

Pumpkin Diseases: Observations from 2010 and Recommendations for 2011

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Important Pumpkin Diseases in 2010

- **Bacterial diseases**
- **Phytophthora blight**
- **Downy mildew**
- **Powdery mildew**

Bacterial Diseases of Pumpkins

- Angular leaf spot:
Pseudomonas syringae pv. *lachrymans*
- Bacterial wilt: *Erwinia tracheiphila*
- *Bacterial spot (bacterial leaf spot):
Xanthomonas cucurbitae

Bacterial Diseases of Pumpkins

➤ Angular leaf spot

**If occurs,
use copper
compound
to control**



Bacterial Diseases of Pumpkins

➤ Bacterial wilt

For control of bacterial wilt, you need to control the vectors (insects)



Bacterial Diseases of Pumpkins

➤ Bacterial spot (bacterial leaf spot)





Bacterial spot (bacterial leaf spot)



Bacterial spot on fruit





Colonization of bacterial-infected fruit by other organisms

**Collapse of pumpkin fruit infected
by *Xanthomonas cucurbitae***



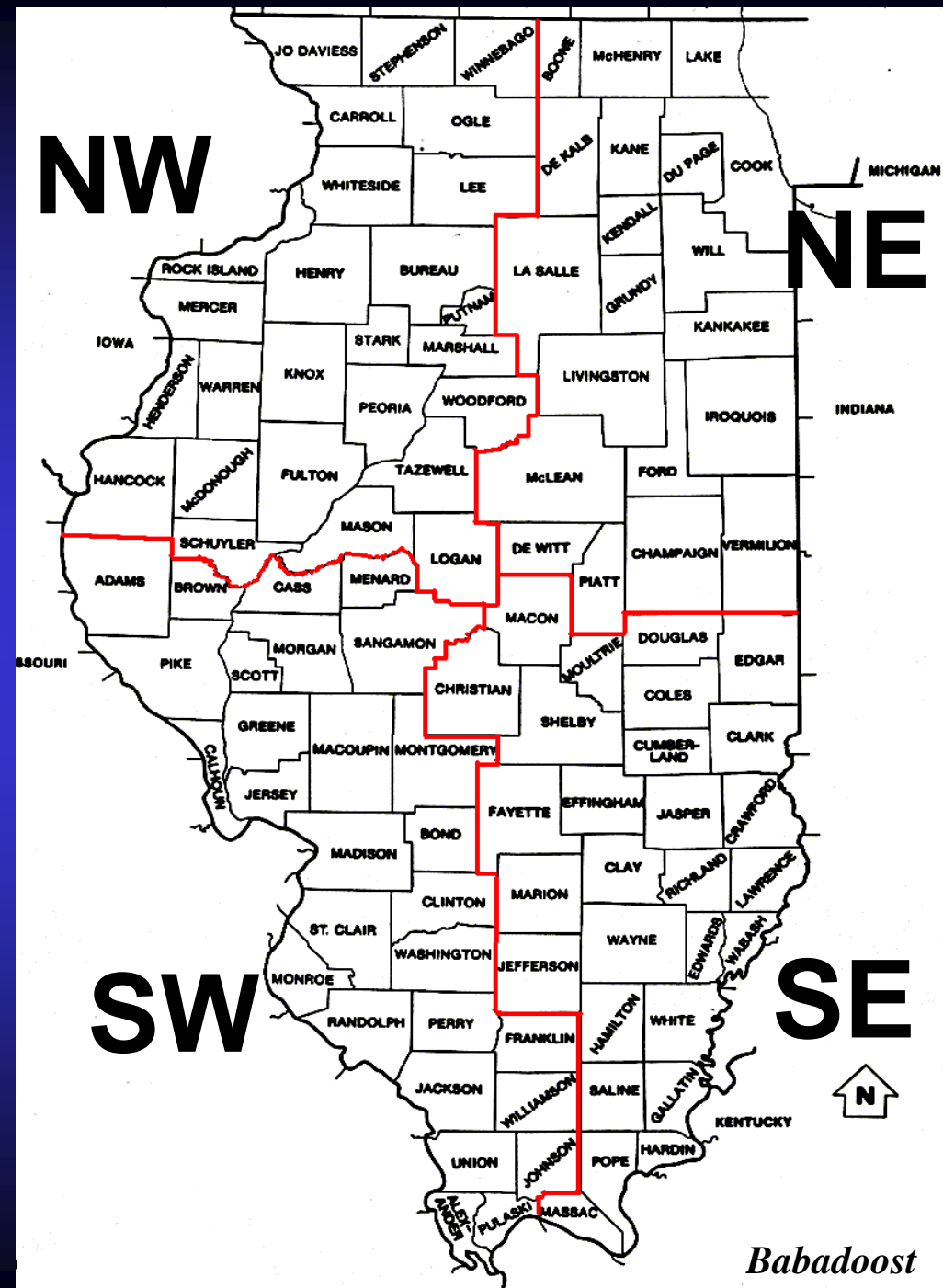
Bacterial Spot of Pumpkins - Research

Objectives:

