

The 12-Month Vegetable Garden


How You Can Enjoy a 365 Day Harvest




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Outline




- Section 1: Getting started
- Section 2: The wonderful world of vegetables
- Section 3: The winter vegetable garden

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Setting the Stage

- What are your goals?
 - A salad now and then
 - Growing a major part of your food
- What are your assets?
 - You – time and knowledge
 - Your growing space
 - Your living and storage space
- Do you have a network?



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Why Grow Your Own Vegetables


- Freshness
- Money savings
- Variety
- Health
- Activity
- Self sufficiency



Impact of a Vegetable Garden

- Lettuce – 3 spring salads, 8 fall salads
- Cucumbers – 118
- Green beans – 8.5 lbs
- Tomatoes – 218
- Bell peppers – 30
- Onions – 12 green + 13 small bulb
- Eggplant – 40
- Broccoli – 8
- Cabbage – 3
- Cauliflower – 5
- Radish – 5 bunches
- Herbs –
 - Basil – 8 bunches
 - Parsley – 11 bunches
 - Sage – 2 bunches
 - Rosemary – 1 bunch
- Flowers – zinnias (7 bouquets); sunflower (38)

Harvest from 4'x24' Bed



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The Harvest - Value

• Lettuce – 3 spring salads, 8 fall salads	\$20.06
• Cucumbers – 118	\$85.00
• Green beans – 8.5 lbs	\$14.36
• Tomatoes – 218	\$109.00
• Bell peppers – 30	\$20.70
• Onions – 12 green + 13 small bulb	\$3.38
• Eggplant – 40	\$15.92
• Broccoli – expected 8	\$7.16
• Cabbage – expected 3	\$4.14
• Cauliflower – expected 5	\$14.95
• Radish – expected 5 bunches	\$5.59
• Herbs –	\$24.85
– Basil – 8 bunches	\$19.92
– Parsley – 11 bunches	\$8.69
– Sage – 2 bunches	\$4.98
– Rosemary – 1 bunch	\$2.49
• Flowers – zinnias (7 bouquets); sunflower (38)	\$59.00

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What do You Need to Garden?

- A place to grow – sunlight, water, air, and soil
- Knowledge and time
- Hand tools – spading fork, hoes, shovel/space, trowels
- Power tools?
- Supplies – hoses, sprinklers, sprayer, hoops, row cover
- Nice things to have
 - Extra refrigerator
 - Freezer
 - Dehydrator
 - Pressure cooker
 - Vegetable storage areas

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Planning the Vegetable Gardening

- Sunlight
 - Full sun is best
 - You can grow veggies in the shade but...

Planning the Vegetable Gardening

- Sunlight
- Water
 - Vegetables need 1.5 to 2 inches of water per week
 - When to water
 - How to water



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Planning the Vegetable Garden

- Sunlight
- Water
- Air
 - Allow for good air movement around the garden
 - Allow for proper spacing among plants



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Planning the Vegetable Garden

- Sunlight
- Water
- Air
- Soil
 - Well drained
 - Not compacted
 - 3-5% organic matter
 - Moderate fertility
 - pH 5.5-7.0



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Planning the Vegetable Garden

