

# IPPC Regional Workshop - ISPM 38 on the International Movement of Seed

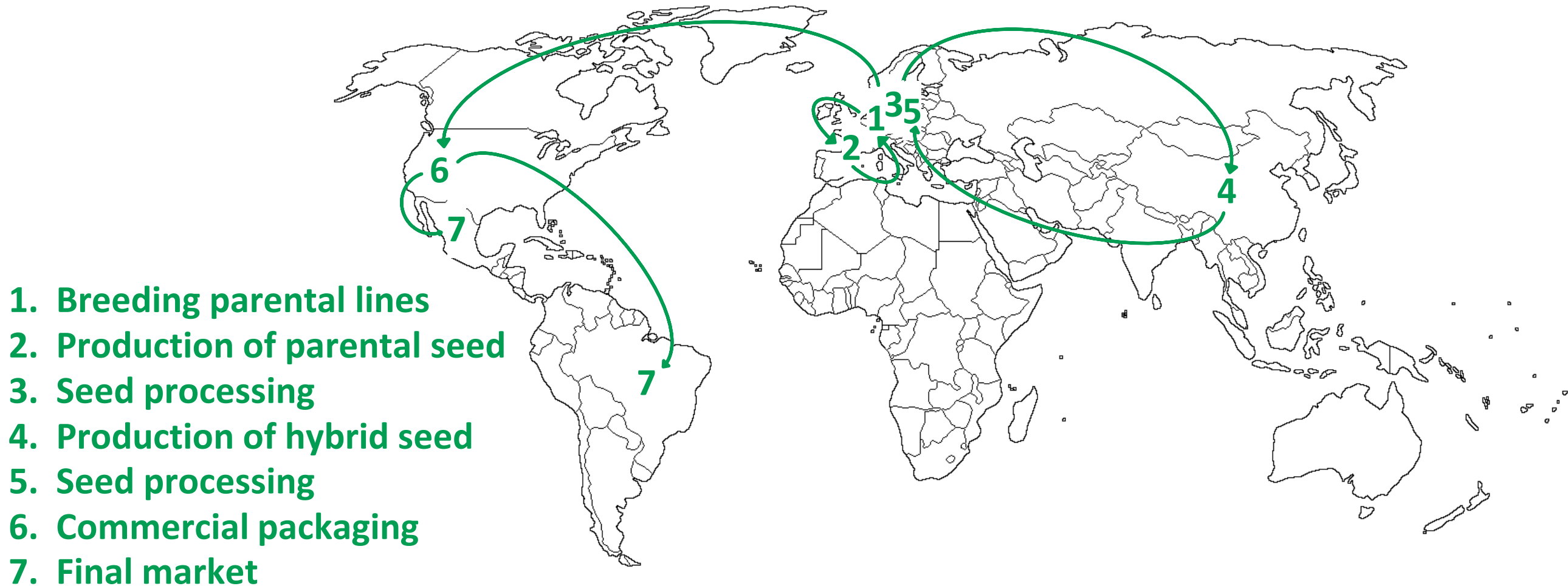
August 2018



A map of the Americas, including North America, Central America, and South America. The landmasses are colored yellow, while the surrounding oceans are white. The map shows the outlines of the continents and major islands.

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# Typical Seed Movement - Vegetables



# IPPC and the Seed Sector – Aligned goals

- IPPC – Prevent the introduction and spread of plant pests
- Seed sector – Deliver quality seed in a timely manner
  - Free from seed transmitted diseases
  - Good germination
  - Varietal and physical purity
- IPPC/ISF Collaborative Efforts
  - International Year of Plant Health 2020
  - ePhyto
  - ISPM 38 Implementation



# Exercise 1

A shipment of pepper seed is moving from Country A to Country B. What considerations should country B make when considering whether to regulate the seed for a particular pest?