- Field surveys to determine the incidence and severity of the bacterial spot
- Determine pathogenic variation of *Xc*
- Determine genetic variation of *Xc*
- Determine the importance of seed-borne aspect of *Xc*
- Determine host-range of *Xc*
- Determine survival of *Xc* in the field

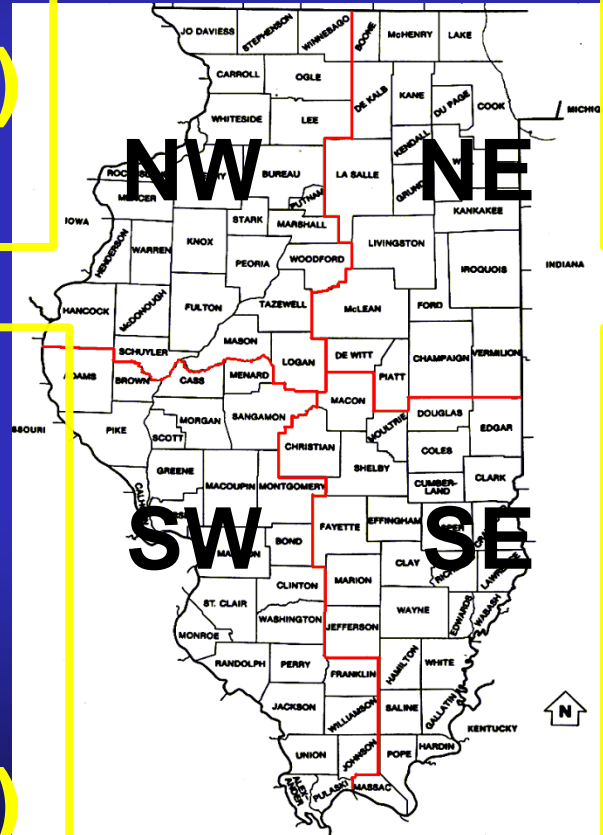
Bacterial Spot of Pumpkins

➤ Survey of disease occurrence 2009 and 2010



2009

17 Fields



NW:

- No. fields surveyed: **6**
- No. fields with disease: **6 (100%)**
- Infect. fruit: **70%**

NE:

- No. fields surveyed: **5**
- No. fields with disease: **5 (100%)**
- Infect. fruit: **30%**

SW:

- No. fields surveyed: **2**
- No. fields with disease: **2 (100%)**
- Infect. fruit: **26%**

SE:

- No. fields surveyed: **4**
- No. fields with disease: **4 (100%)**
- Infect. fruit: **54%**

NW:

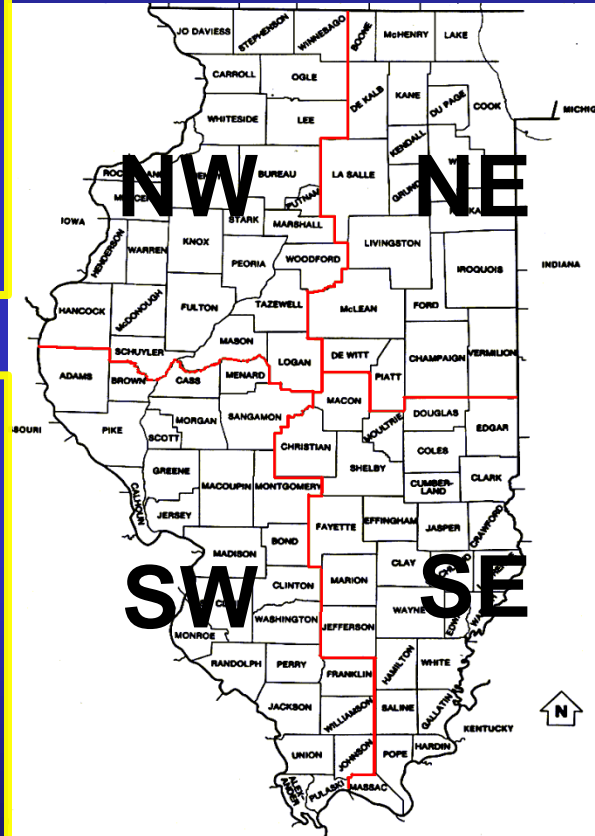
- No. fields surveyed: **12**
- No. fields with disease: **8 (67%)**
- Infect. fruit: **54%**

SW:

- No. fields surveyed: **12**
- No. fields with disease: **9 (75%)**
- Infect. fruit: **15%**

2010

50 Fields



NE:

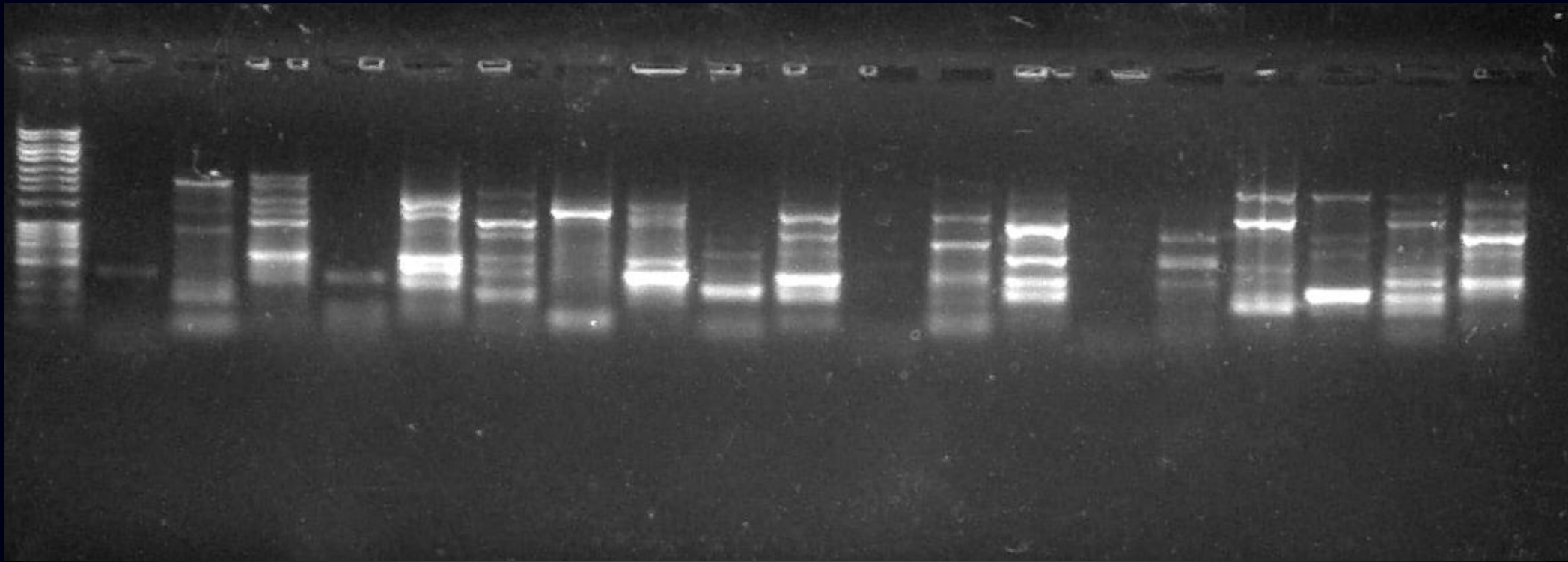
- No. fields surveyed: **12**
- No. fields with disease: **11 (92%)**
- Infect. fruit: **39%**

SE:

- No. fields surveyed: **14**
- No. fields with disease: **12 (86%)**
- Infect. fruit: **28%**

Bacterial Spot of Pumpkins in Illinois (2010)

- No. fields surveyed: **50**
- Fields with infected fruit: **40 (80%)**
- No. of fruits checked: **2,685**
- No. fruits infected: **905 (34%)**
- Fields with $> 90\%$ infected fruit: **3 (6%)**
- Fields with $> 80\%$ infected fruit: **4 (8%)**
- Fields with $> 50\%$ infected fruit: **9 (18%)**



RFLP pattern

Using primers RST2 and RST3, specific for some species of *Xanthomonas* to amplify HRP gene



**Collecting seeds from infected fruits
for testing**

Managing Bacterial Spot of Pumpkin

- **Spray copper at 7-day intervals beginning fruit sets**
- **Effects of Quintec 2.08SC
(not reliable data yet)**

Phytophthora Blight of Pumpkins

Phytophthora Blight of Pumpkins

- Pathogen: *Phytophthora capsici*
- Disease cycles: multi-cycled disease
- Plant infection: at all growing stages
- Environmental factors: moist and warm
- Major symptoms: crown rot, foliar blight, fruit rot