- The soil test!
 - At the beginning
 - Every 2-3 years

University Extension		Soil Test Report		<table border="1"> <tr> <td>Field No.</td> <td>_____</td> <td>County</td> <td>_____</td> </tr> <tr> <td>Station</td> <td>_____</td> <td>Latitude</td> <td>_____</td> </tr> </table>		Field No.	_____	County	_____	Station	_____	Latitude	_____
Field No.	_____	County	_____										
Station	_____	Latitude	_____										
Soil Laboratory		Soil Location		<table border="1"> <tr> <td>Soil Depth</td> <td>_____</td> <td>Soil Name</td> <td>_____</td> </tr> <tr> <td>Soil No.</td> <td>_____</td> <td>Soil Type</td> <td>_____</td> </tr> </table>		Soil Depth	_____	Soil Name	_____	Soil No.	_____	Soil Type	_____
Soil Depth	_____	Soil Name	_____										
Soil No.	_____	Soil Type	_____										
Sample ID: RS234567 Garden		This report is for:		DATE TESTED: 10/25/2023 LABORATORY: SOIL TEST LAB ANALYST: J. DOE									
Lab Contact: John Doe		Submitted by: John Doe		TEST RESULTS: pH: 6.5 N: 0.15% P: 0.05% K: 0.20% Ca: 0.10% Mg: 0.05% S: 0.02% Cu: 0.001% Zn: 0.002% Fe: 0.01% Mn: 0.005% B: 0.001% Mo: 0.0001% Na: 0.001% Cl: 0.001% F: 0.001% Si: 0.01% Al: 0.01% Ti: 0.001% Cr: 0.001% Ni: 0.001% Co: 0.001% V: 0.001% As: 0.001% Se: 0.001% Br: 0.001% I: 0.001% Sr: 0.001% Zr: 0.001% Nb: 0.001% Hf: 0.001% Ta: 0.001% W: 0.001% Re: 0.001% Os: 0.001% Ir: 0.001% Pt: 0.001% Au: 0.001% Ag: 0.001% Hg: 0.001% Pb: 0.001% Bi: 0.001% Po: 0.001% At: 0.001% Rn: 0.001% Fr: 0.001% Ra: 0.001% Ac: 0.001% Th: 0.001% Pa: 0.001% U: 0.001% Np: 0.001% Pu: 0.001% Am: 0.001% Cm: 0.001% Bk: 0.001% Cf: 0.001% Es: 0.001% Fm: 0.001% Md: 0.001% No: 0.001% Lr: 0.001% Lu: 0.001% Yb: 0.001% Er: 0.001% Tm: 0.001% Y: 0.001% Sc: 0.001% Ti: 0.001% V: 0.001% Cr: 0.001% Mn: 0.001% Fe: 0.001% Co: 0.001% Ni: 0.001% Cu: 0.001% Zn: 0.001% Ga: 0.001% Ge: 0.001% As: 0.001% Se: 0.001% Br: 0.001% Kr: 0.001% Rb: 0.001% Sr: 0.001% Y: 0.001% Zr: 0.001% Nb: 0.001% Mo: 0.001% Tc: 0.001% Ru: 0.001% Rh: 0.001% Pd: 0.001% Ag: 0.001% Cd: 0.001% In: 0.001% Sn: 0.001% Sb: 0.001% Te: 0.001% I: 0.001% Xe: 0.001% Ba: 0.001% La: 0.001% Ce: 0.001% Pr: 0.001% Nd: 0.001% Pm: 0.001% Sm: 0.001% Eu: 0.001% Gd: 0.001% Tb: 0.001% Dy: 0.001% Ho: 0.001% Er: 0.001% Tm: 0.001% Yb: 0.001% Lu: 0.001% Hf: 0.001% Ta: 0.001% W: 0.001% Re: 0.001% Os: 0.001% Ir: 0.001% Pt: 0.001% Au: 0.001% Hg: 0.001% Tl: 0.001% Pb: 0.001% Bi: 0.001% Po: 0.001% At: 0.001% Rn: 0.001% Fr: 0.001% Ra: 0.001% Ac: 0.001% Th: 0.001% Pa: 0.001% U: 0.001% Np: 0.001% Pu: 0.001% Am: 0.001% Cm: 0.001% Bk: 0.001% Cf: 0.001% Es: 0.001% Fm: 0.001% Md: 0.001% No: 0.001% Lr: 0.001% Lu: 0.001% Yb: 0.001% Er: 0.001% Tm: 0.001% Y: 0.001% Sc: 0.001% Ti: 0.001% V: 0.001% Cr: 0.001% Mn: 0.001% Fe: 0.001% Co: 0.001% Ni: 0.001% Cu: 0.001% Zn: 0.001% Ga: 0.001% Ge: 0.001% As: 0.001% Se: 0.001% Br: 0.001% Kr: 0.001% Rb: 0.001% Sr: 0.001% Y: 0.001% Zr: 0.001% Nb: 0.001% Mo: 0.001% Tc: 0.001% Ru: 0.001% Rh: 0.001% Pd: 0.001% Ag: 0.001% Cd: 0.001% In: 0.001% Sn: 0.001% Sb: 0.001% Te: 0.001% I: 0.001% Xe: 0.001% Ba: 0.001% La: 0.001% Ce: 0.001% Pr: 0.001% Nd: 0.001% Pm: 0.001% Sm: 0.001% Eu: 0.001% Gd: 0.001% Tb: 0.001% Dy: 0.001% Ho: 0.001% Er: 0.001% Tm: 0.001% Yb: 0.001% Lu: 0.001% Hf: 0.001% Ta: 0.001% W: 0.001% Re: 0.001% Os: 0.001% Ir: 0.001% Pt: 0.001% Au: 0.001% Hg: 0.001% Tl: 0.001% Pb: 0.001% Bi: 0.001% Po: 0.001% At: 0.001% Rn: 0.001% Fr: 0.001% Ra: 0.001% Ac: 0.001% Th: 0.001% Pa: 0.001% U: 0.001% Np: 0.001% Pu: 0.001% Am: 0.001% Cm: 0.001% Bk: 0.001% Cf: 0.001% Es: 0.001% Fm: 0.001% Md: 0.001% No: 0.001% Lr: 0.001% Lu: 0.001% Yb: 0.001% Er: 0.001% Tm: 0.001% Y: 0.001% Sc: 0.001% Ti: 0.001% V: 0.001% Cr: 0.001% Mn: 0.001% Fe: 0.001% Co: 0.001% Ni: 0.001% Cu: 0.001% Zn: 0.001% Ga: 0.001% Ge: 0.001% As: 0.001% Se: 0.001% Br: 0.001% Kr: 0.001% Rb: 0.00									

