phytosanitary integrity and traceability, and be of a size that allows for the detection of *T. indica*. The following methodologies are recommended:

1.5.1. Sampling methodology

- Random samples should be collected during the transfer or storage of grain or seed using a mechanical sampler, when available.
- Samples can also be collected randomly from grain or seed with a probe.

1.5.2. Sample size (based on existing practices)

- Grain (SSS - size selective seed wash for teliospores) – a minimum 50 gram sub-sample for the test derived from a 3.4 pound (1.5 kg) or greater sample.
- Grain (direct examination for bunted kernels) – 3.4 pound (1.5 kg) or greater sample. The entire sample must be examined.
- Seed – same as for grain - but sample size and/or collection methodology may vary depending on the availability of the seed and agricultural practices.

1.5.3. Sampling frequency

The sampling frequency may vary depending on the agricultural practices, grains collection and distribution system and national plant protection organization requirements:

- From areas which are geographically separate from affected areas and where Karnal bunt has not previously been detected, sampling will be done according to the requirements of each NPPO per growing season for a minimum 3 consecutive years or for up to 6 years if areas are surveyed on alternating years.
- From areas where Karnal bunt had been present, sampling will be done according to the requirements of each NPPO per year growing season,

for 5 years (the years need not be consecutive) where a host crop has been grown. Alternatively, affected fields that do not produce a host crop that can be sampled and tested may undergo a form of tillage at least once during the production year in order for this year to be included towards the 5 year requirement.

- From a buffer zone, if one has been established, sampling will be done each growing season according to the requirements of each NPPO.

1.5.4. Testing methodology (See Appendix 1 for details)

- Size selective sieve (SSS) seed wash method for teliospores (USDA and SAGARPA)
- Modified SSS method (CFIA)
- Direct examination for bunted kernels (USDA)

2. Maintenance of a Karnal bunt PFA

In order to maintain the PFA status, the NPPO of each country will document the phytosanitary measures which include the following:

- Movement of regulated articles
- Surveillance
- Testing and sampling

2.1 Movement of regulated articles

- Each NPPO should identify articles regulated for Karnal bunt and specify requirements for national movement in their regulations.
- International and national restrictions on the movement of regulated articles are required to prevent the introduction of Karnal bunt into a PFA.
- An appropriate inspection program should be established for the regulated articles which could include sampling and testing, verification of documents, confirmation of treatments when required, or quarantine actions.
- Only Karnal bunt free seed may be planted in the PFA.

2.2 Surveillance to maintain PFA status

Two types of surveillance are possible for maintaining a PFA status. These are 1) general surveillance and 2) specific surveys (See Section 1.4).

These types of surveys can be used separately or in combination for the maintenance of a PFA as recommended in the following situations. These surveys may include official delimiting and detection surveys which should follow a plan approved by the NPPO.

2.2.1 In countries where Karnal bunt has never been detected:

- Data obtained from general surveillance may be sufficient to maintain a PFA. The NPPO should refer to ISPM 6:1997.

2.2.2 In countries where Karnal bunt exists:

- In areas where Karnal bunt has never been detected
  - Data obtained from general surveillance may be sufficient to maintain a PFA. The NPPO should refer to ISPM 6: 1997.

- In areas where Karnal bunt has previously been detected but are now considered PFAs,
  - If detection surveys at points of aggregation or fields have been conducted for 3 consecutive years or for up to 6 years if areas are surveyed on alternating years with negative results at the specified sampling frequency, data obtained from general surveillance may be sufficient to maintain a PFA. The NPPO should refer to ISPM 6: 1997. The NPPO may conduct periodic monitoring surveys as part of the general surveillance in these areas (see Section 3.0)

- From a buffer zone, if one is still maintained, the sample frequency should be of one sample per five fields per year.

2.3 Testing and sampling methodology

Each country may select and use testing and sampling methodologies to establish their appropriate level of protection. The sampling must be based on criteria to ensure phytosanitary integrity and traceability, and be of a size that allows for the detection of *Tilletia indica*. The following methodologies are recommended:

2.3.1. Sampling methodology
- same as for establishment of the PFA, see Section 1.5.1

2.3.2. Sample size (based on existing practices)
- same as for establishment of the PFA, see Section 1.5.2

2.3.3. Sampling frequency – please refer to Section 2.2

2.3.4. Testing methodology (See Appendix 1)
- same as for establishment of the PFA, see Section 1.5.4

3. Verification of a Karnal bunt PFA

The NPPO must verify compliance with the requirements to establish and maintain the PFA. Any verification survey conducted by the NPPO should follow an appropriate sampling frequency, e.g. one sample per two million bushels (54,000 t). The absence of reports of Karnal bunt from importing countries testing shipments could also contribute to verification of Karnal bunt PFA maintenance.