Phytophthora seedling death of Pumpkins in the greenhouse and field



Phytophthora fruit rot of pumpkins

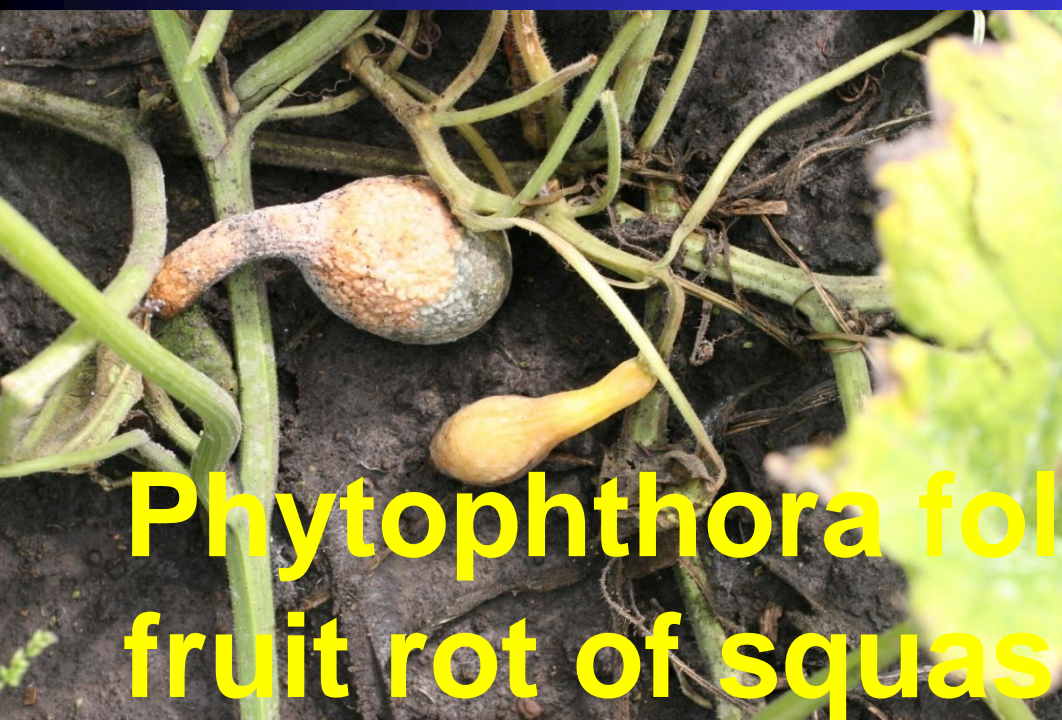


Phytophthora foliar blight of pumpkins

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**Phytophthora crown
infection of a squash plant**



**Phytophthora foliar blight and
fruit rot of squash**

Managing Phytophthora Blight of Pumpkins

➤ Challenges

- ❖ No resistant cucurbit cultivar
- ❖ Genetic diversity of the pathogen
- ❖ Pathogen survival in soil
- ❖ Wide host range of the pathogen
- ❖ Plant infection at all growth stages and after harvest

Managing

Phytophthora Blight of Pumpkins

- **Recommended Practices**
 - ❖ **≥3 years of crop rotations**
 - ❖ **Avoid using contaminated water**
 - ❖ **Disk localized infected areas**
 - ❖ **Fungicide applications**

Disk localized area with Phytophthora infection



Fungicides for Phytophthora Blight of Pumpkins

➤ Effective Fungicides

** **Cyazofamid** (Ranman 400SC)

** **Captan** (Maestro 80DF) – **not registered**

** **Dimethomorph** (Forum 4.16SC)

** **Famoxadone + Cymoxanil** (Tanos 50WDG)

- **Fluazinam** (Omega 500F) – **further studies needed**

*** **Fluopicolide** (Presidio 4SC)

*** **Mandipropamid** (Revus 2.09SC)

* **Mefenoxam** (Ridomil Gold Copper 65WP)

* **Mefenoxam** (Ridomil Gold EC 4SC, Ridom. G. 480SL)

* **Phosphorous acid** (ProPhyt) – **inconsistent results**

Fungicides for Pumpkins Phytophthora

<u>Name</u>	<u>FRAC Code</u>
Dimethomorph (Forum)	40
Famoxadone + Cymoxanil (Tanos)	11, 27
Fluopicolide (Presidio)	43
Mandipropamid (Revus)	40
Mefenoxam (Apron XL LS)	4
Mefenoxam (Ridomil Gold Copper)	4,M
Mefenoxam (Ridomil Gold EC, or SL)	4
Phosphorous acid (ProPhyt, Agri-Fos, ...)	33

Fungicides for Pumpkins

Phytophthora Blight in Illinois

➤ Available Effective Fungicides

Cyazofamid (Ranman 400SC)

Dimethomorph (Forum 4.16SC)

Famoxadone + Cymoxanil (Tanos 50WDG)

Mandipropamid (Revus 2.09SC)

***Fluopicolide (Presidio 4SC)**

Managing Phytophthora Blight of Pumpkins

➤ Effective Fungicide Control

- ❖ **Mix the fungicide with a copper compound**
(i.e., Kocide, Cuprofix,...)
- ❖ **Alternate fungicides**
(i.e., Revus + copper *alternated*
Tanos + copper)

Downy Mildew of Pumpkins

Downey Mildew of Pumpkins

- Pathogen: *Pseudoperonospora cubensis*
- Pathogen survival: **golf area**
- Pathogen dispersal: **air current**
- Reproduction cycle: **every few days**
- Environmental factors: **wet conditions**