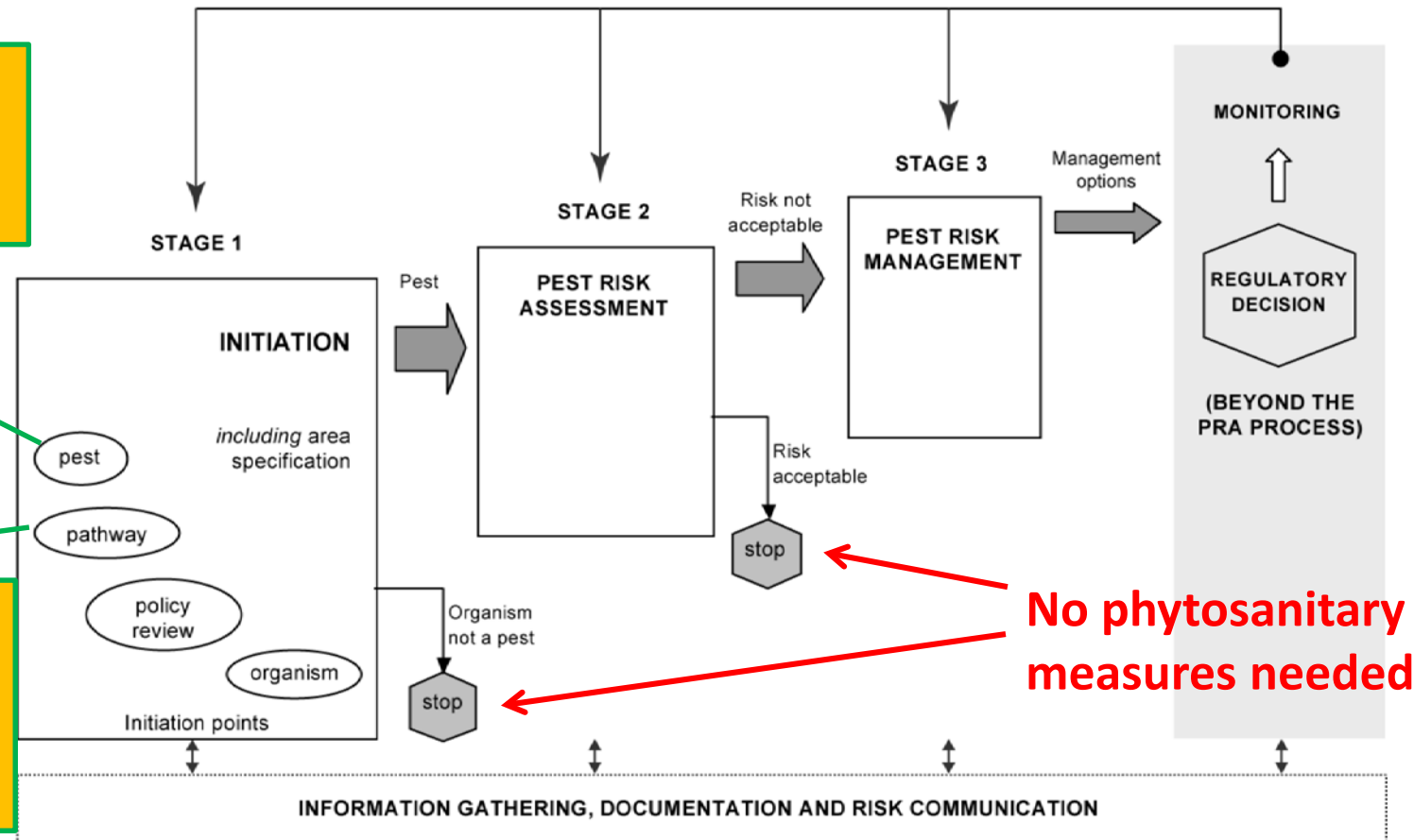


# ISPM 38 Considerations

Is pepper seed a pathway for the introduction of pests?

What are the pests potentially associated with the seed?

Can seed be a pathway for the introduction and spread of those pests?






# ISF Regulated Pest List Initiative

GOAL: Establish meaningful, science based and relevant crop specific pest lists


- Lists of regulated pests taken from NPPO databases and company information on Additional Declarations required per crop and country; updated for new pests every 2 years
- Classification of each pest by whether “seed is a pathway” and remarks pertinent to the industry
  - If seed is a pathway, information on seed assay and seed treatment provided
- Information reviewed by 3 experts and documented with references to support or refute the classification
- Feedback mechanism open to experts outside the industry
- *The ISF Regulated Pest List Initiative is included in the appendix of ISPM 38. **As such, it is for reference purposes only and is not a prescriptive part of the standard.***

# Accessing the ISF Regulated Pest List Database

[http://pestlist.worldseed.org/isf/pest\\_lists\\_db.html](http://pestlist.worldseed.org/isf/pest_lists_db.html)

 **International Seed Federation**  
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[Phytosanitary Matters](#)

- Seed Health
  - ISHI-Veg
- Pest Risk Analysis
- Pest Lists**


IS SEED A PEST RISK?

