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# Alternative Crops

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# Alternative Crops: What Are They?

- Crops that are less commonly grown
- In MN: crops other than corn, soybean, hay, and wheat



# Alternative Crops

- I. Why try an alternative crop?
- II. Preparing for an alternative crop
- III. Growing alternative crops



# Advantages of Diverse Rotations

- Biological and ecological benefits
  - Discourage pest and disease buildup
  - Fully use available resources
  - Improve soil health



Organic field peas



# Advantages of Diverse Rotations

- Management benefits
- Economic benefits



# Alternative Crops

- I. Why try an alternative crop?
- II. Preparing for an alternative crop
- III. Growing alternative crops



# Preparing for Alternative Crops

- 
- Exploring markets
  - Planning crop management
  - Reducing expenses and potential losses



# Exploring Markets

- Expect to put in more time and effort
- Seek out experienced growers
- DON'T plant a new crop assuming you can sell it later!



# Planning Crop Management



- Make a schedule of field operations
- Source specialized equipment
- Be aware of crop-specific quality standards



# Reducing Expenses and Losses

- Consider starting with a test plot
- Look into grants for startup costs



# Reducing Expenses and Losses

- Consider whole-farm insurance (USDA's Whole Farm Revenue Protection program)



# Alternative Crops

- I. Why try an alternative crop?
- II. Preparing for an alternative crop
- III. Growing alternative crops**



# Growing Alternative Crops



- A. Grain legumes
- B. Processing crops
- C. Alternative small grains
- D. Other grains

# Grain Legumes

## Dry Pea



## Field Bean



# Dry Pea: Overview

- Early planted, cool-season crop; harvested in July
- Biomass can contribute to soil N
- Food or feed types
  - Green or yellow color for food
  - Any color for feed







# Dry Pea: Production

- Plant as early as possible (not after May 15)
  - Inoculate seed with *Rhizobium*
  - Can survive frost after emergence
  - Sensitive to excess heat/moisture at flowering
- Control weeds with pre- or early post-emergence tine weeding
- Harvest by direct combining or swathing

# Dry Pea: Variety Selection

- Vining/leafy (indeterminate) or semi-leafless (determinate)
  - Choose semi-leafless types for less lodging and uniform maturity at harvest
- Disease resistance



# Dry Pea: Special Considerations

- Harvest considerations
  - Prostrate growth habit/lodging
  - Shattering



# Field Beans: Overview

- Also known as dry bean or dry edible bean
- Market classes include:
  - Black
  - Pinto
  - Navy
  - Great Northern



# Field Beans: Production



- Plant late May to early June
- Control weeds with cultivation before flowering
- Harvest by direct combining or windrow followed by combining
  - Damage to seed coat during harvest will lead to steep price discounts

# Field Beans: Variety Selection

- UMN research: black, pinto, and navy classes are less risky for MN organic growers
- Kidney and cranberry beans are higher risk



# Field Beans: Variety Selection

- Disease resistance
  - Rust
  - Anthracnose
  - Mosaic virus
  - White mold
  - Root rots
  - Bacterial blight



Bean plant infected with common bacterial blight

# Field Beans: Special Considerations

- Disease prevention
  - Bury residues and keep frequency in the rotation low
  - Source high quality, disease free seed





# Growing Alternative Crops



- A. Grain legumes
- B. Processing crops
- C. Alternative small grains
- D. Other grains

# Processing Crops

- Peas
- Snap beans (green beans)
- Sweet corn
- Used for freezing or canning





# Processing Crops

- Generally grown under contract with broker/processor
  - Markets may be geographically limited
  - Opportunities in southern MN
- Processor generally harvests and transports
  - Will schedule planting and harvest to suit their needs

# Processing Peas: Overview

- Also called green peas, canning peas
- Immature pea seed
- Southern Minnesota leads in processing pea production



# Processing Peas: Production

- Inoculate with appropriate Rhizobium
- Weed control as for field pea
- Harvested using specialized combine
  - Peas are shelled in field



# Processing Peas: Variety Selection

- Varieties may vary for canning vs. freezing
- Similar considerations to dry pea
  - Disease resistance
  - Semi-leafless varieties

Vining pea



Semi-leafless  
pea

# Processing peas: special considerations

- Similar considerations to dry pea
  - Prostrate growth habit can complicate weed control and harvest
  - Can contribute to soil N if well-nodulated



# Sweet Corn: Overview

- For fresh market (sale as whole ears) or processing (canning/freezing)
- Various genetic types
  - Normal sugary (su) is standard for processing
  - Supersweet ( $sh_2$ ) and sugary enhanced (se) for fresh market







