Missouri Grown: Small Scale Horticultural Production

Blackberries
Blackberry

- Grows well in Missouri
- Planting to fruiting in 1 year
- Life of planting: 7-12 years
- Annual yield:
  - 100 qt/100 ft row typical yield
  - 6,000-10,000 lbs per acre (after year 2)
- Four types adapted to Missouri:
  - Erect thorny
  - Erect thornless
  - Semi-erect thornless
  - Primocane fruiting
Vocabulary

• Primocane: everbearing/fall bearing
  o Produce fruit on the first year shoots
  o Produce second crop on the same shoots in year 2

• Floricane: summer bearing
  o First year shoots do not produce fruit
  o Crop is produced on second year shoots

• Two types of growth:
  o Clump – new shoots arise from original crown
  o Hedgerow – plants produce suckers from roots
Why Grow?

• Delicious NUTRITIOUS fruit
• Reduced pest management relative to other fruits
• Short time from planting to production
• Straightforward production practices
• High demand from variety of markets
Considerations

• Vulnerable to heat and winter cold
• Plantings can be short-lived
• Fruit is highly perishable
• Pest management
• Labor intensive
Erect Thorny

- Self-supporting **thorny** canes
- Spread via root suckers
- Form continuous hedgerow
- Most resistant to cold temperatures
Erect Thornless

• Self-supporting *thornless* canes
• Spread via root suckers
• Form continuous hedgerow
• Moderate resistance to cold temperatures
Semi-Erect Thornless

- Require a trellis system – added expense
- No suckers from root system
  - Maintained and planted in clumps with new branches (canes) rising from the clump
- Less hardy than erect cultivars
- Cultivars: ‘Chester’, ‘Triple Crown’
Primocane

- Produce fruit on first year shoots from late summer to frost
- Produce a second crop on the same shoots in the second year
- Primocane crop commercial potential in Missouri is limited by low productivity (due to high summer temperatures)
- Cultivars:
  - ‘Prime Jim’ and ‘Prime Jan’ (thorny) (Softer fruits-suitable for local markets)
  - ‘Prime-Ark 45’ (thorny)
  - ‘Prime-Ark Freedom’ (thornless)
  - ‘Prime-Ark Traveler’ (thornless)
<table>
<thead>
<tr>
<th>Selection</th>
<th>Preparation</th>
</tr>
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<tbody>
<tr>
<td>• Require full sun</td>
<td>• Should take place ONE YEAR BEFORE PLANTING</td>
</tr>
<tr>
<td>• Close to source of water (for irrigation purposes)</td>
<td>• Test soil</td>
</tr>
<tr>
<td>• Well drained soil</td>
<td>• Apply soil amendment as necessary</td>
</tr>
<tr>
<td>• Slightly acidic soil (pH 5.5-7.0)</td>
<td>• Eliminate weeds</td>
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<tr>
<td>• Moderately fertile soil</td>
<td>• Consider raised beds/ridges</td>
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<tr>
<td>• Test soil for harmful nematodes</td>
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</table>
Site Considerations

• Water availability: consider source of irrigation
  o Quantity and quality of water

• Previous use of site
  o Locate far from wild brambles
  o Avoid sites previously used for strawberries, tomatoes, potatoes, peppers, eggplants, or other brambles within the last 4-5 years
Site Considerations

• Soil
  o pH 5.5-6.5 and well drained
  o Soil samples 6-7”
  o Sufficient soil depth (~2ft)

• Air drainage: site should be elevated
  o Cold air falls while warm air rises – fewer spring frost problems
  o Reduces humidity
  o Protect from harsh winds
Soil Testing

• Collect the soil sample from the upper 6-7 inches of the soil profile

• Soil test report will include:
  o Soil pH, organic matter content, phosphorus, potassium, calcium, magnesium, micronutrients
  o Cation exchange capacity, neutralizable acidity
  o Soil pH and nutrient management recommendations

• For more information: [http://soilplantlab.missouri.edu/soil/](http://soilplantlab.missouri.edu/soil/)
Site Preparation: Soil Amendments

- Follow written directions from soil testing agency
- Soil amendments should be applied 6-12 months before planting
- Low pH modified with lime
- High pH modified with sulfur

**Example Report**

University of Missouri
Columbia, MO 65211

**SOIL TEST INFORMATION**

- pH: 4.1
- Phosphorus (P): 22 lbs/acre
- Potassium (K): 303 lbs/acre
- Calcium (Ca): 2691 lbs/acre
- Magnesium (Mg): 578 lbs/acre

**RATING**

- Excess

**LIMESTONE RECOMMENDATIONS**

- Alfalfa/Grass Establishment: 3
- Clover/Grass Establishment: 3
- Alfalfa/Grass Hay: 5
- Cool-Season Grass Pasture: 150 CD/A

To determine limestone needs in tons/acre, divide ENM requirements by the guarantee of your limestone dealer.

