ISPM on the International Movement of Seeds: A Status Report

27 May 2014
Open Meeting of the Phytosanitary Committee
Contents

- Value of global seed trade
- Why is seed for planting a ‘special’ commodity?
- Outline of the (draft) ISPM on International Movement of Seeds
- Seed industry expertise and phytosanitary measures
- Next steps
- Role of the seed industry during implementation
## The Value of Traded Seed
### Exports of Some Selected Countries, 2012 (US$ million)

<table>
<thead>
<tr>
<th>Africa</th>
<th>Latin America</th>
<th>Asia</th>
<th>Europe</th>
<th>North America</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algeria – 10</td>
<td>Argentina – 150</td>
<td>China – 251</td>
<td>France – 1804</td>
<td>Canada – 323</td>
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<tr>
<td>Kenya – 9</td>
<td>Bolivia – 42</td>
<td>India – 67</td>
<td>Germany – 727</td>
<td>USA – 1531</td>
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<td>Morocco – 3</td>
<td>Brazil – 165</td>
<td>Japan – 145</td>
<td>Hungary – 385</td>
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<td>S Africa – 78</td>
<td>Chile – 388</td>
<td>Israel – 126</td>
<td>Italy – 315</td>
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<tr>
<td>Tanzania – 9</td>
<td>Mexico – 203</td>
<td>New Zealand – 111</td>
<td>Netherlands – 1583</td>
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<td>Angola – 8</td>
<td>Peru – 46</td>
<td>Thailand – 80</td>
<td>Denmark – 265</td>
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<tr>
<td>Egypt – 3</td>
<td>Guatemala – 32</td>
<td>Australia – 108</td>
<td>Romania – 218</td>
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</tr>
</tbody>
</table>
The Value of Traded Seed
Imports of Some Selected Countries, 2012 (US$ million)

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<thead>
<tr>
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<th>Europe</th>
<th>North America</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egypt – 53</td>
<td>Argentina – 95</td>
<td>China – 268</td>
<td>France – 687</td>
<td>Canada – 223</td>
</tr>
<tr>
<td>Kenya – 25</td>
<td>Venezuela – 42</td>
<td>India – 84</td>
<td>Germany – 700</td>
<td>USA – 1312</td>
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<tr>
<td>Morocco – 93</td>
<td>Brazil – 120</td>
<td>Japan – 231</td>
<td>Italy – 422</td>
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<tr>
<td>S Africa – 101</td>
<td>Chile – 44</td>
<td>Turkey – 188</td>
<td>Russian Federation – 373</td>
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<tr>
<td>Tunisia – 12</td>
<td>Mexico – 355</td>
<td>S Korea – 111</td>
<td>Netherlands – 685</td>
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</tr>
<tr>
<td>Algeria – 26</td>
<td>Paraguay – 57</td>
<td>Australia – 113</td>
<td>Spain – 374</td>
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<tr>
<td>Zambia – 18</td>
<td>Colombia – 35</td>
<td>Israel – 49</td>
<td>UK – 287</td>
<td></td>
</tr>
</tbody>
</table>
International movement of seeds for planting

Special Features

- For which pests are seeds a pathway of concern?
- Requirements differ per country and per origin
- Frequent re-exports
  - Same seed lot
  - Multiple destinations
  - Over many years
- Well-established industry quality management systems that reduce phytosanitary risk
- Wide array of phytosanitary measures available and used to prevent and reduce risk of disease
Breeding parental lines: EUROPE - State 1
Production of basic seeds: EUROPE - State 2
Treatment and manufacturing of basic seeds: EUROPE - State 1
Production of hybrid seeds: CHINA
Treatment and manufacturing commercial hybrid seed: EUROPE - State 1
Commercial packaging: USA
Final sale and use: MEXICO

Breeding, Production, Marketing of Tomato Seed
The birth of an ISPM on Seed

- ISF lobby since 2008
- Added to IPPC work-programme in 2010
  - ISF expert invited to contribute to drafting standard in 2011
- NAPPO approved a regional ISPM for seed in 2011
- Expert WG met in The Hague (July 2013) → Draft ISPM
  - Refinement of text in a series of versions
- IPPC Standards Committee approved draft (May 2014)
- Country consultation starts on 1 July 2014
- Approval by the CPM in April 2015 (or 2016, if second round of country consultation required)
Objectives of ISPM: International Movement of Seeds