# Sweet Corn: Production

- Plant when soil temps are appropriate
  - 55-60° F for *su* and *se* varieties
  - <60° F for *sh*<sub>2</sub>.
- Weed control options include cultivation, flame weeding, cover crop mulch
- Harvested using specialized machinery
  - Whole ears in husks are transported to processing facility



# Sweet Corn: Variety Selection

- White, yellow, or bicolor kernel color
  - Generally yellow for processing
- Several states conduct variety trials
  - Most conducted in conventional
  - WI organic trial (focus is fresh market varieties):  
<http://varietytrials.eorganic.info/node/736>
- Non-GMO varieties required for organic production

# Sweet Corn: Special Considerations

- Cross-pollination can affect crop quality
  - GMO contamination
  - Field corn or popcorn
  - Kernel color
- Separate from other corn varieties
  - >660 feet
  - >1 week, preferably 3-4



# Snap Bean: Overview

- Also called French beans or haricot beans
- Common bean (*Phaseolus vulgaris*) varieties selected for edible immature pods
- Tight processor specifications for pod and seed characteristics
  - May differ for canning vs. freezing



# Snap Bean: Production

- Alternate with non-legumes in rotation to prevent pathogen buildup
- Weed control includes stale seedbed, tine or flame weeding, inter-row cultivation
- Harvested using specialized equipment




# Snap Bean: Variety Selection

- Look for resistance to root rot and other pathogens
- Fast-canopying bush varieties for weed suppression



# Processing Crops: General Considerations

- 
- Processor contracts will specify practices
  - Quality standards are specific and exacting
  - Production and harvest constraints and risks
  - Know the terms of your contract

# Growing Alternative Crops



- A. Grain legumes
- B. Processing crops
- C. Alternative small grains**
- D. Other grains



# Alternative Small Grains

- Oat
- Barley
- Cereal rye
- Specialty wheats (einkorn, emmer, spelt)
- Triticale



Triticale seed

# Small Grains: Overview

Spring-planted	Fall-planted
Oat	Winter wheat/spelt
Barley	Winter rye
Spring wheat/spelt	Triticale
Spring rye	

- Growing markets for specialty and “ancient” grains
- Differing moisture, nutrient, and management needs
- Described in detail in Small Grains module

# Growing Alternative Crops



- A. Grain legumes
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# Other Grains