**ISF REGULATED PEST LIST INITIATIVE**

### ISF REGULATED PEST LIST INITIATIVE

Seed moved internationally, either for research or trade, are subject to phytosanitary regulations to minimise the risk of introducing or spreading pests worldwide. However, in some instances the phytosanitary measures imposed are unnecessary as seed is not a pathway for the entry, establishment or spread of the pest in question. After scanning national phytosanitary regulations from around the world, ISF has listed the regulated pathogenic organisms (bacteria, fungi, insects, nematodes, oomycetes, phytoplasma, viruses and viroids) for a number of seed species. Using their knowledge and experience, company seed and field pathologists provided an expert interpretation of scientific publications on whether seed was a means for the entry of each pest in the list and the conditions for its establishment.

Scientific articles published in refereed journals or scientific websites of the International Committee on Taxonomy of Viruses (ICTV), the Nematode-Plant Expert Information System (Nemaplex), the International Mycological Association (mycobank) and others were consulted. These ISF Pest Lists have been assembled in the form of a database. For those pests for which seed is a pathway or where the pathway is not yet conclusively proven, the database provides information on detection and risk mitigation. The database is a work in progress.

**PEST LIST DATABASE**

The database will be updated as and when more pest lists are completed or new information is available. It is not expected that changes will be notified.

**GO TO THE DATABASE >**



# Accessing the ISF Regulated Pest List

## ISF regulated pest list database

Remove all filters - List of references by Crop

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List of references by Pest Type

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784 items in table, 1 items shown, 783 items filtered out.

▼	Pep. ▼	PMMV			▼	▼			▼	▼			▼			
Species i	Crop	Pest				Pest classification			Detection				Risk mitigation			
		Scientific Name	Additional Info	Complementary Info	Type	Is seed a pathway in this crop? i	References	Remarks	Is there a seed test?	If yes, type of test	References	Remarks	Can the pest be managed by seed treatment(s)?	If yes, what type(s)?	References	Remarks
Capsicum annuum	Pepper	Pepper mild mottle virus (PMMV)			Virus	Yes	1-57, 1-88, 1-89, 1-90, 1-208	Seed is a known pathway for PMMV in pepper and the recommended management strategy is to evaluate seed productions by field inspection or seed testing of a representative sample of each seed lot.	Yes	Serological, Seed wash	1-240, 1-243, 1-244	An ISHI-Veg method is described. A sample of seed is ground (milled) for testing by ELISA and/or bioassay. Seed tests are available in some commercial labs.	Yes	Chemical (seed disinfection)	1-88, 1-105	There are a number of methods described for reducing the presence of PMMV on seed. Risk management practices may vary with producers.

# ISPM 38 Considerations

How are the pepper seeds going to be used?

What if the shipment is a small sample of 1000 seeds that will be tested/destroyed during testing in a laboratory?

Or what if the pepper seed will be planted in a controlled greenhouse environment?



# ISPM 38 Considerations

## 1.3 Purpose of import

The production of seeds may involve several steps (e.g. breeding, multiplication, destructive analysis, restricted field planting), which may be performed in different countries. The purpose of import of seeds may impact the probability of establishment of quarantine pests and should be considered when conducting the PRA and determining phytosanitary measures (ISPM 32).

With this in mind, do you still recommend the same requirements for a seed shipment destined to be tested and destroyed in a laboratory?

What about planted in a controlled greenhouse environment?

# ISPM 38 Considerations

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Were equivalent phytosanitary measures considered?

