Resources

• Michigan Pollinator Initiative  
  www.pollinators.msu.edu

• Integrated Crop Pollination  
  www.projecticp.org

• The Pollinator Partnership  
  www.pollinator.org
• Blueberry pollination.
• 2018 experiences.
• How can you decrease the risk of poor pollination?
More fertilized seeds = larger Jersey berries
# Recommended colony stocking densities

<table>
<thead>
<tr>
<th>Cultivar, Varieties</th>
<th>Strong honey bee colonies / acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rubel, Rancocas</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Weymouth</strong>, Bluetta, Blueray, Pemberton, Darrow</td>
<td>1.0</td>
</tr>
<tr>
<td>Bluecrop</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Elliot</strong>, Coville, Berkeley, Stanley</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Jersey</strong>, Earliblue</td>
<td>2.5</td>
</tr>
</tbody>
</table>


Oregon State University recommends 3 colonies per acre.

Some Michigan growers use up to 6 colonies per acre, for lower risk of poor pollination.
Memorial Day forecast: Possibly hottest on record
Extreme heat on Memorial Day weekend, 2018

Grand Junction

Average highs = 75.4°F
Average lows = 55.8°F
17 hours over 90°F in May

West Olive

Average highs = 76.3°F
Average lows = 55.7°F
13 hours over 90°F in May

Air temperature (°F)
Extreme heat can affect many aspects of pollination

- Flower development
- Pollen production
- Pollen viability
- Pollen germination
- (and fertilization?)
Misting to cool flowers

Misting system applied 15 minutes every hour to cool berries.

Temperature reduced 15-20 °F below air temperature.

Cooling reduced fruit damage and increased harvestable yields.

Oregon State University
Yang and Bryla (2018)
Nectar remaining in flowers indicates low bee visitation
Bee abundance affects berry weight

Each point is a Michigan or British Columbia farm in one year. There are three and two years of data included, respectively.

Spearman's rank correlation: $S = 38259$, $p < 0.0001$, $r = 0.61$

More bees = larger Bluecrop berries

- Michigan: > 25 bees per 10 min on 10 bushes
- British Columbia: < 10 bees per 10 min on 10 bushes
Sampling bee activity

Measure to make sure you have sufficient bees for pollination.

Fields can be sampled a few times during bloom.

Are you way below, just right, or way above the number for full pollination?

2018 pilot study in Bluecrop

10 minute samples on 10 bushes

Count bees.
Bluecrop fields – 2018 bee activity samples

- 7 above 25 bee threshold
- 7 well below
- 3 intermediate
Use strong honey bee colonies

Best pollination if colonies are strong.

OR/WA standard for Grade A Orchard colony:
Six frames of comb well covered with bees
  3000 sq inches of comb
  600 sq inches of brood
  10 pounds of honey, or equivalent
  normal laying queen

Contracts can be used to describe number and strength of colonies.

A proposal:
Growers pay beekeepers for strong colonies. Not weak ones. Beekeepers get paid well for their colonies.
Integrated **Pollinator** Management

Stock fields with optimal number of strong colonies.

Measure to make sure you have sufficient bees for pollination.
   Fields can be sampled a few times during bloom.

   Are you way below, just right, or way above the number for full pollination?

Help maintain bee health through good farm management.
Bees with access to diverse pollen & nectar sources...

- Live longer
- Have greater reproduction
- Have lower pathogen infection
- Can resist pesticides better
Research needs....

- Improved prediction of bloom
- Understanding high temperature effects
- Temperature reduction strategies
Take home messages

• Pollination is a critical phase of blueberry development.
• Stock fields with strong honey bee colonies. Check them!
• Monitor crop pollination, and learn from experience.
• Consider misting (or overhead irrigation?) for cooling.
• Support wild bees too, to help guarantee pollination.