Downy mildew of pumpkin

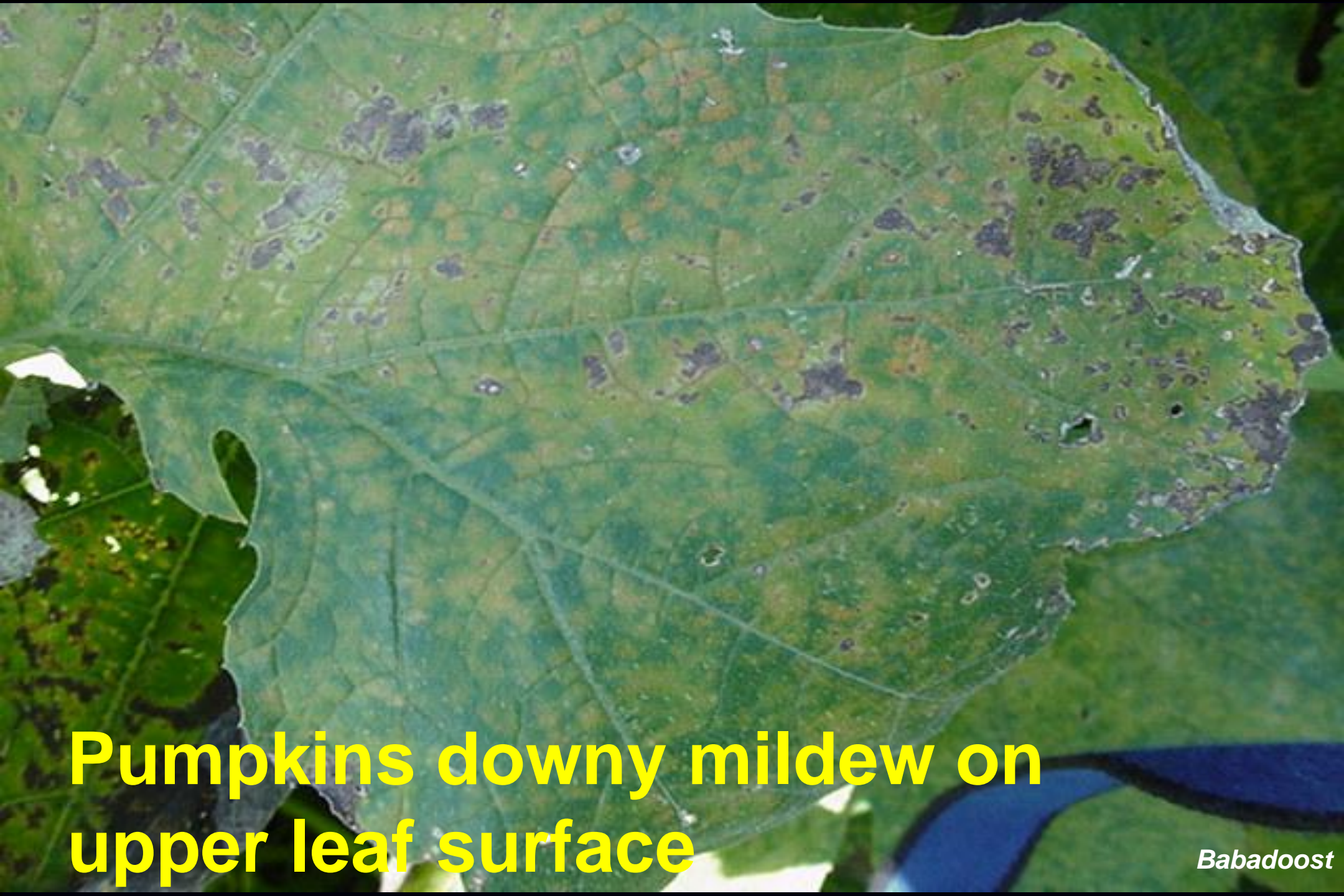
Pathotypes of Downy Mildew Pathogen

Host	Pathotypes				
	1	2	3	4	5
Cucumber (<i>Cucumis sativus</i>)	+	+	+	+	+
Cantaloupe, muskmelon (<i>C. Melo</i> var. <i>reticulatus</i>)	+	+	+	+	+
Small melons (<i>C. Melo</i> var. <i>common</i>)	-	+	+	+	+
Asian melons (<i>C. Melo</i> var. <i>acidulus</i>)	-	-	+	+	+
Watermelon (<i>Citrullus lanatus</i>)	-	-	-	+	+
Pumpkin and Squash (<i>Cucurbita</i> spp.)	-	-	-	-	+