When N requirement for cool-season grass exceeds 90 lbs/acre, apply 2/3 of it during the period from December through February, and the remainder in August.

Do not use nitrogen on spring seedlings of legumes after May 1st because of potential weed competition.
Site Preparation

Building Up Organic Matter

• Best done before planting
• Cover crops - plant and incorporate into the soil
• Manure (8-10 tons/acre), chicken litter (23 tons/acre), compost (8-10 tons/acre) - apply in the fall
• Fresh organic matter should be applied at least 6 mo prior to planting; weathered organic material 2 mo prior to planting
Site Preparation

Weed Removal

• Eliminate perennial weeds—use herbicides before planting
• Cover cropping for 2 cycles can also help eliminate perennial weeds
Types of Planting Materials

• Tissue culture
  o All types of blackberry
  o May be actively growing or dormant
  o Virus tested
• Root cuttings
• Rooted suckers or tip layers
Planting

• Purchase virus tested plants from a reputable nursery
• Planting time
  o Dormant plants - plant in late March through early April
  o Growing tissue cultured plants - plant in early May (after danger of frost has passed)—require special care when acclimating
Other Planting Considerations

• Erect thorny and thornless: 8-10 ft apart between rows; 2-4 ft. between plants
• Semi-erect: 10-12 ft between rows; 6 ft. between plants
• To prevent erosion plant row middles with grass
• Be sure to leave space between rows for any needed equipment
• Water immediately after planting
Management

Irrigation

• Must have reliable source of irrigation: drip or trickle
• 1-1.5 inches per week from bloom to harvest
• After harvest adequate soil moisture is needed for good cane growth
Management

Nutrition

• Test soil annually to monitor soil pH
• Foliar samples are useful to:
  o Evaluate nutrient program
  o Diagnose nutritional problems
• Annual applications of nitrogen fertilizer (and possibly other nutrients) are necessary for high yields of quality fruit
**Management**

**Nutrition**

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<th>Analysis</th>
<th>Results</th>
<th>CL*</th>
<th>Units</th>
<th>ExLow</th>
<th>VenLow</th>
<th>VenMed</th>
<th>Med</th>
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*CL* is the critical level at which no additional nutrient (excluding nitrate-N, sodium, and conductivity) is recommended. **ppm = ppm/g kg

Sample received on: 10/15/2013
Printed on: 10/23/2013
Area Represented: 200 sq ft

**Fertilizer Recommended:**
- 1.9 lbs N/1000 sq ft
- 0 lbs P2O5/1000 sq ft
- 0 lbs K2O/1000 sq ft
- 0 lbs Ca/1000 sq ft
- 0 lbs Mg/1000 sq ft
- 0 lbs S/1000 sq ft
Management

Foliar Testing

• Sample most recently expanded leaves from primocanes
  o For floricane-fruiting: late July to early August
  o For primocane-fruiting: bloom to early red fruit
Management
Weed Control

• Eliminate perennial weeds before planting

• Between plant rows:
  o Maintain a plant cover in the row middle
  o Cultivation – beware of erosion

• Within row, between plants:
  o Mechanical weed control
  o Use of organic mulch
  o Weed barrier fabric with clump forming brambles
  o Herbicides
What is IPM?

• Integrated Pest Management
  1. Establish a plan
  2. Identify pest correctly
  3. Monitor pest/beneficial populations regularly
  4. Determine action threshold
  5. Choose proper management tactic
  6. Evaluate plan effectiveness
Midwest Small Fruit and Grape Spray Guide

• The guide includes information on blackberry pest management
• The Guide is updated annually
• Locate the Guide at:
  o hard copy from local Extension office
• Check the online guide regularly – labels change and the online guide is updated accordingly
Management

Diseases

Anthracnose
Management of Disease Rust
Management

Diseases

Spur blight or Stem blight

Stem Blight
Management

Diseases

Botrytis blossom & fruit rot

Crown gall

Photo Courtesy of UC Agriculture and Natural Resources
Management

Insect
Management

Insect

Raspberry crown borer
Management
Insects
Spotted wing drosophila
Management

Insects

Stink bug
Management
Pruning Erect Cultivars

• Trellis systems vary from none to elaborate
• Tip primocanes in May
• Pull out (not cut) unwanted suckers during growing season
• Early spring prune laterals to 12-14 inches; remove dead canes
Management
Pruning Primocane Cultivars