The Basics of Vegetable Gardening

- Where to place the garden
 - Full sun
 - Close to a water source
 - Close to the house
 - Protected from winds



Site Problems

- Soil problems – compacted, heavy, poorly drained, rocky, pH issues
 - Soil amendments, especially compost
 - Provisions for drainage
 - Raised bed gardens



Site Problems

- Shortage of water
 - Irrigate with water efficient irrigation – soaker hose, drip hose
 - Use mulches



Site Problems

- Shortage of space
 - Edible landscaping – you CAN eat the flowers!



Site Problems

- Shortage of space
 - Container vegetable gardens
 - Large containers are best
 - Use soilless growing media
 - Watering important



Site Problems

- Shortage of space
 - Succession planting, companion planting

April 15 → May 15



Site Problems

- Shortage of space
 - Grow crops vertically



Site Problems

- Shortage of space
 - Grow miniature or non-vining cultivars



Planning the Vegetable Garden

- What should you grow?
 - Plant what you like to eat!
 - Consider that some vegetables require lots of resources (space, water, time) – corn, winter squash, sweet potatoes
 - How about a network of gardens?
- How much should you plant?
 - How much can you take care of?
 - What are your goals?

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Planning the Vegetable Garden

- Start with vegetables that taste good fresh!
 - Tomato
 - Asparagus
 - Sweet corn
 - Peas
 - Green beans
 - Lettuce
 - Summer squash
 - Green onions
 - New potatoes

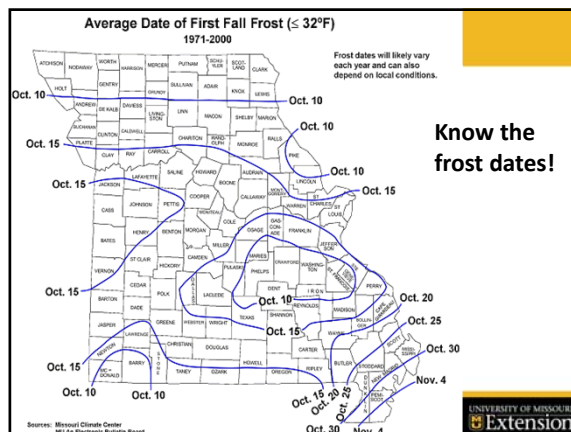
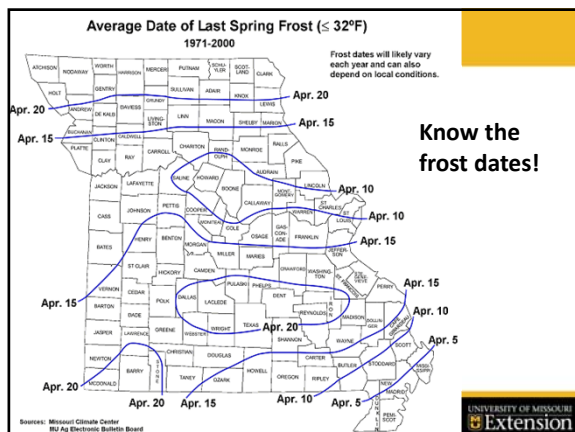


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Planning the Vegetable Garden

- Choose cultivars that will grow in your area
- Check out the MU Extension Vegetable Planting Calendar – see <http://extension.missouri.edu/explorepdf/agguides/hort/g06201.pdf>





Planning the Vegetable Garden

- Plant cool season vegetables at the proper time



Planning the Vegetable Garden

- Plant warm season vegetables at the proper time



Planning the Vegetable Garden

- Distribute your harvest over a longer period of time
 - Plant short, medium, and long season cultivars
 - Succession plantings
 - May 1 – Green bean planting 1
 - June 1 – Green bean planting 2
 - July 1 – Green bean planting 3
 - August 1 – Green bean planting 4



Planning the Vegetable Garden

- Know the days to harvest for your vegetables



Planning the Vegetable Garden

- Plant perennials in permanent homes out of the way
 - Asparagus
 - Rhubarb
 - Horseradish



Planning the Vegetable Garden

- Seed
 - Use fresh seed
 - Plant properly
 - Store unused seed
 - Saving seed?



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Planning the Vegetable Garden

- Why is crop rotation important?**
 - Rotation focuses on not planting vegetables in the same place in the garden for consecutive growing seasons
 - Benefits of rotation
 - Less problems with diseases that are found in the soil
 - Decreased insect problems
 - Utilize nutrients already in soil provided by previous crop

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Planning the Vegetable Garden

Planning rotations – remember the groups!