+ = Compatible host; - = Incompatible host



Downy mildew symptoms on leaves



**Pumpkins downy mildew on
upper leaf surface**



**Pumpkins downy mildew
on upper leaf surface**

**Pumpkins
downy mildew
on lower leaf face**





Cupping and necrosis of downy mildew-infected leaves



**A pumpkin field with downy
mildew-infected plants**

Management of Downy Mildew of Pumpkins

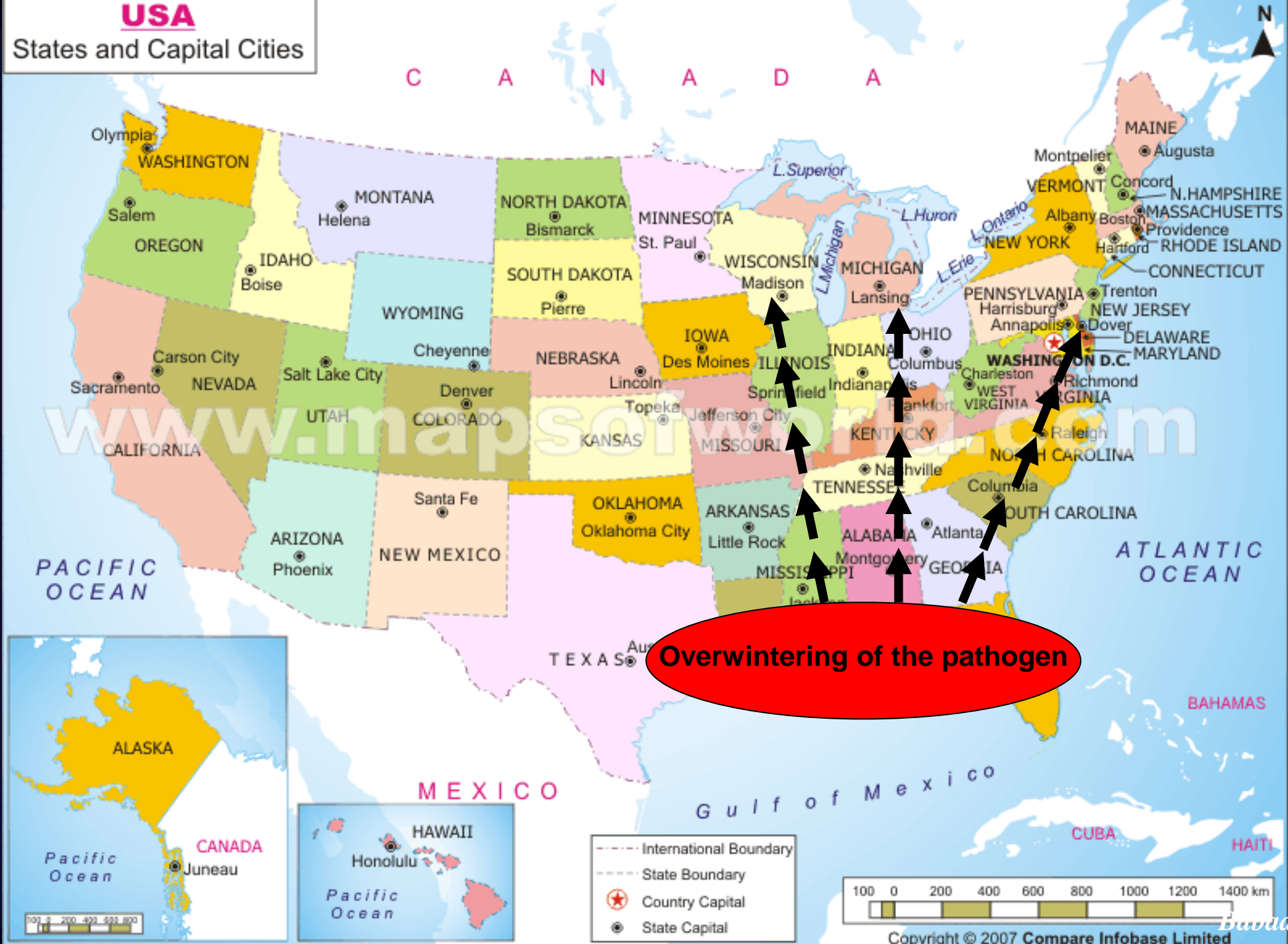
- Where does downy mildew pathogen survive in winter?
 - ❖ In the south (Guelph area)
 - ❖ In greenhouses
- When is downy mildew expected in the Illinois?
 - ❖ Usually in July or August

Management of Downy Mildew of Pumpkins

- **Monitoring spread of the pathogen:**
 - ❖ **North Carolina State Univ. Website**
(www.ces.ncsu.edu/depts/pp/cucurbit)
- **Field scouting is very important**
- **Fungicide applications**

