# **Vegetable Gardening**

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# 5 Things, and some backup

- Light
- Soil
- Water
- Space
- Time/Temperature
- What can will go wrong and what to do about it
- Resources

## Light requirements

- Full sun: 6+ hours blasting sun with some of that in the middle of the day
  - Vegetables for full sun all
- Partial sun: 4-6 hours of sun, not all during the middle of the day
  - Vegetables for partial sun salad greens, soup greens, cabbage family, roots, onion family
- Partial shade: 2-4 hours of sun, none of it during the middle of the day
  - Vegetables for partial shade salad greens, soup greens
- Light shade / dappled shade: Less than 2 hours of direct sun, but some scattered rays of sun coming through light foliage
  - Vegetables for dappled shade salad greens
- Full shade: No direct sun at all the north side of buildings or walls
  - Vegetables for full shade none

Light levels change during the growing season – sun height, leaf canopy





## Vegetables in some shade

- Leaves require the least light, then roots, then flowers, then fruit
- Small fruit requires less sun than big fruit cherry tomatoes, not beefsteak
- Most places have more sun in spring and fall than summer – consider focusing on cool season crops (peas, brassicas, salad greens)
- Other alternatives:
  - Container gardening moving the containers around into patches of sunlight
  - Gardening away from home at a community garden
  - Gardening inside with supplemental light but find out a lot about pollination!

### Make sure there's access to water

- Rainwater generally needs to be supplemented
- Town / well water some towns have watering restrictions
- Rain barrels
  - Not always easy to collect rainwater near the garden (need a roof)
  - 1" of rain on an 8'x8' shed generates almost 40 gallons!
  - Can use for regular hose or to fill watering can
  - Need supplementary pump to drive water through soaker hose
- Watering cans
  - 1" of water on an 8'x4' raised bed is about 20 gallons
  - 20 gallons of water weighs 167 pounds

## Providing water

- Most vegetables need a minimum of 1" of water per week
  - Watery fruits may need more (e.g. watermelon)
  - Water established plants once per week during drought
  - Water seedlings, new transplants more often
- Drip irrigation / soaker hoses are the best
  - Keeping leaves dry reduces disease
  - Keeping soil from splashing on leaves reduces disease
  - Drip irrigation is more targeted and evaporates less than sprinklers – wastes less water
- Overhead sprinklers are the easiest
  - Can see the coverage
  - Few sprinklers can cover a large area

## Get a soil test!



- Same:
  - Variety
  - Seed pack
  - Planting day
  - Planting person
  - Planting Depth
- Different: pH
  - Green plant: 6.1
  - Yellow plant: 5.3

### **Nutrient Availability**



https://growappalachia.berea.edu/2019/05/02/feeding-your-plants/

# Middle of 1<sup>st</sup> page – what's in your soil

Analysis	Value Found	Optimum Range
Soil pH (1:1, H2O)	5.3	
Modified Morgan extractable, ppm		
Macronutrients		
Phosphorus (P)	4.8	4-14
Potassium (K)	62	100-160
Calcium (Ca)	403	1000-1500
Magnesium (Mg)	51	50-120
Sulfur (S)	10.5	>10
Micronutrients *		
Boron	0.1	0.1-0.5
Manganese (Mn)	2.8	1.1-6.3
Zinc (Zn)	1.9	1.0-7.6
Copper (Cu)	0.3	0.3-0.6
Iron (Fe)	14.8	2.7-9.4
Aluminum (Al)	117	<75
Lead (Pb)	1.3	<22

<u>Lead (Pb)</u>

- < 100 ppm (parts per million)
  - No action required
- 100 ppm 300 ppm
  - Avoid bare soil if there are children around who may eat soil
  - Wash or peel any edibles grown in the soil
  - Grow for fruit rather than roots or leaves
- > 300 ppm
  - Cover (e.g. lawn, mulch), and/or
  - Remediate (pH > 6.5, add compost), or
  - Remove