- Tomato and kin – tomato, pepper, eggplant, potato
- Vines – cucumber, squash, melons
- Roots – beet, carrot, turnip, radish, parsnip, onion
- Greens – spinach, lettuce, kale, Asian greens
- Cole crops – cabbage, broccoli, cauliflower, kohlrabi
- Beans – green bean, southern pea, english pea
- Herbs

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Planning the Vegetable Garden

Planning Rotations – Patrick's Garden

Rotation	Spring	Summer	Fall	Winter
1	Garlic	Garlic	Roots	Roots
2	Roots	Tomato/kin	Tomato/kin	Greens
3	Greens	Vines	Vines	Roots
4	Roots	Beans/misc	Cole crops	Greens
5	Greens	Spring roots/beans	Garlic	Garlic

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Planning the Vegetable Garden

Planning rotations – Year 1

Bed 1 Garlic – Garlic – Roots – Roots	Bed 4 Roots – Beans – Cole crops – Greens
Bed 2 Roots – Tomato – Tomato – Greens	Bed 5 Greens – Roots – Beans – Garlic
Bed 3 Greens – Vines – Vines – Roots	

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Planning the Vegetable Garden

Planning rotations

- Rotation 3 (greens-vines-vines-roots)
 - Previous fall – planted winter greens, harvest through winter and into current spring
 - Plant parsnip seed April 15 at end of bed, harvest in fall and winter
 - Plant cucumber April 1 (inside), May 1, and June 1; continuous harvest from June 15 to September 1
 - Plant zucchini May 1 and June 1, harvest July-August
 - Plant carrots July 15, harvest in fall and winter
 - Plant other winter vegetables as needed

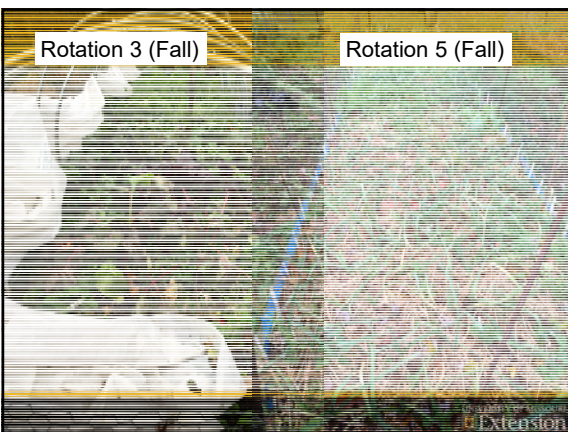
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Planning the Vegetable Garden

Planning rotations

- Rotation 5 (greens-spring roots/beans-garlic)
 - Previous fall – planted winter greens, harvest through winter and into current spring
 - Plant carrots, beets, radish on March 15, harvest June 1
 - Plant more carrots on April 1, harvest June 15
 - Plant green beans on April 15 (inside), May 1, June 1, and July 1; continuous harvest from July 15 to September
 - Plant garlic on September 15

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Planning the Vegetable Garden

Planning rotations

- Tuck-in plants
 - Herbs – great companion plants
 - Radish – short time from planting to harvest
 - Beets/turnips – eat entire plant when small
 - Leaf lettuce – eat when small
 - Onions – pull when small and enjoy as green onions
 - Flowers – habitat for pollinators

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Starting Seed Indoors



- Why?
- Vegetables to consider
- When should I plant?
- What should I plant in?
- What type of growing media?
- The process...
- Hardening off

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Starting Seed Indoors

- Why start seed indoors:
 - To get a jump on the season
 - To have transplants to fit into rotations
 - Best use of expensive seeds
 - Natural part of saving seed



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Starting Seed Indoors

- Vegetables to consider:

- Tomato
- Pepper
- Vine crops
- Cole crops
- Onions
- Chard, spinach, lettuce
- Herbs like parsley and basil



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Starting Seed Indoors

- When should I plant?

- Generally, plant 4-6 weeks before you plan to plant in the garden

- Example:

- Plant kohlrabi seed on March 1 for a planting date of April 1
- Plant cucumber and tomato seed on April 1 for a garden planting date of May 10
- Plant head lettuce and spinach on August 1 for a planting date of September 1

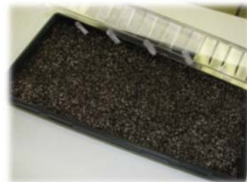


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Starting Seed Indoors

- What should I plant into?