4. Change of the PFA Status

4.1 Presence of pest

Upon the detection of Karnal bunt within a PFA, the country should notify trading partners, review the existing surveillance program (i.e. initiate trace-back procedures), and the PFA status should be immediately suspended. After the program is reviewed, new procedures can be added to address the identified gaps. Upon removal of the source of contamination, the PFA status may be reinstated.

If the source of contamination cannot be easily determined or removed, the following options are possible:

- If Karnal bunt is detected in a limited area which can be identified and isolated, then the PFA may be re-defined to exclude the affected area; or
- The PFA status is terminated.

4.2 Faulty procedures

A change in the PFA status may also occur as a result of non-compliance to this standard (surveys, sampling and testing, movement controls, documentation, etc.).

An importing country should officially notify the exporting country if it no longer recognizes the PFA status. The decision to terminate a PFA should depend on the severity of the non-compliance and documentation provided.

5. Reinstatement of the PFA Status

Successful eradication of Karnal bunt and implementation of corrective actions are critical to reinstatement of the PFA status. The PFA status can only be reinstated when compliance with the requirements for establishment of the PFA, as outlined in this standard, are met.

In order to gain recognition of a redefined PFA, the affected portion of the original PFA must be defined and excluded. Phytosanitary measures to prevent the introduction of Karnal bunt into the revised PFA must be implemented. Trading partners should be notified after the PFA status is reinstated.

6. Contingency Plans

The NPPO should have a contingency plan which describes the corrective actions which will take place in the event that Karnal bunt is detected in a PFA. The actions

may include:

- If Karnal bunt is detected in a consignment arriving at the PFA, the consignment should be removed, disposed of, or returned to origin.
- If Karnal bunt is detected in a storage facility within the PFA, an investigation should be implemented as soon as possible to determine the source of the Karnal bunt infection. The infested grain or seed should be disposed of, or processed in a manner to kill the pathogen.
- If Karnal bunt is detected in production areas in the PFA, phytosanitary measures and delimiting surveys must be implemented immediately and the PFA terminated, suspended and/or redefined.
- The NPPO should prepare a report confirming phytosanitary measures taken (including delimiting surveys) and any actions taken to, suspend, reinstate, redefine or terminate the PFA.

7. Documentation

Documentation supporting the Karnal bunt PFA should be made available to the importing country upon request. Recognition of the PFA by an importing country may be confirmed in a bilateral agreement. Technical reports of all surveillance activities carried out in the fields, storage facilities, processing plants and verification points should be compiled by the NPPO and kept for at least three years.

This appendix was adopted by the NAPPO Executive Committee in 2009 and revised by the NAPPO Expert Group on RSPM 13 on July 6, 2016.
The appendix is for reference purposes only and is not a prescriptive part of the standard.

APPENDIX 1. Inventory of diagnostic tests currently in use in North America for the detection of Karnal Bunt

The tests listed here are currently being used within NAPPO member countries as the main means of detecting the presence of Karnal bunt in samples of wheat and other grains for a variety of regulatory purposes. These tests have not been rigorously and scientifically compared to one another to determine equivalency or efficacy but are considered by the users to be adequate for their intended purposes. A test may be useful in one circumstance but not another and not all tests are expected to meet all needs and satisfy all requirements. There is a presumption that those using these tests will have an appropriate level of laboratory experience to apply the appropriate test to the appropriate situation. These tests are presented here for the use with the following general considerations:

- Any country is at liberty to use any method to certify wheat for export or to provide survey data in support of area freedom unless constrained by limitations in specific bilateral agreements or by the awareness of the unacceptability of a particular test to a trading partner
- Any two countries can by mutual agreement select one or more of the above tests as part of a bilateral agreement thus making a specific test mandatory in order to achieve a specific objective
- Any country may evaluate or audit any imported or provided sample by using the test methodology of their choice
- Data collected in the past by any one of these methodologies should be accepted for the determination of KB free areas unless concerns about the reliability of the test method that has been used have been previously voiced
- NAPPO member countries should make every effort to work towards using methodologies acceptable to all parties, harmonizing testing methods where possible and incorporating new technological advances whenever possible
- It is important that all testing be conducted in suitable facilities by properly educated and trained individuals in a manner consistent with good laboratory practises.

Test protocols include the following:

- Appendix 1a: Guía Ilustrada de la Metodología de Diagnóstico para Detectar Teliosporas de Carbon Parcial *Tilletia indica* en Trigo (Mexico)
- Appendix 1b: Seed Wash Extraction for all Ustilaginales and other Fungal Spores Transported by Grain and Straw (Canada)
- Appendix 1c: USDA APHIS Laboratory Procedures for Grain and Seed Analysis can be found at: http://www.aphis.usda.gov/plant_health/plant_pest_info/kb/downloads/kb-manual-appD.pdf