To provide guidance to countries (NPPOs) to:

- Prevent entry, establishment and spread of regulated pests associated with seeds
- Assess and manage the pests risks associated with the international movement of seeds
- Promote the use of harmonized import requirements, testing and diagnostic protocols
- Promote the use of import requirements and phytosanitary certification systems that are better suited for seeds
Seed as a pathway for pests

For pest ‘x’ - is the crop a host?

yes
Is seed a pathway for introduction?

yes
Will introduction of the pest result in its spread?

yes
Identification of phytosanitary measures

no

no

no

yes

Identification of phytosanitary measures

Stage 1 of PRA

Stage 2 of PRA

Stage 3 of PRA

Introduction: The entry of a pest resulting in its establishment [FAO, 1990; revised FAO, 1995; IPPC, 1997]

Spread: Expansion of the geographical distribution of a pest within an area [FAO, 1995]
Definitions

- **Seed-borne pest**: pest that can be found on the seed (externally) or within the seed (internally) but is not necessarily transferred to the resulting plant.

- **Seed-transmitted pest**: pest that can be transferred via seed to progeny plants resulting in infection or infestation.

  - All seed-transmitted pests are seed-borne.
  - Seed-borne pests may be introduced.
  - Not all seed-borne pests necessarily lead to establishment.
  - Some seed-borne pests that do not transmit a disease may, nevertheless, establish (e.g. contaminating pest).
Intended use, risks and measures

1. Seeds with no potential to germinate or generate plants
2. Seeds not for planting but retaining viability
3. Seeds for planting under restricted conditions and not for release
4. Seeds for planting under restricted conditions with the intention of release
5. Seeds for planting

- Countries to perform a PRA for each scenario and to define requirements in relation to the risk associated with the intended use
- Important for R&D material and samples for testing/trials
Phytosanitary measures
Options to prevent introduction and spread of regulated pests

- Seed certification
- Use of resistant varieties
- Pest free areas
- Seed treatments
- Inspection
- Sampling
- Diagnostics
- Packaging
- Integrated measures for seed production
- Prohibitions
- Post entry quarantine
- Designation of planting areas
Equivalency of phytosanitary measures

- Offers countries the possibility to set requirements in an “or” format:
  - Area freedom “or” field inspection “or” laboratory test
- Increases flexibility for companies to meet phytosanitary requirements
- The ISPM encourages countries to define multiple equivalent options
- Essential for seeds re-exported to multiple destination countries with differing single format requirements
Specific situations for seed

- Testing treated seed
- Use of indirect seed testing methods for disinfected seed
- Testing ‘obscured’ seed
- Sampling and testing small seed lots
- Mixing and blending of seed

» The standard will provide guidance to NPPOs how to best handle these specific situations
Technical areas of expertise of seed industry

- Diagnostic methods - ISHI protocols
- Seed as a pathway - ISF Pest Lists
  - 4 seed species (melon, onion, pepper, spinach) - 307 pests (those regulated national regulations worldwide in 2013) - 611 references cited
  - Features – sort and filter, online form to report an error
  - Verification (after peer review) of pest lists for 4 seed species (cucumber, carrot, squash, vegetable Brassicas)
  - Peer review of an additional 4 (tomato, bean, lettuce, watermelon)
  - Expanding database to other seed species (vegetable, field and forage crops)
- Seed treatments - Treatment and disinfection options per pest category
### ISHI-Veg: Current Activities and Priorities

**Method development and guidelines for seed health testing**

<table>
<thead>
<tr>
<th>Plant Family</th>
<th>Methods in ISHI-Veg Manual</th>
<th>Research / Method in Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solanaceae (tomato and pepper)</td>
<td>6 (1 ISTA Rule)</td>
<td>5</td>
</tr>
<tr>
<td>Cucurbitaceae</td>
<td>2 (1 - ISTA Rule, 1 - NSHS Standard)</td>
<td>6</td>
</tr>
<tr>
<td>Roots, bulbs and leafy vegetables</td>
<td>7* (2 - ISTA Rules)</td>
<td>10</td>
</tr>
<tr>
<td>Bean, Brassicas, Pea and Radish</td>
<td>7* (6 - ISTA Rules)</td>
<td>7</td>
</tr>
</tbody>
</table>

