


## Global Dispersion of Bacterial Pathogens by Seed

### How to Prevent and Manage the Bacterial Contamination and Infection to Vegetable Seeds

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Seed is the starting unit and the end point of many crops

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More than 90% of the world's food crop is grown from seeds

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Seed contamination can be a critical step in the ecology and epidemiology of many plant pathogenic bacteria

## In a World of Globalization






Seeds are important source of inoculum, spread and survival of pathogen

Seed is often produced in one country, processed and packaged in another country and sold and planted in another country

With such movement of seeds comes an increase danger of spread of seed borne Bacterial diseases

## Phytosanitary Regulations




The increase in international movement of seeds has resulted in **increased phytosanitary regulations**

Unfortunately, most times the phytosanitary regulations and seed quality standards are often imposed without sound scientific data

Regulations state only that the seeds must be tested in a laboratory without any indication of the **method to be used** or the **amount of seed** to be tested

## Survival



In/on insects, in water, on volunteer hosts

← In/on Seeds, on planting material →

On machinery and on packaging materials

In association with perennial/biennial hosts

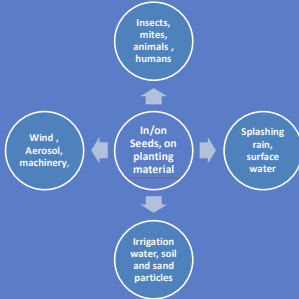
Is safe, in debris left on soil surface

## Source: Cull piles, water systems, soil

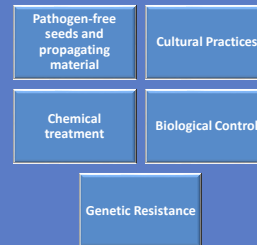




## Dissemination



## Management Strategies to Minimize Seed Contamination



## Prevention and Scouting

- For most pathogenic bacteria, there are no chemical controls after the disease is detected.
- Prevention is the most effective control of plant pathogenic bacteria.

## Scouting and Monitoring



Scouting and monitoring allows detection and elimination of potential sources of inoculum

## Field Sanitation: Sanitize hands regularly

- All stakes must be washed off with detergent and dipped in 10% Clorox for at least 2 minutes.
- Control all Solanaceous weeds in fields planted to tomato.
- Workers in the field should sanitize their shoes and wash their hands between fields.

## Field Sanitation:



Most Plant pathogenic bacteria are highly contagious and must be treated with maximum caution. Use maximum sanitation to insure a bacterial free growing environment



Plants should not be handled when wet. avoid working in the fields when it is wet or after heavy dew.

## Cultural practices

- Disinfection of tools
- *Removinmg and destroying infected plants*
- *Crop rotation*
- *Maniging soil pH, soil and plant nutrient statues*
- *Soil tillage*
- *Sopil residue management*
- *Manage nitrogen excess water application*
- *Excess water preassure during seedling production*



## Biological Control

- Use of antagonistic microorganisms to control plant pathogenic bacteria
  - Lack of efficacy vand environmental constrains
  - Bacteriophages: Viruses that infect and kill bacteria ( ex *X. euvesicatoria*)



## Genetic Resistance

- Most effective way to manage
- *Induce Resistance (Actigard?)*



## Use of Immunostrips



## After Confirmation in the Field

- Regulate employees, personnel working in an infected field must disinfect their hands, arms, and shoes (use Clorox or isopropyl alcohol).
- All field equipment must be rinsed in 10% Clorox to avoid carrying infectious plant materials and/or soil into a clean field.
- **Start work first in fields were no bacterial disease was detected and disinfect their hands when moving to other fields.**
- Rogue and burn all infected plants to prevent harvesting fruit and contaminating other seed lots. When removing plants avoid direct contact with the plants.
- **Flag/mark infected fields and instruct growers to work in these fields last.**

## Chemical Control

- Apply copper sprays at regular 5 to 7-day intervals to minimize spread of the disease within a field
- **However, strict adherence to proper sanitation must accompany chemical use.**

## Seed Extraction