# Seed Sector Considerations

Due to the nature of the seed industry, several phytosanitary requirements are difficult or even impossible to comply with. For example:

Additional declarations on the phytosanitary certificate in the country of production:

- Countries of final destination are not always known at time of seed production
- Requirements may change over time
- Seeds may be stored for several years (which is not possible to anticipate)
- Additional declarations by the NPPO of the country of production cannot be obtained afterwards

Testing in the country of re-export:

- Validated tests not always available
- Number of seeds for test may be a hurdle (e.g. small seed lots)

# Seed Sector Considerations

- Seed treatment:
  - Active ingredient may not be registered in country of re-export
  - For organic seeds, chemical treatment is not possible
- Physical treatment:
  - May negatively affect the quality of seeds

These seed sector considerations were all taken into account in ISPM 38:

- Additional Official Phytosanitary Information to enable re-export of seeds
  - Exporting NPPO provides importing NPPO with AOPI to allow future re-export to other countries
- Equivalent Measures



# ISPM 38 Considerations

## 5. Phytosanitary Certification

The global and temporal nature of the seed trade (i.e. re-export to many destinations, repeated re-export from the same seed lot, long-term storage) presents phytosanitary certification challenges distinct from those of the international movement of other commodities.

NPPOs are encouraged to exchange additional official phytosanitary information at the time of export certification with other NPPOs to enable certification for re-export of seeds, as described in ISPM 12 (*Phytosanitary certificates*). Additional official phytosanitary information, which is not required by the first country of import, may be included on the phytosanitary certificate issued by the country of origin when so requested by the exporter in order to facilitate future re-export to other countries (ISPM 12).

A country's phytosanitary import requirement for a field inspection may not be known at the time of production. Where appropriate, the NPPO of the importing country may consider equivalent phytosanitary measures (such as tests or treatments) to fulfil its phytosanitary import requirements for seeds already harvested, in accordance with ISPM 24. However, it is the responsibility of the exporting country to meet the phytosanitary import requirements.

# ISPM 38 Considerations

## 3. Equivalence of Phytosanitary Measures

The equivalence of phytosanitary measures (ISPM 1 (*Phytosanitary principles for the protection of plants and the application of phytosanitary measures in international trade*)) is particularly important for the international movement of seeds as seed companies may have breeding and multiplication programmes in several countries and may export these seeds to other countries, and there may be frequent re-export from a single seed lot.

Determination of the equivalence of phytosanitary measures may be initiated by the exporting country making a request for equivalence to the importing country, as described in ISPM 24 (*Guidelines for the determination and recognition of equivalence of phytosanitary measures*). It may also be initiated by the importing country. NPPOs are encouraged to provide multiple options when setting phytosanitary import requirements.

# ISPM 38 Considerations

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Equivalent phytosanitary measures may provide NPPOs with options to achieve the required protection. An example of an equivalent phytosanitary measure is the substitution of a requirement for field inspection of the seed crop in the country of origin with appropriate seed testing or seed treatment for the regulated pest. ISPM 24 provides further guidance on the equivalence of phytosanitary measures.

For seeds (including organic seeds) requiring for import a specific chemical treatment, if the chemical is not permitted for use in the country of origin, export or re-export, the NPPO of the importing country should consider an equivalent phytosanitary measure, where possible, provided that the measure is technically feasible and reduces the assessed pest risk to an acceptable level. It is recommended that phytosanitary import requirements do not specify chemical products, active ingredients or exact protocols.



# ISPM 38 Considerations

If you determined that you would require a laboratory test for a particular pest of pepper seed, is it a direct or indirect test method?

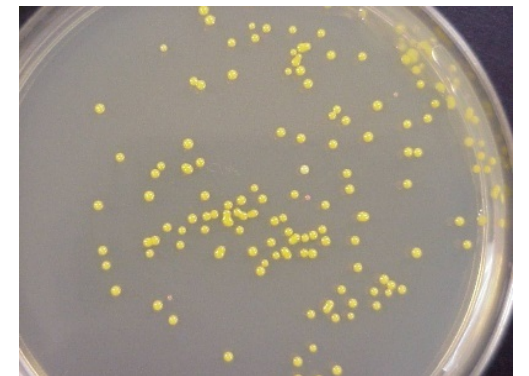
Why does this matter?



# Direct Methods

Examples of direct methods: Grow outs, seed plating (with bioassay), dilution plating (with bioassay)

They permit the pathogen to be detected and **confirmed** (viability and pathogenicity shown)



# Indirect Methods

Indirect methods provide an indication of pathogen presence as they react with proteins (antigens, nucleic acids) which are known to be indicative of the target pathogen

- Per ISPM 38: “ Molecular and serological diagnostic methods are considered indirect protocols to detect pests in seeds”

They provide *an indication* of the presence of the target pathogen, not confirmation

- This is because indirect methods may detect non-viable pathogens or closely related species