# 2<sup>nd</sup> page – what to do

# UMass Extension

#### Soil and Plant Tissue Testing Laboratory

203 Paige Laboratory 161 Holdsworth Way University of Massachusetts Amherst, MA 01003 Phone: (413) 545-2311 e-mail: soiltest@umass.edu website: soiltest.umass.edu



#### CENTER FOR AGRICULTURE

#### Recommendations for Home Vegetable (mixed)

Limestone (Ta	rget pH of 6.5)	Nitrogen, N		Phosphorus, P2O5	Potassium, K2O
			lbs / 100 sq ft		
20		.253		0.2	0.25

#### Comments:

For instructions on converting nutrient recommendations to fertilizer applications in home gardens, lawns and landscapes, see Reference "Step-bv-Step Fertilizer Guide for Home Grounds and Gardening" (listed below).

Recommendation: Add	20 # lime .253 # nitrogen .2 # phosphorus .25 # potassium	per 100 square feet





# Fertilizer

- 3 numbers on each bag
  - N-P-K
  - Nitrogen Phosphorus Potassium (always in that order)
- Numbers are the percent of that element in the fertilizer by weight
  - 50 pound bag of 14-14-14
    - 14% nitrogen 7# nitrogen
    - 14% phosphorus 7# phosphorus
    - 14% potassium 7# potassium
  - 30 pound bag of 12-32-06
    - 12% nitrogen 3.6# nitrogen
    - 32% phosphorus 9.6# phosphorus
    - 6% potassium 1.8# potassium

## Improve your soil / Fertilize

- Start with rich soil lots of organic matter
- Add more organic matter every year
- Fertilizing schedule
  - When planting seedlings in cold soil, consider adding liquid fertilizer
  - When plants start blooming, consider adding liquid fertilizer or side-dressing with granular
  - If it's really rainy, consider fertilizing again
- What to use
  - Plants don't thrive on an exclusive diet of synthetic fertilizer
  - Compost + organic fertilizer is an option
  - Compost + synthetic fertilizer is also good
- Keep soil covered in winter either cover crops or mulch



#### Space



Flat



**Raised Planters** 



#### Raised beds

#### Containers

### How much to grow

- Generally "how much can I fit?" rather than "how much can I use?"
- Agricultural model
  - 36 inch wide "beds" with "rows"
  - Rows per bed, separation in row, separation between rows
  - One crop per bed at a time
    - Or maybe some underplanting of compatible crops
- Square foot gardening
  - Number of each kind of plant that can fit in a square foot.

### Some comparisons

Сгор	Agriculture	Square Foot
Basil	3 rows per bed, 12" spacing within rows, 12" spacing between rows	1 or 4 per square foot Equiv. spacing 6"-12"
Carrots	3 rows per bed, 2" spacing within row, 12" spacing between rows	16 per square foot Equiv. spacing 3"
Lettuce	3 rows per bed, 9" spacing within row, 12" spacing between rows	4 per square foot Equiv. spacing 3"
Summer Squash	2 rows per bed, 24" spacing within row, 18" spacing between rows	1 per square foot Equiv. spacing 12"
Tomatoes	2 rows per bed, 24" spacing within rows, 30" spacing between rows	1 per 4 squares Equiv. spacing 24"

### Timing is based on "last frost date"



50% last frost date from derived from "NCDC freeze frost"

### Soil temperature matters too

#### Lettuce

Germination temperature: 40 F to 85 F - Seed can go dormant at high temperatures. Best germination is below 70 F.

Days to emergence: 7 to 14 - Germinates in about a week at 50 F, 2 days at 70 F.

Seed can be saved 1 year.

#### Peppers

Germination temperature: 70 F to 95 F - Will not germinate below 55 F. Days to emergence: 7 to 10 - at soil temperatures around 85 F. Seed can be saved 2 years.

