Raspberry Production

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RASPBERRY (**Rubus**)  

- 195 species

- 2 main species in production:  
  - *R. idaeus* - Red raspberry  
    - *ssp. vulgatis* - European  
    - *ssp. strigosus* - North American  
  - *R. occidentalis* - Black raspberry  
  - Purple raspberries - hybrids of red x black raspberry  
  - Yellow raspberries - single recessive gene mutation of red raspberry
**R. idaeus- Red Raspberry**

- Largest commercial market
  - More cold tolerant than blackberry
  - Higher yield and less disease than black raspberry
  - Yellow varieties are becoming more popular
  - Purple raspberries have inferior fruit quality and not commercially viable
SITE SELECTION AND ESTABLISHMENT

• Full Sun

• Good air circulation but protected site from wind
  – Reduce leaf damage
  – Faster drying after rain, dew, irrigation
  – Slope- allows cold air to drain away
    • Summer bearing- north facing slope
    • Fall bearing- south facing slope

• Crop History of Site
  – Wait 3 years before replanting if previous crop was raspberry, strawberry or solanaceous crop
SOIL CONDITIONS

• Well drained mineral soil
  – Ideal: deep sandy loam with 5-7% organic matter
  – Sandy soils must be irrigated

• pH: ideal 6.0-6.8, can tolerate 5.5-7.5
Planting Raspberries

- Plant in spring after danger of frost
**Plant Spacing**

**Yield** = \(# \text{ of canes} \times \# \text{ of laterals}\)

- Plant narrow rows and more rows/acre
- Row width: 12-18”
  - Ideal for harvest
  - Wider rows will have greater disease issues due to poor circulation
- Between row spacing: equipment often dictates
FLOWERS

• Flowers
  – Flowers are smaller than blackberry
  – Borne terminally on lateral shoots
  – Self fruitful, bees do 80-90% of pollinating
  – Spring frost injury- vascular connections to bud are damaged, may not be noticed until fruit development
FLORICANE BEARING
FLORICANE BEARING

- Fruit are borne on laterals of 2 year old canes
  - Requires canes to be overwintered
- Short days, cool temps: floral initiation
- One crop in summer
- Cane dies after fruiting
- If heading to control height, do not remove more than 25% of cane
- New canes sprout from root buds
  - Planting can spread over time
PRIMOCANE BEARING

- New canes will grow; Do not tip
- Remove 2-year-old canes
- Fall crop

Summer  Fall  After harvest
**Primocane Bearing**

- Fruit are borne on laterals of current seasons growth
  - Day length and temperature neutral
  - Initiate flowers in June-July
  - Flower early July-August
  - Fruit late August/Sept to frost

- Fruiting starts at
  - Tip of inflorescence and moves inward
  - Top of cane and moves down
Why Fall Bearing Raspberries?

- Overwinter well - no exposed canes
- Excellent supplemental crop
  - Same harvest window as apples
  - After blueberries and strawberries
- Low maintenance
- High value crop
- Potential to extend local fruit availability
SELECTING CULTIVARS

• Select variety based on your target market
• Production system
  – Field vs high tunnel
• Variability in ripening time can ease harvest
• Post harvest needs?
  – Shipping
  – PYO
  – Direct market
Hill System
FIGURE 4-15 Red raspberry training systems: (A) hedgerow (topped); (B) cross-arm with tied spread bundle (topped); (C) cross-arm with cane weaving; (D) cross-arm with movable wires (Gjerde).
Trellising Fall Bearing Raspberries

- Fruit is borne at the top of the canes resulting in top heavy drooping canes
- Trellis reduces damage due to wind
- Some trellis support is needed
- Simple T-trellis is sufficient
  - 7’ post with 3’ arm
  - Place posts every 25-30’ in row
  - Removable posts- PVC pipe permanently in ground
  - Baler twine
FERTILITY
Start Right!