- Trellis systems vary from none to elaborate
- Primocanes are not tipped in May
- Remove floricanes following harvest
- Early spring remove the dead portion of last season’s primocanes
Management

Pruning Semi-Erect Cultivars

- Must provide trellis
- Tip primocanes when 6” above top wire
- In winter or early spring
  - select 8-10 of the strongest canes and tie to trellis
  - Remove additional canes and prune laterals to 18-24 inches
Management
Why Trellis?

• Trellising helps:
  o control plant size;
  o facilitate cultural operations,
  o stimulate lateral cane growth,
  o thin out weak canes,
  o alter fruiting time,
  o improve insect and disease control,
  o increase harvest efficiency,
  o make picking more enjoyable
Trellising Systems

Two Wire Trellis

• Advantages: Easy to build maintain, economical
• Disadvantages: lower yield, crowded canopy (increase disease) harvest more difficult
Trellising Systems

Supported Hedgerow

- Advantages: allows greater light penetration—higher yields; increase air circulation (reduce disease);
- Disadvantage: higher cost
# Trellising Systems

## Advantages
- Fruit harvest
  - Easy to harvest
  - All fruit one side of canopy
  - Less sunscald on fruit
- Winter protection is possible

## Disadvantages
- Expensive
- Harder to train and prune
Harvesting

• Harvest season mid-June through August (floricane crop); August-frost (primocane crop)
• Harvest fruit when black and dusty-ripe
• Pick daily or every other day
• Pick fruit when cool and dry (early morning but after dew has dried)
• Pick directly into sales container—shallow, half-pints to quarts
Labor Considerations

• Labor Availability
  o Labor intensive crop—particularly at specific times such as harvest
    ▪ 15-20 pickers may be required per acre during peak harvest
  o “Pick-your-own” may help with labor issue—but consider resident population and traffic near area
Mechanical Harvesting

- Not commonly done in Missouri
- Rows need to be 10-11 ft apart with 20 ft of space at the end of row for turning
- Mechanized harvesting only recommended for berries which will be further processed
- For small orchards, smaller pull-behind models
Post-Harvest Handling

• Blackberries very perishable - only a few days (up to 7 days when properly cooled and stored)
• Cool down immediately after picking
• Store at 32° F
Marketing

• Pick-your-own – public harvests the blackberries
• Prepicked, direct marketed fruit
  o Roadside stand or on-farm market
  o Farmers market
  o CSA
• Wholesale markets
  o Produce auctions
  o Food hubs
  o Institutions, grocery stores, restaurants
• Value added – jelly, sauces, juice, wine, dried or frozen fruit
• Social media, email, newspaper, radio – useful tools to build client base
• Agritourism opportunities
Investment

- Investment Costs
  - Significant investment occurs before plants mature and yield well to generate much revenue
  - Establishment costs = $6,000 to $10,000 per acre
  - Payback period = 4 to 5 years

### Typical Blackberry Costs and Revenue by Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
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<tbody>
<tr>
<td>Stage</td>
<td>Site Prep.</td>
<td>Planting</td>
<td>1st Crop Production</td>
<td>2nd Crop Production</td>
<td>3rd Crop Production</td>
<td>Full Production</td>
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<td>Revenue</td>
<td>$$</td>
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</table>
Economics

• Enterprise Budgets
  o Planning tool for estimating costs and revenue
    ▪ Gross revenue (selling price x quantity sold)
    ▪ Variable costs (fertilizer, chemicals, labor, water, supplies)
    ▪ Fixed costs (machinery, irrigation equipment, etc.)
  o Benchmark your actual costs vs. estimates over time
  o Analyze your cash flow needs by year and overall profitability for the blackberry enterprise
  o Is it a good business decision or not?

Blackberry Enterprise Budgets
Arkansas https://www.uark.edu/ua/cars/Subpages/Research/Food/high%20tunnel%20berries.html
Oklahoma State http://www.agecon.okstate.edu/budgets/index.asp
MS State http://www.agecon.msstate.edu/whatwedo/budgets/generator/index.asp
Additional Resources

• Additional Reading
• University of Missouri Extension Guides
• Freezing Berries
• State Fruit Experiment Station (MSU)
• Pest Management
• Pruning
• Additional Production Help
• Disease Control