* A method to be voted by ISTA in June 2014

**Guidelines for standardizing molecular methods used in seed health testing**

**Guidelines for standardizing classical methods – plating assays and ELISA – used in seed health testing**
<table>
<thead>
<tr>
<th>Crop</th>
<th>Pest</th>
<th>Scientific Name</th>
<th>Additional info</th>
<th>Complementary info</th>
<th>Type</th>
<th>Is seed a pathway in this crop?</th>
<th>Main literature references</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melon</td>
<td>Acidovorax avenae pv. citrulli</td>
<td>Synonym: Acidovorax citrulli</td>
<td>Bacterium</td>
<td>Yes</td>
<td>4-3, 4-17, 4-95, 4-115, 4-131, 4-132</td>
<td>Seed is a known pathway in melon and all seed lots should be routinely tested.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Melon</td>
<td>Macrophomina phaseolina</td>
<td>Fungus</td>
<td>Yes</td>
<td></td>
<td>4-43</td>
<td></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Melon</td>
<td>Melon rugose mosaic virus (MRMV)</td>
<td>Virus</td>
<td>Yes</td>
<td></td>
<td>4-29</td>
<td>There is evidence that seed is a pathway in melon. However, distribution of this virus is very limited.</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Melon</td>
<td>Colletotrichum lagenarium</td>
<td>Synonym: Colletotrichum orbiculare, Teleomorph: Glomerella lagenarium</td>
<td>Fungus</td>
<td>Yes</td>
<td>4-32, 4-60, 4-137</td>
<td>Seed can be a pathway for the fungus on melons. The normal harvesting (avoiding infected fruit) and cleaning of melon seed would reduce seed contamination.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Melon</td>
<td>Didymella bryoniae</td>
<td>Synonym: Mycosphaerella melonis, Anamorph: Phoma cucurbitaeaeurum</td>
<td>Fungus</td>
<td>Yes</td>
<td>4-32, 4-60, 4-138</td>
<td>Seed is a known pathway in melon and all seed lots should be routinely tested.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Melon</td>
<td>Cucumber green mottle mosaic virus (CGMMV)</td>
<td>Virus</td>
<td>Yes</td>
<td></td>
<td>4-10, 4-16, 4-51, 4-52</td>
<td>Seed is a known pathway in melon and all seed lots should be routinely tested.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Melon</td>
<td>Melon necrotic spot virus (MNSV)</td>
<td>Virus</td>
<td>Yes</td>
<td></td>
<td>4-8, 4-13, 4-14, 4-111</td>
<td>Seed is a known pathway in melon and all seed lots should be routinely tested.</td>
<td>Yes</td>
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<tr>
<td>Melon</td>
<td>Squash mosaic virus (SqMV)</td>
<td>Virus</td>
<td>Yes</td>
<td></td>
<td>4-2, 4-26</td>
<td>Seed is a known pathway in melon and all seed lots should be routinely tested.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Melon</td>
<td>Alternaria alternata f. sp. cucurbitae</td>
<td>Fungus</td>
<td>Pathway not proven</td>
<td>4-9, 4-125, 4-126, 4-134</td>
<td>The fungus infects melon although the distribution is limited. The primary information for seed as a pathway is a reference wherein untreated melon seed was plated onto a general agar medium. Alternaria was found as a superficial contaminant. Commerical harvesting and cleaning of seed would remove superficial contaminants.</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Melon</td>
<td>Aspergillus niger</td>
<td>Fungus</td>
<td>Pathway not proven</td>
<td>4-126</td>
<td>Aspergillus niger is a common saprophyte. The primary information for seed as a pathway is a reference wherein untreated melon seed was plated onto a general agar medium and Aspergillus was found as a superficial contaminant. Commerical harvesting and cleaning of seed would remove superficial contaminants.</td>
<td>No</td>
<td></td>
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<tr>
<td>Pest</td>
<td>Detection</td>
<td>Risk Mitigation</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Is there a seed test?</td>
<td>If yes, type of test</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>If yes, type of test</td>
<td>Main literature references</td>
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<td></td>
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<tr>
<td></td>
<td>Remarks</td>
<td>Can the pest be managed by seed treatment(s)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>If yes, what type(s)</td>
<td>Main literature references</td>
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<td></td>
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<td></td>
<td>Remarks</td>
<td>Remarks</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Squash mosaic virus</td>
<td>Routinely tested. Yes Grow-out, DNA based 4-54, 4-94</td>
<td>Multiple methods described but primary ones are grow-out and PCR. Direct-PCR on seedwash can be used but only as a prescreen test due to possible cross reactions.</td>
<td>Yes Physical, Chemical (seed disinfection) 4-18, 4-19, 4-42, 4-55, 4-95</td>
<td>There are a number of methods described for reducing the presence of Aac on seed. Risk management practices may vary with producers.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Melon mosaic virus</td>
<td>ROUTINE</td>
<td>Incubation 4-123</td>
<td>Blotter method and commercially available.</td>
<td>Yes Physical, Chemical (seed coating) 4-22, 4-37</td>
<td>Seed treatment with fungicides is effective against the fungus.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Melon mosaic virus</td>
<td>Routinely tested. Yes Incubation 4-123, 4-127</td>
<td>Agar or blotter methods.</td>
<td>Yes Chemical (seed coating) 4-22</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Squash mosaic virus</td>
<td>Routinely tested. Yes Serological 4-20</td>
<td>The most common method is ELISA testing of seed. This is an indirect method and often positive results are confirmed using a bioassay.</td>
<td>Yes Physical, Chemical (seed disinfection) 4-10, 4-22, 4-24</td>
<td>Heat treatment of low and medium ELISA positives has been effective in eliminating CGMMV. After heat treatment, a bioassay or PCR can be used for evaluation of the effectiveness of heat treatment.</td>
<td></td>
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</tr>
<tr>
<td>Squash mosaic virus</td>
<td>Routinely tested. Yes Serological 4-20, 4-101</td>
<td>ELISA direct seed assays.</td>
<td>Yes Physical, Chemical (seed disinfection) 4-8</td>
<td>Reference 4-8 indicates the virus can be eliminated from seed with acid treatment.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Squash mosaic virus</td>
<td>Routinely tested. Yes Serological 4-11, 4-20, 4-35</td>
<td>ELISA direct seed assays well established for SqMV.</td>
<td>No</td>
<td></td>
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</tbody>
</table>
Next steps

