Black Rot
Fungus overwinters as pycnidia or pseudothecia within cane lesions or mummified fruit. Pycnidia (containing conidia) formed within current season or over-wintered infections. Ascospores.

Rain, spring through early summer. Conidia cause repeating cycles of infection during summer rains. Conidia dispersed by splashing rain, dispersed by wind.

Spores infect young leaves, canes and berries if wetness/temperature conditions are favored.

Leaf lesion.
BLACK ROT: CONSIDERATIONS

- Most commercial vineyards (in NY, that is!) have low levels of inoculum
  - If so, makes it much easier to control with limited number of sprays
    - (Opposite is true, of course)
Serious economic losses usually result from berry-to-berry spread within the vine (rain-splashed “secondary” spores)
BLACK ROT: CONSIDERATIONS

- Economic losses usually result from berry-to-berry spread within the vine (rain-splashed “secondary” spores)

  *Key to control is to keep from getting established within clusters early*
BLACK ROT: CONSIDERATIONS

- Fruit highly susceptible for 3 +/- weeks from bloom
  - Multiple infection periods then = DANGER
BLACK ROT: CONSIDERATIONS

- Fruit highly susceptible for 3 +/- weeks from bloom
  - Multiple infection periods then = DANGER

- Berries are highly resistant/immune by 4-6 wk after mid-bloom, depending on:
  - Cultivar
  - Season (heat unit accumulation)
BLACK ROT: PERIOD OF BERRY SUSCEPTIBILITY (cv. Chardonnay)
BLACK ROT:
CONSIDERATIONS

- Berries are highly resistant/immune by 4-6 wk after mid-bloom
  - Minimal danger then if no infections present, since overwintering inoculum is gone
The fungal life cycle proceeds as follows:

1. **Fungus Overwinters**: As pycnidia or pseudothecia within cane lesions or mummified fruit.
2. **Pycnidia**: (Containing conidia) formed within current season or over-wintered infections.
3. **Conidia**: Cause repeating cycles of infection during summer rains.
4. **Conidia**: Spores infect young leaves, canes, and berries if wetness/temperature conditions are favored.
5. **Infected Berry**: Conidia cause infections.
6. **Rain, Spring through Early Summer**: Conidia dispersed by splashing rain.
7. **Ascospores**: Formed within mumified fruit, dispersed by wind.

This cycle repeats, sustaining the fungal presence in the environment.
Black Rot Spore Discharge--1996

Cumulative % Discharge

1996

BB-2wk  2wk-10"  10"-PrBlm  +2wk  +4wk  +6wk  +9wk
Black Rot Spore Discharge -- 1997

Cumulative % Discharge

BB-2wk  2wk-10"  10"-PrBlm  +2wk  +4wk  +6wk  +9wk

1997
Black Rot Spore Discharge--1998

Cumulative % Discharge

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<th>2wk-10&quot;</th>
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<th>+2wk</th>
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## BLACK ROT CONTROL: SPRAY TIMING, 1995-99 (cv. 'Aurore', Dresden, NY)

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*Immediate prebloom (+/-)
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% Control (clusters infected), yr
BLACK ROT: IMPORTANCE OF SANITATION (Removal of mummies from trellis)

- Mummies in trellis (versus on the ground)
  - Produce spores until +/- veraison (trellis) vs. 1-2 wk postbloom (ground)
ASCOSPORES (air-borne) FROM MUMMY: GROUND vs. TRELLIS

Spores per mummy (x 1,000)

- Green line: Ground
- Black line: Trellis

BI: Benchmark
BLACK ROT: IMPORTANCE OF SANITATION (Removal of mummies from trellis)

- Mummies in trellis (versus on the ground)
  - Produce spores until +/- veraison vs. 1-2 wk postbloom
  - Produce 10-20x as many spores over the season
CONIDIOSPORES (splash-dispersed) FROM MUMMIES: GROUND vs. TRELLIS

- **Spores per mummy (x 1,000)**
- **Dates:**
  - 5/15/03
  - 5/22/03
  - 5/29/03
  - 6/5/03
  - 6/12/03
  - 6/19/03
  - 6/26/03
  - 7/3/03
  - 7/10/03
  - 7/17/03
  - 7/24/03
  - 7/31/03
  - 8/7/03
  - 8/14/03
  - 8/21/03

**Graph Key:**
- **Ground**
- **Trellis**
BLACK ROT: IMPORTANCE OF SANITATION (Removal of mummies from trellis)

- Mummies in trellis (versus on the ground)
  - Produce spores until +/- veraison vs. 1-2 wk postbloom
  - Produce 10-20x as many spores over the season
  - Produce spores right next to new fruit (splash dispersal)
BLACK ROT: LENGTH OF INCUBATION PERIOD

- Need to know to determine, “What went wrong?”
BLACK ROT: LENGTH OF INCUBATION PERIOD

- Need to know to determine, “What went wrong?”
- 2 - 3 weeks when berries are young
- 3 - 5 weeks as berries become resistant
BLACK ROT: EFFECT OF BERRY AGE ON INCUBATION PERIOD (cv. Riesling)
Overwintering spores produced bud break through fruit set

- No further spores if disease is controlled then
Fruit extremely susceptible for 3+/- wk after cap fall

- Prebloom thru 1st 3 wk postbloom is the CRITICAL time for control!
BLACK ROT BIOLOGY & CONTROL: SUMMARY

- Fruit extremely susceptible for 3+/- wk after cap fall
  - Prebloom thru 1st 3 wk postbloom is the CRITICAL time for control!
    - Earlier sprays also may be beneficial if very high disease pressure (carryover, warm & wet)
BLACK ROT BIOLOGY & CONTROL: SUMMARY

- Fruit extremely susceptible for 3+/- wk after cap fall
  - Prebloom thru 1st 3 wk postbloom is the CRITICAL time for control!
    - Earlier sprays also may be beneficial if very high disease pressure
    - Later sprays to limit spread may be necessary if disease is well-established
Spores from mummies in trellis are more plentiful and more dangerous than from those on the ground.

- Get ‘em out of there!
- Prune and drop
Spores from mummies in trellis are **more plentiful** and **more dangerous** than from those on the ground

- Get ‘em out of there!
  - Prune and drop

- From ground, too, if “organic” producer
  - Bury (till) and/or cover (mulch)
10 - 30+ day incubation period, depending on berry age

- Incubation period increases as berries start to develop age-related resistance
BLACK ROT: FUNGICIDES

- Mancozeb, ziram, ferbam
  - Standards, good control under most commercial conditions
  - Strictly protectants, subject to washoff

- SI (DMI) fungicides
  - Nova, Elite = Gold standards
  - Rubigan = fair/poor
BLACK ROT: FUNGICIDES

- Abound, Sovran, Flint, Pristine
  - Very good
  - Equivalent to one another (+/-)
  - More rainfast than mancozeb, etc.

  ✦ Can get away with longer spray intervals
BLACK ROT: FUNGICIDES

- Captan, copper, sulfur
  - Only fair to poor (sulfur)
  - Potential “Achilles heel” for organic producers
    - MUST emphasize importance of sanitation