- Sanitation is critical – use new containers, or sanitize reused containers (for a gallon of sanitizer, mix 1½ cups bleach with 14½ cups water)
- Planting containers
 - Flats or pans
 - Cell packs
 - Pots



Direct seeding into a flat

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Starting Seed Indoors



Seeding into cell packs



Seeding into pots

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Starting Seed Indoors

- The germination and growing media

- Sterile and fine texture
- Well drained but holds moisture
- Mixtures with soil – consider sterilizing (2 hours at 170°F)
- Soilless mixtures



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Starting Seed Indoors

- The process

- Plant seed at the proper depth
- Good germination depends on:
 - The right temperature
 - The right humidity
 - The right media moisture
- Water from below or use mist bottle



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Starting Seed Indoors

- Hardening off seedlings
 - Prepare seedlings for garden conditions:
 - Wind
 - Temperature fluctuations
 - Direct sun
 - Lower humidity
 - Gradually expose seedlings to outdoor conditions



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Planting Seed Outdoors

- Plant at the proper time
- Plant at the proper depth
- Plant at appropriate density
- Avoid crusting of the soil – mist daily



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Planting Seed Outdoors

- Germination time varies
- Thinning may be necessary
- Planting plan
 - Plant seed in rows – space rows appropriately
 - Plant seed in beds
 - Proper spacing can be a challenge



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Planting Transplants

- Purchasing transplants can save time and energy
- Purchase good quality transplants
 - Disease/insect free
 - No nutrient issues
 - Well grown
 - Not leggy or over-mature



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Planting Transplants

- Plant in the garden at the proper time
 - Remember frost dates!
 - Remember soil temperature!
 - Don't plant too early!



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Preparing a New Garden Site

- Destroy perennial weeds
- Amend the soil as directed by soil test
- Apply compost
- Turn or till the soil initially



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What About Raised Beds?



- Excellent growing environment
- Well suited for 12 month gardening
- Build out of durable materials

Garden Layout Tips

- Plant perennials together on one side of the garden or in a different spot to avoid interference with working.
- Group quickly maturing crops together or plant them between rows of crops that mature later. (Interplanting/Succession)
- Plan the distance between rows according to cultivation methods. No sense in planting if you can't get between the rows!

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Pest Control/Prevention

- Dispose of crop residue (leftovers)
- Rotate Crops
- Use "treated" seeds
- Use "resistant" varieties
- Purchase healthy transplants
- Use limited chemicals if necessary

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The Wonderful World of Vegetables



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Vegetable Classification

- The part that you eat
 - Root Crops- carrots, onions, radishes, turnips, parsnips, rutabaga
 - Green part (stems, flowers, leaves, immature fruits) – lettuce, cabbage, greens, broccoli, okra, asparagus
 - Fruits and berries – tomatoes, peppers, eggplant, squash, melons, corn

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Vegetable Classification

- Season of production
 - Cool season
 - Spring
 - Fall
 - Warm season
 - Summer

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Vegetable Classification

- Life cycle
 - Perennial
 - Annual



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Vegetable Classification

- Family relationships
 - Cole crops - broccoli, cauliflower, cabbage, brussel sprouts, kale, collards, radish, turnip
 - Alliums - onion, garlic, leek, shallot
 - Legumes - peas, beans
 - Vine Crops - pumpkins, squash, melons, cucumbers
 - Solanaceous crops - tomato, potato, eggplant, pepper
 - Other - lettuces, sweet potato, corn, okra, asparagus, rhubarb



Cole Crops

- All members of the mustard family, *Brassicaceae*, and of the genus/species *Brassica oleracea* L.
 - *B. oleracea* var. *capitata*: cabbage
 - *B. oleracea* var. *botrytis*: broccoli, cauliflower
 - *B. oleracea* var. *caulo-rapa*: kohlrabi
 - *B. oleracea* var. *gemmifera*: brussels sprouts
 - *B. oleracea* var. *acephala*: collards, kale

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Cabbage

- Cabbage types
 - Green
 - Red
 - Savoy



Broccoli, Cauliflower, Brussel Sprouts, Kohlrabi



Leafy Cole Crops

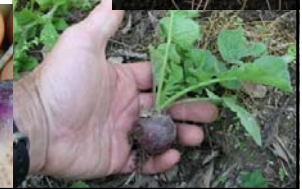
- Kale
- Collards
- Bok choy
- Mustard



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Root Cole Crops

- Radish
- Turnip
- Rutabaga



Cole Crops

- Culture
 - Most are cool season crops, doing best in temperatures of 60-65° F; grow for spring or fall crops
 - Most will not tolerate hot temperatures – bolt, develop strong flavors, refuse to develop

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Cole Crops

- Culture
 - Well drained soil, with pH of 6.5-7.5
 - Often grown as transplants (broccoli, cabbage, Brussels sprout, cauliflower), also grown from seed (kohlrabi, chinese cabbage, radish, kale, collards)
 - Plant transplants 2 weeks before last frost date (April) (for spring crop) or August 1 (for fall crop)
 - Don't plant after other cole crops
 - Heavy nitrogen feeders
- Challenges
 - Cabbage worm complex
 - Insect netting
 - Bt or other insecticides