- Country consultation: July-November 2014
- Review of comments by Steward (and Expert WG)
- Second draft of ISPM finalised by Steward: February 2015
- Another round of Country Consultation needed?
  » Standards Committee to decide
- Approval by IPPC members April 2015 (or 2016, if second round of country consultation required)
- Country implementation 2016-2018
The ISPM for seed is a major step forward

- But ..........it is only a 1\textsuperscript{st} step on a long road

- Seed industry has a key role to play:
  - To bring the ‘undiluted’ ISPM to approval
  - To ensure the ISPM is implemented by most countries

- ISHI protocols and ISF pest lists are a major asset
- This work is not finished!
Role of the Seed Industry
Country consultation

- Interact with your NPPO
  - Explain the relevance of the ISPM and its contents
  - Prevent dilution
- Contribute to the ISF efforts
  - To expand the pest lists
  - To increase the number of ISHI protocols
- Prepare to interact with your NPPO to adapt requirements and bring them in line with the ISPM principles
  - Collaborative action of ISF and Regional Associations
Role of the Seed Industry
National Implementation

The ISPM is “a recommendation for countries and NPPOs”. Adapting country requirements will take time and will need:

- Encouragement from the industry
- Training National Associations and seed companies
- Interaction with NPPOs to eliminate requirements that are technically unjustified
- ISF Sections to define priorities (crops and countries)
- ISF Phytosanitary Committee to co-ordinate
- Continue work in ISHI-protocols and on ISF Pests Lists
Thank you for your attention