Dynamics of *Botrytis cinerea* colonization of raspberry flowers and fruit

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How does *Botrytis cinerea* infect red raspberry?

“Spray first at 5% bloom and again 7-10 days later. Applications during the growing season, especially pre-harvest, aid control when wet weather is expected.”

2014 PNW Plant Disease Management Handbook
Insights into current disease management

Calendar sprays:

- **Bloom**: Disease incidence 18-30%
- **Full season**: Disease incidence 1-10%
- **Pre-harvest**: Disease incidence 5-10%

Ellis et al. 2008
1. How is infection related to *flower and fruit development*?

2. Through which *flower and fruit organs* does infection occur?

3. How do *fungicide applications* affect colonization process?
Sampling strategy

- 2015-2016, Unsprayed field
- Sampling once a week
- All developmental stages present in a field
*B. cinerea* colonization of raspberry flowers and fruit in 2016
Colonization of flower and fruit parts in 2016

Percentage of colonization

Developmental stage

Pedicle  Sepal  Stamen  Receptacle  Carpel

Carpel
Colonization of raspberry in 2015-2016: Conclusions

- Low colonization of flowers - less than 15%

- *B. cinerea* colonization increases as fruit develops - up to 67% of total sampled fruit

- Carpels are most frequently colonized parts. As fruit develops, additional flower parts get colonized by the fungus
  - Potential source for direct infections of ripe fruit?
Cultivar Wakefield
Field 1 - planted in 2015
Field 2 - planted in 2012

Effect of fungicide applications: experimental design 2017

Field 1
No Spray  Spray

Field 2
No Spray  Spray

17 miles

Three stages:
- Fertilized flowers
- Green fruit
- Ripe fruit
Effect of fungicides on *B. cinerea* colonization in 2017

Percentage of colonization

May June July

Captan Captan Pristine, Rally Captan Meteor Captan Switch Captan Switch

No Spray Spray

Effect of fungicides on *B. cinerea* colonization in 2017
Colonization of flower organs by *B. cinerea*

![Bar graph showing colonization of different flower organs by *B. cinerea* after treatment with spray.](image)

- **Carpel**: A significantly higher percent of samples were colonized after the spray treatment compared to the no spray condition.
- **Sepal**: Similar percent of samples were colonized in both conditions.
- **Stamen**: No significant difference in colonization between the two conditions.
Colonization of ripe fruit by *B. cinerea*

**Field 1**
- **Organ:** druplet, stamen, sepal, receptacle
- **Organ Comparison:**
  - Druplet: A, B
  - Stamen: A, A
  - Sepal: A, B
  - Receptacle: A, A

**Field 2**
- **Organ:** druplet, stamen, sepal, receptacle
- **Organ Comparison:**
  - Druplet: A, A
  - Stamen: A, B
  - Sepal: A, B
  - Receptacle: A, B

Legend:
- **Green:** No Spray
- **Red:** Spray
Average number of *B. cinerea* colonies per ripe fruit

![Bar graph for Field 1 and Field 2 showing the number of colonies per ripe fruit for different organs: drupelet, stamen, sepal, and receptacle. The graph compares the number of colonies under no spray and spray conditions.]
Conclusions

• Limited colonization of flowers

• *B. cinerea* colonization increases as fruit develops

• Carpels are most frequently colonized parts. As fruit develops, additional flower parts get colonized by the fungus
  • Potential source for direct infections of ripe fruit?

• Fungicide applications do not decrease *B. cinerea* colonization of early developmental stages either by incidence or quantitatively

• Fungicide applications decrease *B. cinerea* colonization on ripe fruit
Conclusions

Calendar sprays:

• Save money
• Decrease fungicide resistance

More studies must be done
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