## Buckwheat



## Sorghum



## Sunflower




## Flax



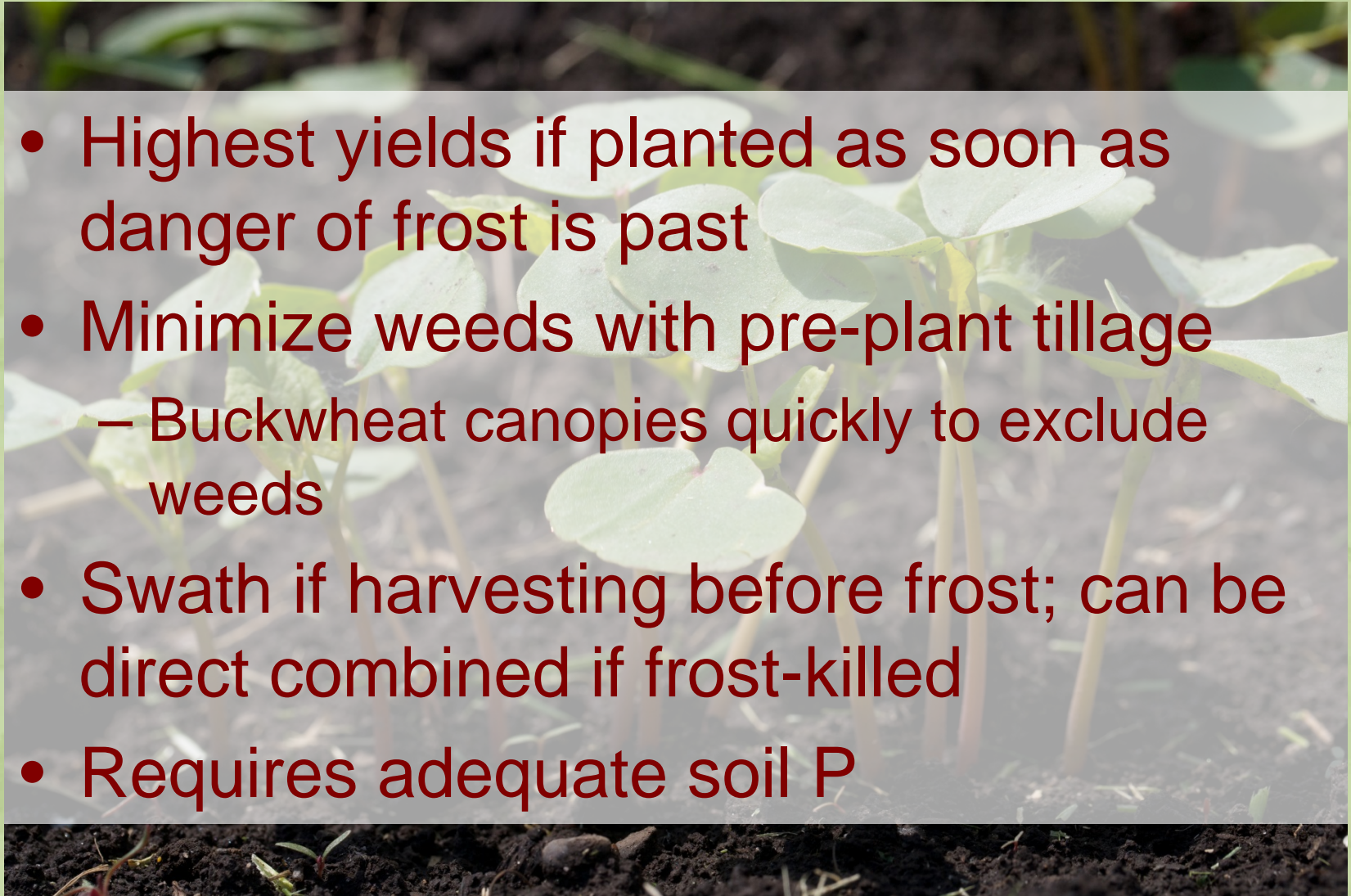
# Buckwheat: Overview

- Fast-growing annual
- Highly valued as green manure, smother crop for weeds
- Short growth period (10-12 weeks) allows flexibility in timing





# Buckwheat: Production

- 
- Highest yields if planted as soon as danger of frost is past
  - Minimize weeds with pre-plant tillage
    - Buckwheat canopies quickly to exclude weeds
  - Swath if harvesting before frost; can be direct combined if frost-killed
  - Requires adequate soil P

# Buckwheat: Special Considerations

- Grain may be difficult to sell
- Do not plant after small grains or flax
  - Volunteer seed will make buckwheat grain cleaning difficult



Buckwheat seed



Flax seed

# Sorghum: Overview

- Also known as milo
- Generally used in US for livestock feed; also can be food
- Thrives in hot weather; few disease or insect problems





# Sorghum: Production

- Plant mid-May to early June (soil temps 60-65° F)
  - Performs best in warm temperatures
  - Some varieties will not mature in Minnesota
- Fertility requirements are similar to corn
- Control weeds with stale seedbed or cultivation up to 6 inches tall
- Harvest by combining



# Sunflower: Overview

- Major types are oilseed and confectionary
- Most commercial varieties are hybrids
  - Some varieties require pollinators



# Sunflower: Production

- Plant when soil temps are  $<50^{\circ}$  F for uniform emergence
- Control weeds with pre-plant and pre-emergence harrowing, inter-row cultivation
  - Critical period is first 4 weeks
- Combine harvest using sunflower head attachment and seed pan