- Start preparing the site at least one year in advance
- Soil testing is essential!
- Crucial Factors for consideration:
  - Soil pH (ideal is ~6.5)
  - Soil texture (sand:silt:clay)
  - Soil moisture
  - Organic matter
  - Nutrient status
FERTILITY

• New Planting
  – Do not apply nutrients right after planting as canes are sensitive...water is most crucial
  – If needed, apply nutrients several weeks after planting

• Established Planting
  – Split application in March and May
  – Very northern climates may only do one application in March

• Do not fertilize in fall
**Estimated N Requirements**

**Table 6. Estimates of the nitrogen requirements (lb./A) for brambles.**

<table>
<thead>
<tr>
<th>BRAMBLE TYPE</th>
<th>YEAR</th>
<th>SANDY</th>
<th>IRRIGATED LOAMY</th>
<th>CLAYEY</th>
<th>SANDY</th>
<th>NONIRRIGATED LOAMY</th>
<th>CLAYEY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primocane-fruited with no summer crop</td>
<td>1</td>
<td>40</td>
<td>30</td>
<td>25</td>
<td>35</td>
<td>30</td>
<td>25</td>
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<tr>
<td></td>
<td>2</td>
<td>80</td>
<td>70</td>
<td>60</td>
<td>70</td>
<td>65</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>3+</td>
<td>120</td>
<td>100</td>
<td>90</td>
<td>90</td>
<td>80</td>
<td>70</td>
</tr>
<tr>
<td>Summer-bearing reds, thornless blackberries</td>
<td>1</td>
<td>35</td>
<td>30</td>
<td>25</td>
<td>30</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>55</td>
<td>50</td>
<td>45</td>
<td>45</td>
<td>40</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>3+</td>
<td>80</td>
<td>70</td>
<td>60</td>
<td>60</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>Summer-bearing black and purple raspberries, thorny blackberries</td>
<td>1</td>
<td>30</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>45</td>
<td>40</td>
<td>35</td>
<td>35</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>3+</td>
<td>60</td>
<td>50</td>
<td>45</td>
<td>45</td>
<td>40</td>
<td>30</td>
</tr>
</tbody>
</table>
POTASSIUM

- Raspberries have a high requirement for potassium, especially during fruiting
- K levels should be monitored through tissue analysis
- Best forms:
  - Potassium sulfate (400lb/A)
  - Potassium magnesium sulfate (160lb/A)

APPLICATIONS SHOULD BE BASED ON TISSUE ANALYSIS!
Table 7. Accepted standards of nutrient ranges determined by leaf analysis.

<table>
<thead>
<tr>
<th>NUTRIENT</th>
<th>RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen</td>
<td>2.00–3.00 % of leaf dry weight</td>
</tr>
<tr>
<td>Potassium</td>
<td>1.50–2.50 %</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>0.25–0.40 %</td>
</tr>
<tr>
<td>Calcium</td>
<td>0.60–2.50 %</td>
</tr>
<tr>
<td>Magnesium</td>
<td>0.30–0.90 %</td>
</tr>
<tr>
<td>Manganese</td>
<td>50–200 ppm (parts per million)</td>
</tr>
<tr>
<td>Iron</td>
<td>50–200 ppm</td>
</tr>
<tr>
<td>Copper</td>
<td>7–50 ppm</td>
</tr>
<tr>
<td>Boron</td>
<td>30–50 ppm</td>
</tr>
<tr>
<td>Zinc</td>
<td>20–50 ppm</td>
</tr>
</tbody>
</table>

NRAES Bramble Production Guide
Mulching

• Mulches are desirable to:
  – Retain moisture
  – Protect roots
  – Reduce weeds

• Straw, shavings, sawdust
  – If mulch is applied, more N may be required at time of mulch application due to high C:N ratio

• Sod between rows
IRRIGATION

• In loamy soil
  – need 1-1 ½” every 7-10 days

• In sandy soil
  – need ½ - 1/3” every 3-5 days

• Drip irrigation
  – 1 or 2 tapes/row
  – Can fertilize through irrigation system
HARVEST
Fruit

- Druplets detach from receptacle when harvested
- 30-50 days for fruit development
- Must be picked every 2-4 days due to range of ripeness
- Fall bearing types will continue to fruit until frost
Harvest

