International Rules for Seed Testing
2020

Validated Seed Health Testing Methods

7-011: Detection of *Pyricularia oryzae* in *Oryza sativa* (rice) seed

Including changes and editorial corrections adopted at the Ordinary General Meeting 2019, Hyderabad, India

Effective from 1 January 2020
Validation reports

See References. Copies are available by e-mail from the ISTA Secretariat at ista.office@ista.ch.

Please send comments, suggestions or reports of problems relating to this method to the ISTA Seed Health Committee, c/o ISTA Secretariat.

Disclaimer

Whilst ISTA has taken care to ensure the accuracy of the methods and information described in this method description, ISTA shall not be liable for any loss or damage, etc. resulting from the use of this method.

Note on the use of the translations

The electronic version of the International Rules for Seed Testing includes the English, French, German and Spanish versions. If there are any questions on interpretation of the ISTA Rules, the English version is the definitive version.

Safety precautions

Ensure you are familiar with hazard data and take appropriate safety precautions, especially during weighing out of ingredients. It is assumed that persons carrying out this test are in a laboratory suitable for carrying out microbiological procedures and familiar with the principles of Good Laboratory Practice, Good Microbiological Practice, and aseptic techniques. Dispose of all waste materials in an appropriate way (e.g. autoclaving, disinfection) and in accordance with local health, environmental and safety regulations.
7-011: Detection of *Pyricularia oryzae* in *Oryza sativa* (rice) seed

**Host:** *Oryza sativa* L.

**Pathogen(s):** *Magnaporthe grisea* (Hebert) Barr (Imperfect state *Pyricularia oryzae* Cavara, syn. *P. grisea*)

**Prepared by:** ISTA-PDC Method Validation Sub-committee

**Authors:** ISTA-PDC Method Validation Sub-committee

**Revision history**

Version 1.0, 2000-07-13
Revised 2001-11-20: J. Sheppard, V. Cockerell
Reprinted 2003

Version 1.1, 2008-01-01: Treated seed revised; Reporting results revised

Version 1.2, 2014-01-01: Clarification of blotter preparation and incubation; addition of positive control

Version 1.3, 2016-01-01: New Figure 1

Version 1.4, 2017-01-01: Reporting results revised

**Background**

This method was originally published in the *ISTA Handbook of Seed Health Testing* in November 1964 as S.3. No. 12 and revised in 1981 by S. B. Mathur, Institute of Seed Pathology for Developing Countries, Copenhagen, Denmark. The method was incorporated into the newly revised *Annexe to Chapter 7* in 2002 from the 1999 edition of the ISTA Rules. The method was reviewed by the ISTA-Seed Health Committee in 2006 (Cockerell & Koenraadt, 2007) with the recommendation to accept for a further five years.

**Treated seed**

This method has not been validated for the determination of *Pyricularia oryzae* on treated seed. Seed treatments may affect the performance of the method. (Definition of treatment: any process, physical, biological or chemical, to which a seed lot is subjected, including seed coatings. See 7.2.3.)

**Materials**

**Reference material:** reference cultures or other appropriate material

**Media:** blotters (filter paper), e.g. Whatman No. 1 or equivalent

**Petri dishes:** when sowing density is given by a number of seeds per Petri dish, a diameter of 90 mm is assumed

**Incubator:** capable of operating in the range 22 ±2 °C. To stimulate sporulation, alternating 12 h periods of darkness and near-ultraviolet light (NUV) during incubation are recommended. The recommended source is the black light fluorescent lamp (peak at 360 nm) but daylight fluorescent tubes are satisfactory

**Sample preparation**

The test is carried out on a working sample of 400 seeds as described in Section 7.4.1 of the ISTA Rules.

**Methods**

1. Pretreatment: None.
2. Blotter method:
   2.1 Place three layers of 90 mm filter paper in each plate and soak with sterile distilled/deionised water. Drain away excess water.
   2.2 Aseptically place 25 seeds, evenly spaced, on the surface of the filter paper in each dish.
   2.3 Positive control (reference material): Aseptically place seeds in an appropriate number of plates to obtain the reference culture, or plate a reference culture on media. The number of plates required will depend on the level of contamination of the positive-control seed lot.
3. Incubation: 7 days at 22 °C in alternating cycles of 12 h darkness and 12 h light, preferably NUV. If the filter paper dries out during incubation, add an appropriate amount of sterile distilled/deionised water onto the paper, usually after 3 days of incubation. Avoid touching the seeds as adding water can cause cross-contamination.
4. Examination: Examine each seed at ×12–50 magnification for conidia of *P. oryzae*. Generally, the fungus produces small, inconspicuous, grey to green colonies on glumes (Fig. 1), consisting of short, delicate,
conidiophores carrying clusters of conidia at their tips. The growth rarely covers the whole seed. In doubtful cases confirmation may be made by examining conidia at ×200 magnification. Conidia are typically obpyriform (Fig. 2), hyaline, truncated with a short tooth at the base, 2-septate, usually with a pointed acute apex, 20–25 µm × 9–12 µm.

**Notes:** For correct identification of *P. oryzae* on seed, it is essential that the seed is very carefully examined under a stereoscopic microscope between ×25–50 magnification. Care must be taken not to confuse *Pyricularia* growth with that of a common saprophyte, *Cladosporium*. Clusters of a few conidia with acute tips, on short pale conidiophores, viewed under stereoscopic microscope, are diagnostic for *Pyricularia*. In *Cladosporium*, the numerous conidia are grouped as in a ‘brush’ on comparatively long, dark conidiophores. In doubtful cases, conidia must be examined at higher magnifications, ×200–400. Compare with positive control.

**General methods**

**Checking tolerances:** Tolerances provide a means of assessing whether or not the variation in results within or between tests is sufficiently wide as to raise doubts about the accuracy of the results. Suitable tolerances, which can be applied to most direct seed health tests, can be found in Table 5B Part 1 of Chapter 5 of the ISTA Rules, or Table G1 in Miles (1963).

**Reporting results:** The result of a seed health test should indicate the scientific name of the pathogen detected and the test method used. When reported on an ISTA Certificate, results are entered under ‘Other Determinations’. The report must indicate the number of seeds tested. In the case of a negative result (pathogen not detected), the results must be reported as ‘not detected’. In the case of a positive result, the report must indicate the percentage of infected seeds.

**Quality assurance**

**Critical control points (CCP)**

None listed.

**References**

The following references are extracted from the *ISTA Handbook of Seed Health Testing*, Working Sheet No. 12, S. B. Mathur, 1981.


**Validation references**

Figure 1. Growth of *P. oryzae* on rice glumes.

Figure 2. Conidia and conidiophores of *P. oryzae*. ×750.

Figure 3. Conidia and conidiophore.