#### Borrow someone else's schedule

#### 2021 Robbins Farm Garden Gantt Chart

	XXX )	XX XX	X Fail	ed cro	р					Indo	ors o	r nurs	ery be	ed		In main garden								Harvesting in garden								
CROR	MAR	CH (3)		APRI	L (4)	2	MA	Y (5)	2	4	JUNE	E (6)	2		JULY	(7)	2		AUGU	JST (8)	4	SEP	TEMB	ER (9	)	ОСТО 1	BER	(10)	. 1	NOVEN	ABER	(11)
ARTICHOKE		2	, 4		2			2	2	4	1	2	3		1	2	3		1	2 3	**		2	2	4	1	2		<u> </u>	1 4	2	<u> </u>
ARUGULA (1) ARUGULA (2) ARUGULA (3) ARUGULA (4)							ľ																									
BASIL							+		_																							
BEANS, Bush BEANS, Pole (after Peas) BEANS, Dried (3 Sisters)							RP	RP																								
BEETS																																
BOK CHOY (1) BOK CHOY (2)																																
BROCCOLI (1) BROCCOLI (2)					_																											
BRUSSELS SPROUTS																													¢			
CABBAGE (1) CABBAGE (2)																																
CANTALOUPE																																
CARROTS																																
CAULIFLOWER (1) CAULIFLOWER (2)																																
CELERY			_																								l					
CILANTRO (1) CILANTRO (2)																																
COLLARDS																																
CORN																																

## Direct sowing versus planting seedlings

#### Must direct sow

- Long roots (carrots, parsnips)

#### Usually direct sow

- Corn
- Leaves (arugula, basil, cilantro, dill, lettuce, spinach)
- Legumes (beans, peas)
- Round roots (beets, turnips)

#### Must start inside

- Celery
- Alliums (leeks, onions)
- Solanaceous (eggplant, peppers, tomatoes)

#### Usually started inside

- Parsley

#### No preference

- Brassicas (broccoli, cabbage, cauliflower)
- Cucurbits (cucumbers, melons, squash)
- Okra

http://extension.missouri.edu/p/G6570 includes a nice table of when to start what

### Resources

- Production:
  - Cornell Vegetable Growing Guides (http://www.gardening.cornell.edu/homegardening/sceneb771.html)
  - New England Vegetable Growing Guides (https://nevegetable.org/crops)
- Disease resistance:
  - Web search of disease trials
- Variety / Timing / Flavor
  - Seed Savers Exchange (9,153 tomato listings versus 134 in Johnny's)
  - Cornell Vegetable Varieties (<u>http://vegvariety.cce.cornell.edu/main/login.php</u>)
  - All American Selections

## What can go wrong









# Mulch

#### • Goal

- Conserve moisture
- Keep soil cool
- Prevent soil from splashing onto leaves
- Provide organic matter
- Prevent / reduce erosion
- Options
  - Straw / hay / chopped up leaves
  - Plastic
  - Cover crops (e.g. clover, low growing purslane)



## Protect from pests

- Clean up the garden at the end of the year; some pests overwinter in garden debris
  - Or maybe don't good bugs overwinter in garden debris too...
- Rotate your crops; some pests overwinter in the ground under the crop
- Use barriers
  - Fences for deer, rabbits and woodchucks
  - Floating row cover for insects
  - Earth products for other insects, mollusks
- Encourage predator bugs by planting flowers
- Monitor and tolerate a few bugs is a good thing
- As a last resort, use pesticides, but READ THE LABEL
  - Make sure the product is labeled for what you are trying to kill
  - Observe the PHI (pre-harvest interval)
  - Apply exactly as prescribed by the label

## **Control diseases**

- Clean up the garden at the end of the year; many diseases overwinter in garden debris
- Rotate your crops; many diseases overwinter in the soil
- Plant resistant varieties
  - Common diseases in the area are powdery mildew (whole squash family), early blight (tomatoes), downy mildew (cucumbers)
- Keep the leaves as dry as possible by
  - Don't crowd the plants seed pack or plant label should indicate spacing
  - Don't over-head water at the end of the day leaves need to dry before night
  - Consider mulching with straw or plastic to prevent soil splashing onto the plant when it rains
- Monitor and tolerate a little disease won't impact harvest enough to matter
- As a last resort, use a fungicide but READ THE LABEL
  - Make sure the product is labeled for what you are trying to kill
  - Observe the PHI (pre-harvest interval)
  - Apply exactly as prescribed by the label

# Questions?