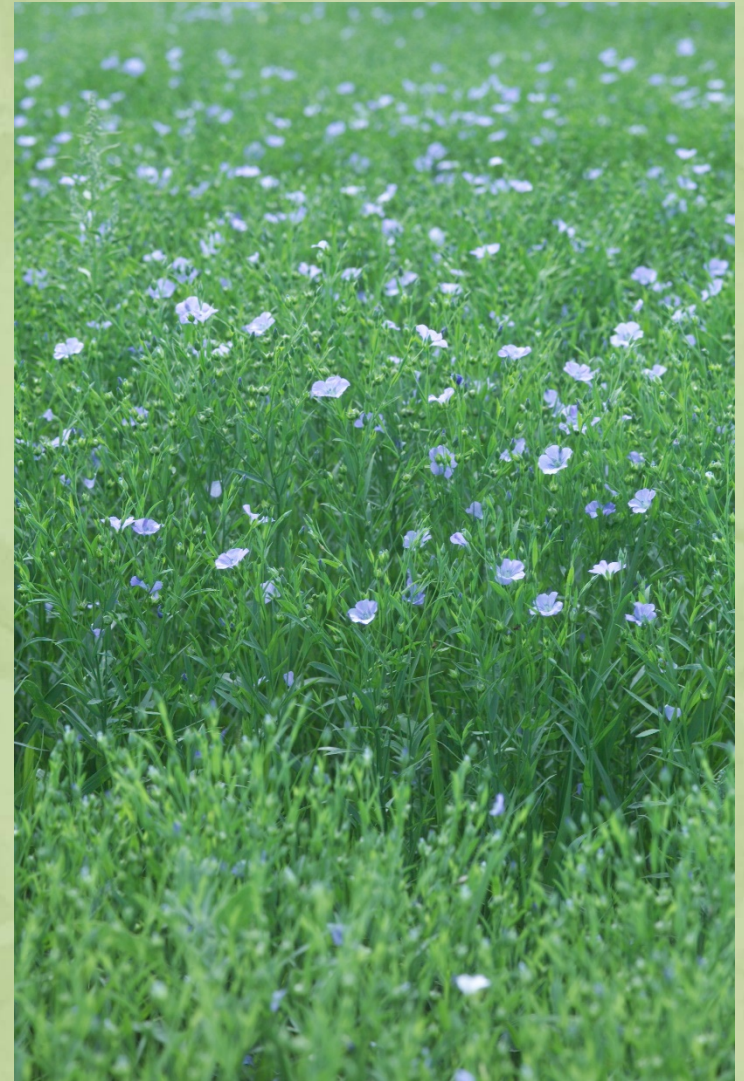
# Sunflower: Special Considerations

- Bird and insect predation can be issues



# Flax: Overview

- Cool season annual
- Oilseed and health food crop
  - Golden seed for food
  - Brown seed for oil





# Flax: Production

- Plant late April to early May for best yields
- Fertility requirements similar to small grains
- Weed control
  - Multiple pre-plant cultivations
  - Underseeding with clover or other forage
- Harvest by windrowing followed by combining

# Flax: Special Considerations

- Sensitive to poor drainage, excess moisture, and drought
- Extremely vulnerable to weed competition





# Summary: Risks of Alternative Crops

- Markets: DO NOT plant without ensuring market access
- Weed competition
- Weather vulnerabilities





# Summary: Rewards of Alternative Crops

- Strong consumer demand for certified organic
- Can select crops to suit conditions and constraints

# Approaching Alternative Crops

- Experiment at a small scale
- Consult with experienced growers
- Choose favorable land
  - Well-drained
  - Lower weed pressure



Amaranth overwhelmed by weeds

# Resources: Production Guides

- Dry pea
  - <https://hort.purdue.edu/newcrop/afcm/drypea.html>
  - <http://agresearch.montana.edu/wtarc/producerinfo/agronomy-nutrient-management/Pulses/NDSUFactSheet.pdf>
- Sunflower
  - [http://www.agmrc.org/media/cms/sunflower\\_guide\\_69AF73CC348B6.pdf](http://www.agmrc.org/media/cms/sunflower_guide_69AF73CC348B6.pdf)
  - <http://www.gov.mb.ca/agriculture/crops/production/print,sunflowers.html>
- Dry bean
  - <http://library.ndsu.edu/tools/dspace/load/?file=/repository/bitstream/handle/10365/17658/A-602-1990.pdf?sequence=2>.
  - <https://hort.purdue.edu/newcrop/articles/ji-beans.html>
  - <http://corn.agronomy.wisc.edu/Crops/FieldBean.aspx>
- Organic sweet corn
  - <https://content.ces.ncsu.edu/organic-sweet-corn-production>
  - <https://attra.ncat.org/attra-pub/viewhtml.php?id=31>
- Organic processing pea
  - <https://www.ces.ncsu.edu/redirects/pdfs.php?src=2013/12/pea.pdf>
- Alternative Field Crops Manual
  - <https://hort.purdue.edu/newcrop/afcm/index.html>



# Other Resources

- Organic variety trials (searchable by crop)
  - <http://varietytrials.eorganic.info/>
- List of companies offering organic grain production contracts
  - <http://non-gmoreport.com/articles/2017-non-gmo-and-organic-grain-production-contracts/>
- USDA Whole Farm Revenue Protection Program
  - <https://www.rma.usda.gov/policies/wfrp.html>
- Other modules in this series:
  - Marketing
  - Small grains
  - Economics of New Crops
  - Rotations
  - Preventing GMO Contamination



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