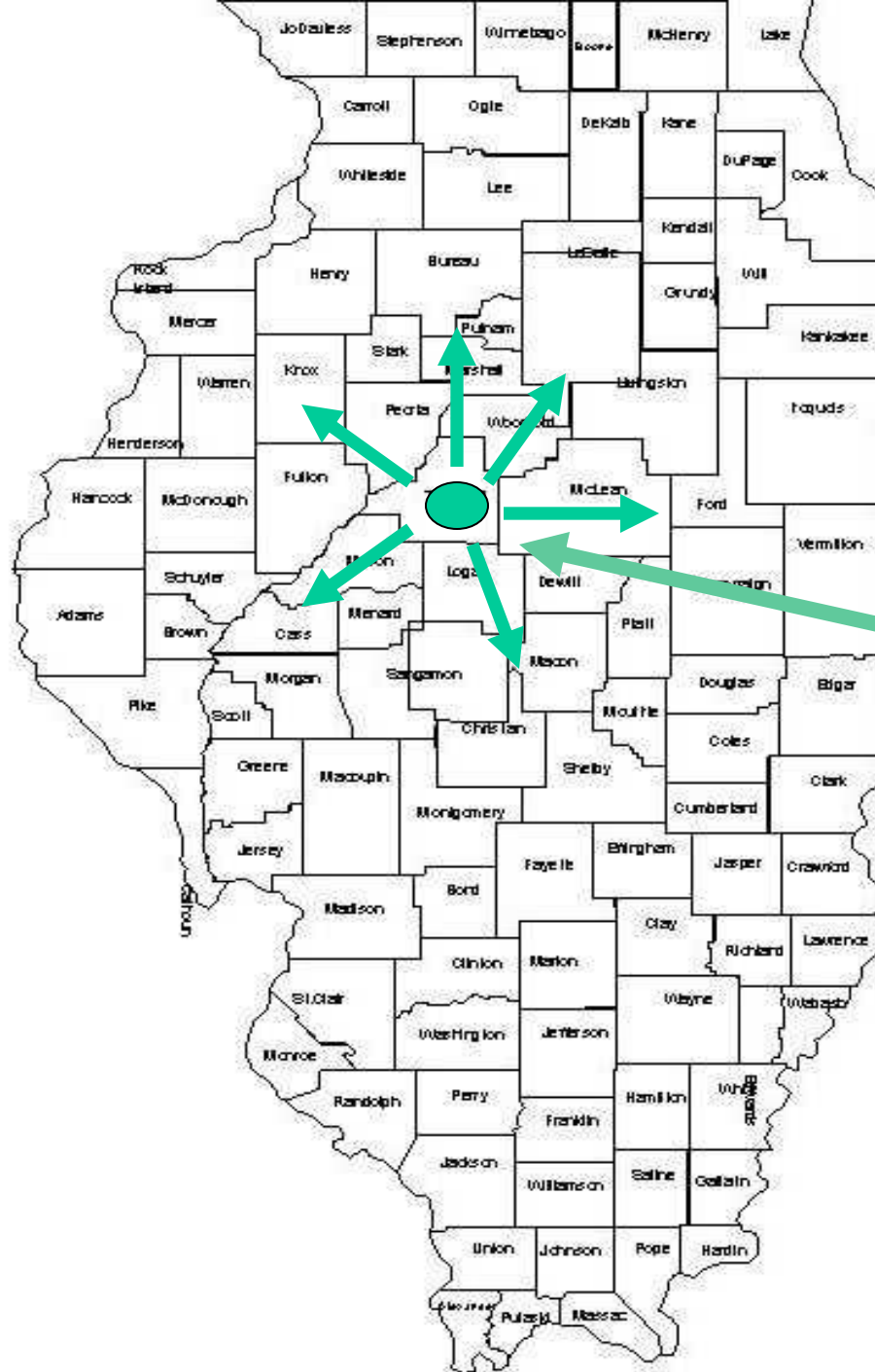
USA

States and Capital Cities



Overwintering of the pathogen

Illinois



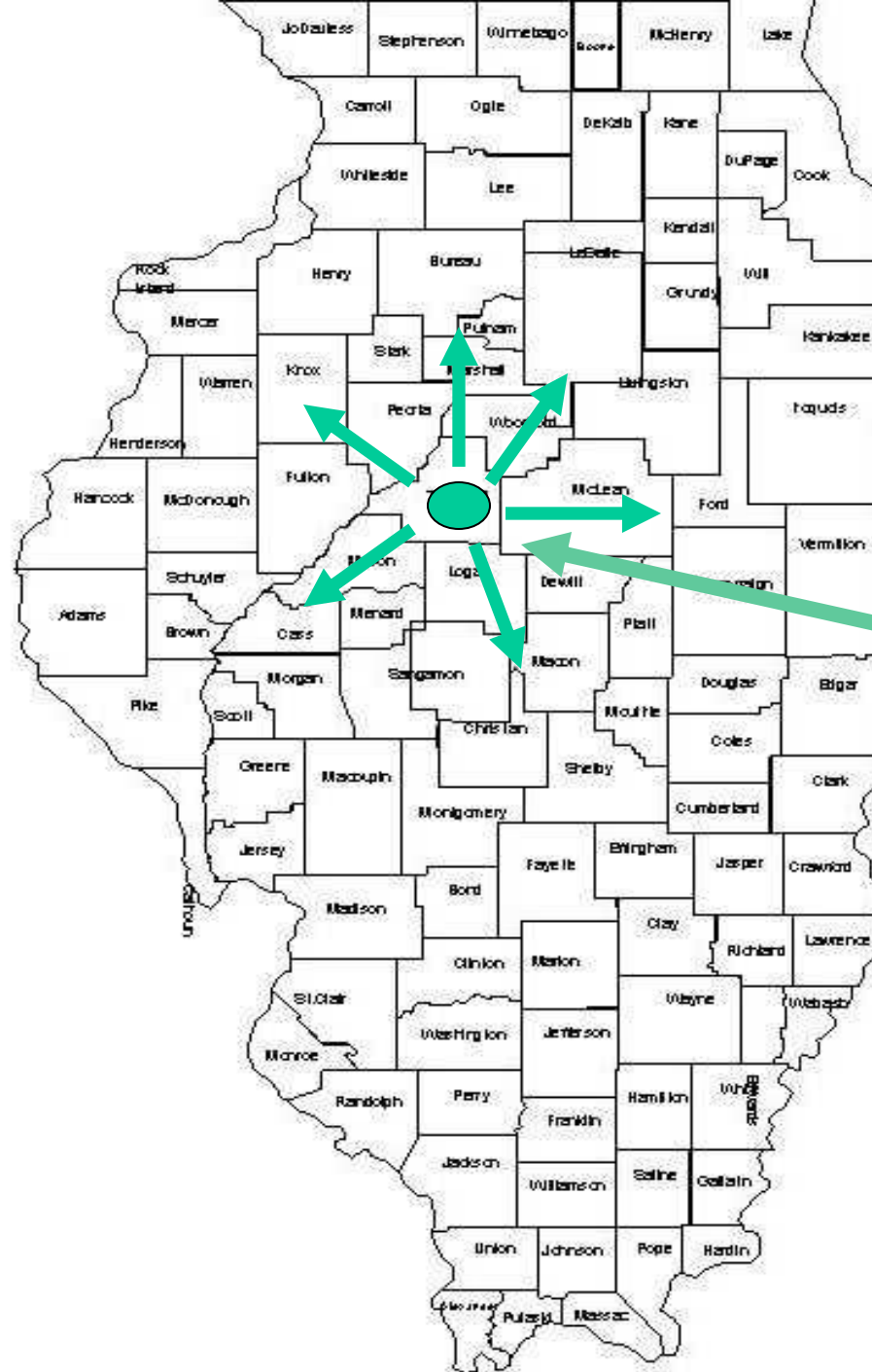
**Development
of downy in
Illinois in
2007
(pumpkin
and squash)**

Illinois



**Development
of downy in
Illinois in
2009
(cucumber
and melon)**

Illinois



**Development
of downy in
Illinois in
2010
(pumpkin
and squash)**

Processing pumpkins are more susceptible to downy mildew than jack-o-lantern pumpkins

Control of Downy Mildew of Pumpkins

➤ Fungicide Applications Effective Fungicides

- ❖ Mandipropamid (Revus)
- ❖ Propamocarb (Previcur Flex)
- ❖ Dimethomorph (Forum, Acrobat)
- ❖ Famoxadone + cymoxanil (Tanos)
- ❖ Cyazofamid (Ranman)
- ❖ Zaxomide + mancozeb (Gavel)*
- ❖ Chlorothalonil (Bravo Weather Stik)

Control of Downy Mildew of Pumpkins

➤ Effective Fungicide Control

- ❖ Prior to the infection, apply Bravo Weather Stik mixed with a copper compound (i.e., Kocide-3000, Cuprofix) - preventive
- ❖ At the first sign of the disease, spray plants with one of the effective fungicides (Revus, Tanos, Ranman) mixed with Bravo Weather Stik
- ❖ Weekly applications of the fungicides throughout the season is needed

Powdery Mildew of Pumpkins

Powdery Mildew of Pumpkins

- Pathogens: *Podospheeria* sp. (fungus)
- Pathogen survival: crop residue
- Pathogen dispersal: air current
- Reproduction cycle: every few days
- Environmental factors: humid condition



Pumpkins powdery on vines

Powdery mildew on lower leaf surface





Cucurbit powdery mildew

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Pumpkin Powdery Mildew

➤ Fungicides:

Procure, Rally; Quadris, Quadris Opti, Cabrio, Pristine, Flint; Quintec; Sulfur

- **Apply sprays beginning first sign of the disease on vines (≥ 4 spray)**

**4 sprays: Pristine + Kocide-3000 (2 wks)/
Quintec or Procure + Kocide (1 wk)/ Pristine
+ Kocide (2 wks)/Quintec or Procure + Kocide**



Pumpkin filed day in Illinois

Questions/ Comments