Legumes

- English peas
 - Standard peas
 - Edible pod peas



Legumes

- Green beans
 - Bush beans
 - Pole or vine beans
 - Green, yellow, purple



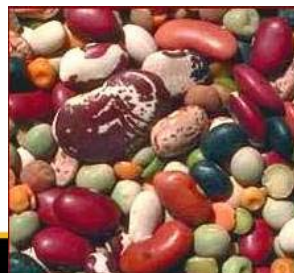
Legumes

- Southern peas
 - Black eyed peas
 - Purple hull peas



Legumes

- Many different types of seed beans!
 - Lima
 - Navy
 - Kidney



Legumes

- Culture
 - Warm season (green beans, beans, southern peas) and cool season (English peas)
 - Usually direct seeded
 - Harvest before seed is mature (green beans, English peas, southern peas) or when seed is mature and dry (beans)

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Alliums

- Bulb onions
 - White
 - Red
 - Yellow
- Shallots



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Alliums

- Garlic
 - Soft neck
 - Hard neck
 - Elephant garlic



Alliums

- Bunching onions
- Leeks
- Chives



Alliums

- Cool season crops
- Most are grown from sets (small plants) or bulbs
- Often planted in spring for harvest in summer and fall (garlic is exception, planted in fall)
- General culture
 - Well drained soil
 - pH 5.5-7.0
- Challenges
 - Bulb rots
 - Bulbs that don't keep

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Root Crops

- Carrot
- Parsnip
- Salsify
- Beet



Root Crops

- Culture
 - Most are cool season crops; optimum temperature: 60-70° F
 - Most are direct seeded
 - Most do best in lighter soils
 - Harvest when large enough to eat

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Greens

- Lettuce (many types)
 - Leaf lettuce
 - Head lettuce
- Specialty greens



Greens

- Chard
- Spinach



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Greens

- Culture
 - Most are cool season crops
 - Usually direct seeded; sometimes transplants are used
 - Shallow rooted and fast growing
 - Preferred pH 6.0-6.8
 - Grows best when temperatures are between 65-75°F during day & 40-45°F at night
- Challenges
 - Bolting (premature flowering) can be a problem



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Asparagus



Asparagus

- Culture
 - Perennial cool season vegetable
 - Deep rooted
 - Direct seeding is not recommended; plant crowns; greenhouse grown transplants can be used
 - Male cultivars are superior

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Rhubarb

- Types of rhubarb
 - Red stalks
 - Green stalks



Rhubarb

- Culture
 - Cool-season perennial
 - Leaf blades contain a toxin called oxalic acid and are not edible!
 - Prefers well-drained soil & high organic matter
 - Can be grown from seed, but best to plant crowns
 - Fall is the best time to divide

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Vine Crops

- Squash
 - Summer
 - Winter
- Pumpkin
- Melon
 - Cantaloupe
 - watermelon
- Cucumber
- Gourd




Vine Crops

- Culture
 - Warm season crops
 - Usually direct seeded (can use transplants for earlier crop)
 - Often planted in hills
 - Vine types and bush types
 - Harvest at proper time
- Challenges
 - Insect pests
 - Diseases




Tomato

- Fruit characteristics
 - Color
 - Use
 - Heirloom vs standard




Pepper

- Fruit characteristics
 - Bell peppers
 - Banana peppers
 - Hot peppers



Eggplant (Aubergine)


- Fruit characteristics
 - Oval
 - Asian
 - Fruit colors
 - Purple
 - White
 - Striped



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Tomato, Pepper, Eggplant


- Culture
 - Warm season crops
 - Often started from transplants
 - Optimum temperature: 65-85° F
 - 65° nights are ideal
 - Temps >90° affect fruit set
 - Fruit ripening: temps >85° inhibits lycopene (red pigment in tomatoes)
 - Trellis or stake tomato plants to increase garden space and produce better crops.
 - Harvest when fruit is fully developed
- Challenges – diseases, insects



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Potato

- Tuber characteristics
 - Harvest season – early, midseason, late
 - Flesh color
- Intended use
 - Baking
 - Boiling
 - General purpose
 - Storage



Potato

- Culture
 - Cool season crop
 - Plant from tubers or parts of tubers
 - Plant mid-March through April
 - Excessive nitrogen delays tuber formation
 - Can dig for new potatoes when flowers form
 - Allow vines to die back before digging for storage
- Challenges – Colorado potato beetle

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Sweet Corn

- Types of sweet corn
 - su cultivars (standard)
 - se cultivars (sugar enhanced)
 - sh₂ cultivars (super sweet)
 - Yellow, bicolor, and white