- Indicators of maturity:
  - Ease of abscission is best indicator of fruit maturity
  - Fully developed color

- Hand harvest every 2-3 days
  - Directly into retail containers
DOUBLE CROPPING FALL BEARING

• Can produce 2 crops:
  – Year 1- Fall crop
  – Year 2- summer crop

• Advantages:
  – Larger total crop

• Disadvantages:
  – Pruning is more difficult – lose profits on increased yield in pruning labor
  – Canes become weaker and taller
  – Fruit quality of summer crop is not very good
Post Harvest

• Shelf life is short
  – 2-3 days at 32-45°F
  – Not sensitive to cold storage injury

• Post harvest handling is critical!
  – Do not leave boxes sitting in the sun!
  – Remove field heat as soon as possible
  – Ensure fruit are properly handled during transportation chain
PRUNING
PRUNING RED RASPBERRIES

Summer Bearing (Floricane Fruiting)

- Remove fruited floricanes
- Head floricanes by ¼
- Remove weak or damaged wood
- Thin canes to 4-6 per foot of row
Pruning Fall Bearing Raspberries

• Cut canes as close to the ground as possible
  – Lateral buds can break from cane stubs
  – Weak laterals are potential infection site for disease

• Remove cuttings from the rows
Rototill to narrow rows

12-18” row
Timing Of Pruning

• Carbohydrates move from canes to roots in the fall
  – Cutting canes before Dec. can reduce carbohydrate reserve and effect spring growth

• Carbohydrates move into buds in the spring
  – Cutting canes too late can lead to loss of carbohydrates if they have started to move

• Best time is Dec.-early March
PRIMOCANE SUPRESSION

• After 3rd year of growth primocane suppression can increase yield and quality of fruit
  – 3-4 consecutive years, then skip a year to allow stand to recover

• Late spring suppression of primocanes

• Disadvantages:
  – Labor
  – Long-term reduction in stand vigor
SEASON EXTENSION
EARLIER PRODUCTION

– Early season prices
– May correspond with other crops on the farm

• In northern climates, much of the yield potential of fall-bearing raspberries is lost due to the short season

• Use of row covers in spring can lead to cropping 2 weeks earlier
  – Heritage, Caroline and Josephine responded well in studies
**Spring Row Cover**

- Place row cover on early in the spring
- Place loosely over canes so canes are not restricted
- Leave the covers on until canes are ~18”
  - Remove earlier if temperatures are high
Fall Extension

• Primocane raspberries can be extended by:
  – Planting late cultivars
  – Delaying harvest
  – Protecting fruit (high tunnel production)
DELAYING HARVEST

- Pinching primocanes @ 12” height
  - Promotes branching
  - Delays production of fruit by 3 weeks (NY)
  - Minimal difference in yield
PROTECTING FRUIT

• Fall bearing raspberry yield is primarily limited by fall frost

• Protecting the crop from frost lengthens harvest period

• Protecting fruit results in higher quality fruit as well as increased yields
What is a High Tunnel??

- Large plastic hoop houses with roll up (or down) sides to allow for ventilation
- Not necessarily heated
- Allow for extension of natural season
- Intermediate environmental protection (between field and greenhouse)
Benefits of High Tunnel Production

- Long growing season = Increased yield
  - Low investment, high return
- Improved fruit quality
  - No wind or rain damage
- Increased growth
- Wild life barricade
- Some reduced pest pressure
- Harvest is not weather dependant!
CHALLENGES OF HIGH TUNNEL PRODUCTION

- New pest pressure
  - Powdery mildew and mites
- Soil degradation
- Increased rodent activity
- Wind/snow damage to tunnel
- Potential for extreme high temps if not managed properly
EARLY SEASON

• Can be done with floricane or primocane brambles
  – Plastic remains up over winter
• Can use floating row covers to gain additional heat and to protect tender leaves during cold nights
  – Remove row cover when plants are 18” high
Late Season Extension

- Plastic can be removed over the winter
  - Snow cover for crowns
  - Snow leaches the soil

- Tunnel provides protection from low night temperatures

- Additional protection can be provided by covering raspberries with lightweight floating row covers
  - Cover crop when temps are predicted to fall below 25°F
  - Remove in the morning when temperatures begin to rise
## Production Comparison

Table 1. Yield and berry quality comparison of fruit after treatments of high tunnel cover, field row cover, or no cover of four primocane-fruiting bramble cultivars.