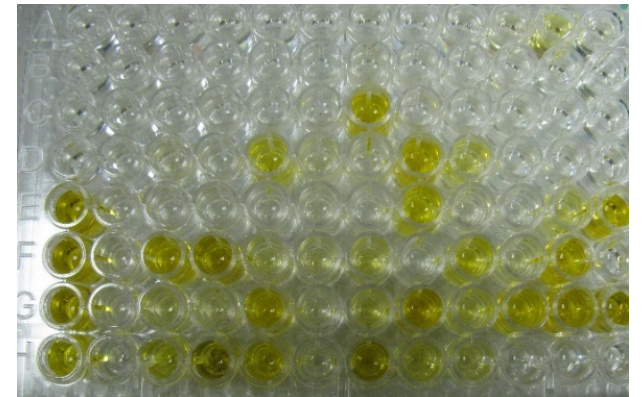


# Indirect Methods

The ISF position paper on Indirect Methods is an ISF initiative to clarify the difference between indirect and direct test methods. It states that “A positive result of an indirect test should be considered as preliminary and should always be followed with a confirmatory test that is preferably a direct test”

- Negative result = No pathogen present
- Positive result = Pathogen may be present; Seed lot is suspect and needs further evaluation

Considering that regulatory or quality usage decisions can be based off these results (that is, import permission, production use), the interpretation of results needs to be done carefully



# Accessing the ISF Regulated Pest List

## ISF regulated pest list database

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List of references by Pest Type

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784 items in table, 2 items shown, 782 items filtered out.

		Watermel	Xanthomonas c														
		Pest				Pest classification				Detection				Risk mitigation			
Species	Crop	Scientific Name	Additional Info	Complementary Info	Type	Is seed a pathway in this crop?	References	Remarks		Is there a seed test?	If yes, type of test	References	Remarks	Can the pest be managed by seed treatment(s)?	If yes, what type(s)?	References	Remarks
Citrullus lanatus	Watermelon	Xanthomonas campestris pv. cucurbitae			Bacterium	No	9-16, 9-76, 9-77, 9-167	This bacterium causes Bacterial Leaf Spot on cucurbits including watermelon. However, no references found indicating seed as a pathway for X. campestris pv. cucurbitae in watermelon. Seed as a pathway is reported in squash and pumpkin, but not in watermelon. Available information indicates there is no scientific basis for regulation of X. campestris pv cucurbitae on watermelon seed.									

If you question any content in the list, identify additional references to be considered, or have any comments, please submit to the ISF secretariat via this link



# Seed is Life

# International Seed Health Initiative

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- In 1993, ISF supported the establishment of a cross-industry group to address seed health issues on vegetable seeds
- They are collectively referred to as ISHI-Vegetables
  - seed companies, private laboratories and public sector institutions
- The goal: to develop and validate seed health assays which enable the delivery of sufficiently healthy seeds to customers globally
- Currently 55 active scientists (plant pathologists, molecular biologists) from 11 countries
- Represents ~75% of the vegetable seed traded internationally (measured in USD)

# ISHI-Veg

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- The development of Seed Health tests are NON-COMPETITIVE
  - Participants share data, methods, seed sources, microbial isolates, and experience
  - They actively monitor new or emerging diseases and work to develop methods timely
- Methods are publicly shared via ISF website: <http://www.worldseed.org/our-work/phytosanitary-matters/seed-health/ishi-veg/#protocols>
- Methods may also be shared and validated with other organizations:
  - International Seed Testing Association
  - National Seed Health System (US)
- More recently, governments have adopted some of the methods as part of import requirements
  - Example, Australia has stated that the ISHI-Veg method for Pepino Mosaic Virus should be used to meet import testing declarations

# Overview of ISHI-Veg Method Types

Assay Type	Presence of pathogen given	Pathogenicity confirmed	Direct or Indirect Method
Grow-Out	Yes	Yes	Direct
Bio-assay	Yes	Yes	Direct
Blotter/Microscopy	Yes	Yes (via bioassay)	Direct
	Yes	No	Indirect
Dilution Plating	Yes	Yes (via bioassay)	Direct
	Yes	No	Indirect
Bio-PCR	Yes	No	Indirect
ELISA	Yes	No	Indirect
Seed or Seed Extract PCR	Yes	No	Indirect

Direct Methods permit the recovery and full characterization of the pathogen.  
Indirect methods do not.