Dried Corn

- Popcorn
- Ornamental corn



Sweet Corn

- Culture
 - Warm season crop
 - Usually direct seeded
 - Plant enough to allow for pollination
 - Optimum temperature: 56-86° F
 - Needs plenty of nitrogen
 - Moisture is critical during silking & ear dev.
 - Preferred pH: 6.0-6.5
 - Harvest when kernels are developed but before starchy taste (sweet corn) or after the ears have dried (dry corn)
- Challenges – corn earworm

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Sweet Potato

- Culture
 - Warm-season crop; very cold-sensitive
 - Plant slips – shoots that grow from the root
 - Optimum temperature: 70-85
 - Optimum pH: 5.8-6.0
 - Grow in raised beds to avoid poor yields
 - Harvest before frost, or cut off frosted vines



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Okra



- Culture
 - Warm season crop
 - Harvest pods when small

Herbs

- Mint family (Lamiaceae)
 - Spearmint, peppermint, other mints
 - Basil
 - Rosemary
 - Lavender
 - Thyme
 - Sage
 - Marjoram, oregano



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Herbs

- Carrot family (Apiaceae)
 - Parsley
 - Dill
 - Anise
 - Caraway
 - Cilantro



The Winter Vegetable Garden



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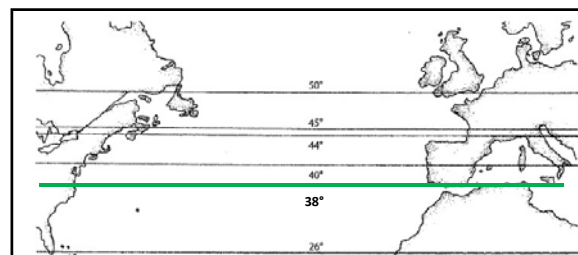
Outline

- Introduction
- Extending the season with garden structures
- Cool season vegetables



Introduction

- Keys to success
 - Select your site very carefully
 - Select the most cold tolerant crops
 - Cover your crops



- Winter vegetable gardening has been successful in Maine and France at 44th parallel
- Missouri is located on the 38th parallel, and gets as much winter sun as Spain, southern Italy, Greece, or Turkey



Introduction

- Choosing a site
 - South facing sites are preferred
 - A slope to the south is good
 - Prevent wind chill if possible, especially from the north
 - Hedges, windbreaks
 - Fences or walls
 - Avoid low lying areas where cold air sinks
 - Locate near a heat sink source – patio, stone wall, brick wall
 - Shady summer sites may have enough sun during the winter – fallen leaves, different sun angle

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Introduction

- Grow winter crops to harvestable size by mid/late fall
- Plant more than you think you need
- Crops grow very little in the winter months December-January
- February – crops will start to grow again
- Crops may be held at harvestable size for many months with protection

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Plant Covers

- Plant covers work by:
 - Trapping the sun's heat during the day
 - Trapping heat in the ground at night
 - Additional heat sinks (walls, insulation) provide additional heat
- Minimal water needs during the winter
- Minimal pest pressure during the winter



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What temperatures can I expect in my protective structures?

Sample nighttime low temperatures (°F)			
Outside	Cold Frame	Tunnel	Double Coverage
-10	6	4	18
0	14	11	25
18	28	24	36

Sample daytime high temperatures, unvented (°F)			
Outside	Cold Frame	Tunnel	Double Coverage
Sunny day			
5	60	42	78
20	75	60	85
Cloudy day			
30	45	45	60

High Tunnels

- High tunnels are larger version of low tunnels made with a poly-cover
- Require a rigid frame
- With a greater ground cover and volume of air
 - keep in more heat
- Able to get into on very cold days if a door is built
- Harvest during the day when temperatures are not freezing





Plant Covers

- **Cold frames, hotbeds**
 - Location is important
 - Frame will stay closed most of the time
 - Harvest during the day when temps are above freezing



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Plant Covers

- **Low tunnels**
 - Use poly covers or row covers (consider 2 layers)
 - Harvest during the day when temps are above freezing



Low Tunnel Construction (For a 2' wide by 18' long planting bed)

- Hammer ten, 2 ft. long pieces of 3/8 in. rebar, 10 inches into the ground along each side of the planting row.
- Drive the rebar 10-12" into the ground, leaving about 14" above ground. The five sets of rebar are there to support five pvc bows. To give the first and last plants a little extra room add one foot to each end of the low tunnel. This gives a 5-ft. space between the 1st and 2nd bows and the 4th and 5th bows, and 4-ft. spacing between the 2nd and 3rd, and 3rd and 4th bows.