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Treatment</th>
<th>Total yield (g)</th>
<th>Average berry weight (g)</th>
<th>Soluble solids concentrate (%)</th>
<th>Diameter (mm)</th>
<th>Firmness (Newton)</th>
<th>Number of canes</th>
<th>Biomass weight (oz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autumn</td>
<td>High tunnel</td>
<td>1004 a</td>
<td>2.7 bc</td>
<td>9.0 cb</td>
<td>18 cb</td>
<td>2.0 c</td>
<td>28 b</td>
<td>102 b</td>
</tr>
<tr>
<td></td>
<td>Row Cover</td>
<td>452 bc</td>
<td>2.4 cd</td>
<td>9.1 cb</td>
<td>17 c</td>
<td>2.3 bc</td>
<td>12 cd</td>
<td>11 de</td>
</tr>
<tr>
<td></td>
<td>No cover</td>
<td>226 cd</td>
<td>2.4 cd</td>
<td>8.8 cb</td>
<td>16 c</td>
<td>0.8 c</td>
<td>9 cd</td>
<td>4 e</td>
</tr>
<tr>
<td>Caroline</td>
<td>High tunnel</td>
<td>224 cd</td>
<td>3.4 b</td>
<td>9.3 b</td>
<td>20 b</td>
<td>1.0 c</td>
<td>44 a</td>
<td>71 c</td>
</tr>
<tr>
<td></td>
<td>Row cover</td>
<td>52 d</td>
<td>2.5 cd</td>
<td>9.5 b</td>
<td>-</td>
<td>-</td>
<td>14 c</td>
<td>8 de</td>
</tr>
<tr>
<td></td>
<td>No cover</td>
<td>29 d</td>
<td>1.8 d</td>
<td>8.2 c</td>
<td>-</td>
<td>-</td>
<td>9 cd</td>
<td>2 e</td>
</tr>
<tr>
<td>Jaclyn</td>
<td>High tunnel</td>
<td>173 cd</td>
<td>2.3 cd</td>
<td>9.4 b</td>
<td>17 c</td>
<td>1.0 c</td>
<td>11 cd</td>
<td>30 d</td>
</tr>
<tr>
<td></td>
<td>Row cover</td>
<td>77 cd</td>
<td>2.1 cd</td>
<td>8.7 cb</td>
<td>16 c</td>
<td>0.9 c</td>
<td>6 d</td>
<td>3 e</td>
</tr>
<tr>
<td></td>
<td>No cover</td>
<td>118 cd</td>
<td>1.9 d</td>
<td>9.5 b</td>
<td>17 c</td>
<td>3.8 b</td>
<td>8 cd</td>
<td>5 e</td>
</tr>
<tr>
<td>APF-45</td>
<td>High tunnel</td>
<td>789 ab</td>
<td>8.7 a</td>
<td>11.16 a</td>
<td>24 a</td>
<td>15.6 a</td>
<td>31 b</td>
<td>294 a</td>
</tr>
<tr>
<td></td>
<td>Row cover</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>5 d</td>
<td>8 d</td>
</tr>
<tr>
<td></td>
<td>No cover</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>5 d</td>
<td>10 e</td>
</tr>
</tbody>
</table>

LSD, P ≤ 0.05

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*Means are average four treatment replications.

*Least significant difference at P ≤ 0.05; NS = no statistical difference; means sharing the same letter are not statistically different from each other.
WHO IS YOUR MARKET??

- Season extension only works if you have someone who will buy your crop!
  - People are not always thinking about raspberries in October!

- Wholesale vs. Retail?

- Market research is part of the planning stage!
QUESTIONS?