Low-Tunnel Construction

- Cut ten, 10 ft. long pieces of 1/2 in. pvc water pipe into 8 ft. long pieces and slide them over the rebar to make five bows.
- Connect the bows at the top with stretchy clothesline and along each side with some nylon twine.
- Cut and drape a piece of 22 ft. long X 10 ft. wide row cover over the frame, and secure it to the ground with sod pins, bricks or boards.



The Low Tunnel in Fall - Winter

- Plant your fall crop in the open or under shade cloth
- Once temperatures drop below ideal, install the low tunnel
- Keep the low tunnel installed till maturity
- 2-8 degrees of frost protection, depending on thickness
- May need to vent on warmer days



Good for any fall crop that need more time to mature or to keep summer crops producing longer

Plant Covers

- Passive solar greenhouse



<http://bradford.cafnr.org/search/passive+solar+greenhouse>

Plant Covers

- Row covers
 - Single or double layers of polypropylene



Germination/Growing Temperatures

Crop	Min Germ. Temp.	Optimum Range Germ. Temp.	Growing Temp. Range	Growing Temp. Optimal Range	Hardy to
Parsnip	35 F	50-70 F	40-75 F	60-65 F	5 F
Arugula	35 F	45-70 F	40-75 F	60-70 F	5 F
Spinach	35 F	45-75 F	40-75 F	60-65 F	8-12 F
Cabbage	40 F	45-95 F	40-75 F	60-65 F	12-20 F
Beet/Chard	40 F	50-85 F	40-75 F	60-65 F	15-25 F
Lettuce	35 F	40-80 F	45-75 F	60-65 F	20-25 F
Pea	40 F	40-75 F	45-75 F	60-65 F	18-25 F
Cucumber	60 F	60-95 F	60-90 F	65-75 F	32 F
Eggplant	32 F	75-90 F	65-95 F	70-85 F	32 F
Tomato	50 F	60-85 F	65-95 F	70-75 F	32 F

Cool Season Vegetables

- Characteristics of cool season vegetables
 - Optimum germination and growth occurs during cool temperatures
 - Ability to tolerate **light** frosts, or even hard freezes with protection
 - Poor growth during periods of hot temperatures
 - Some crops require cool weather to establish, but are generally not planted for fall/winter gardens
 - Onions and potatoes

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Cool Season Vegetables

- Cool season vegetables
 - Root crops - Radishes, turnip, rutabaga, carrots
 - Garden or English peas
 - Lettuce, spinach, chard
 - Cole crops




Root Cole Crops

- Radish
- Turnip
- Rutabaga




Root Crops

- Carrot
- Parsnip
- Salsify
- Beet



Greens

- Lettuce (many types)
 - Leaf lettuce
 - Head lettuce
- Specialty greens



Very Hardy Greens



Arugula (Rocket, Italian Cress)

Green Chicory (Italian Dandelion)

Claytonia (Miners Lettuce)

Endive (Frisée)

Dandelion

Escarole (Batavian Endive, Batavia, Scarole)

Very Hardy Greens



Kale

Maché (Corn Salad, Lamb's Lettuce, Lamb's tongue, Field Lettuce)

Mizuna (Japanese Greens, Spider Mustard)

Radicchio (Red Italian Chicory, Chioggia)

Sorrel (Also all green varieties)

Tat Soi (Spoon Cabbage)


Greens

- Chard
- Spinach



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Kale



Lacinato kale

Russian kale

Siberian kale

Curly kale

Its All About Scheduling

Vegetable	Planting Date
kohlrabi – winter	1-Jul
kale – winter	5-Jul
carrots – winter	15-Jul
kale – winter	20-Jul
chard - winter	1-Aug
lettuce - winter	1-Aug
lettuce - winter	20-Aug
pak choi	20-Aug
beets - winter	1-Sep
spinach	1-Sep

This is what your garden should look like as winter approaches!



Managing Row Covers in Winter

- Have hoops in place in October
- Cover plants with row cover when temperatures drop below freezing
 - One layer for temperatures between 20 – 30°F
 - Two layers for temperatures below 20°F
 - Remove row covers when temperatures are above 30°F

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October 25, 2015



January 18, 2016

Storing Fresh Vegetables

- Important considerations
 - Temperature
 - Relative humidity
- Cool and humid – root crops, potato
- Cool and dry – onion, dried vegetables
- Warm and humid – sweet potato
- Warm and dry – winter squash, garlic, pumpkin

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Putting Vegetables By

- Freezing
 - Quick and easy
 - Preserves flavor and nutrition
 - Blanching may be needed
 - Expensive
 - What happens if you lose power?



Putting Vegetables By

- Canning
 - Great for long term storage
 - Must be done properly to ensure safety
 - Changes to flavor and some loss of nutrients/vitamins



Putting Vegetables By

- Drying
 - Dehydrator (or other energy source)
 - Finished product does not take up much space
- Pickling, fermenting



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