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Planning, Planting and Caring for Your Vegetables to Maximize Your Harvest

Meredith Melendez
Rutgers NJAES Cooperative Extension of Mercer County

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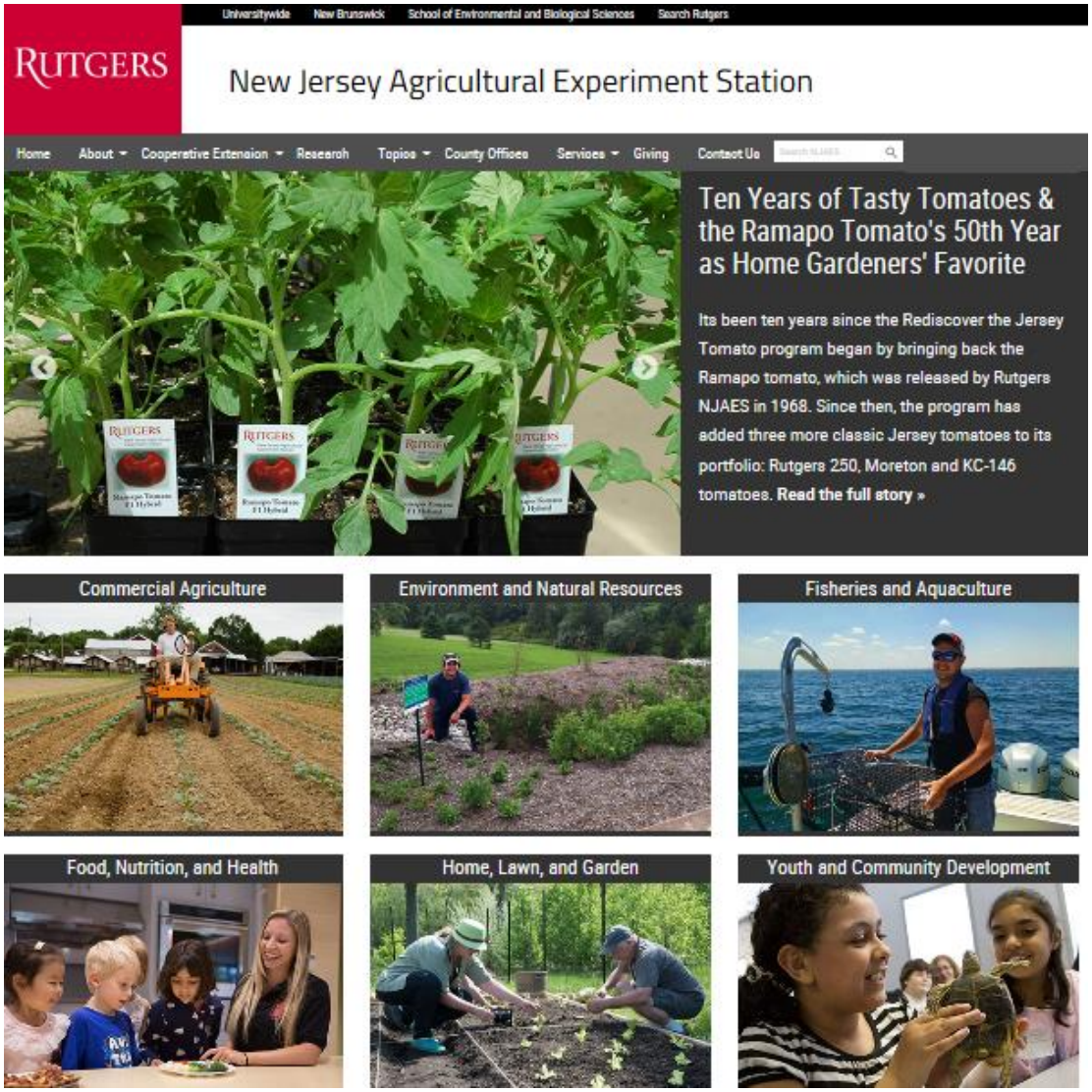

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Lawn & Garden

Rutgers Master Gardener Program

Barbara J. Bromley, County Horticulturist, advises and coordinates the Master Gardener Program in Mercer County. She also provides lectures and public information on horticultural topics and environmental responsibility. Her specialties include insect and plant ID, turf management, and plant diagnostics.

Rutgers Master Gardeners are a group of volunteers trained and certified by Rutgers Cooperative Extension to provide educational programs and activities in support of environmentally responsible home gardening. To learn more about becoming a Master Gardener or to receive an application, call 609-989-6830.

Master Gardener Helpline: 609-989-6853

Trained Master Gardener volunteers operate a year-round telephone helpline to advise the public about horticultural matters and diagnose and solve home gardening problems. County residents may get free answers to home garden, insect, and pest questions by calling 609-989-6853 from 9 am to 3 pm, March through October, and from 10 am to 2 pm, November through February.

Mercer Educational Gardens

The Mercer Educational Gardens, open dawn to dusk, use self-guided tours to teach backyard composting to the residents of Mercer County. There are 20 different compost bins, each maintained by a Master Gardener team. Some bins can be purchased, but many can be made at home with common materials. Surrounding the compost bins are seven teaching gardens with various plant materials. The Mercer Educational Gardens are located adjacent to the Mercer County Equestrian Center in Pennington, 431A Federal City Road.

Master Gardener Events

The Master Gardeners sponsor a variety of events throughout the year. These events include a series of lectures on environmentally responsible home gardening, an annual gardening symposium, a spring plant sale (first Saturday of May), and an award winning insect festival

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4-H Youth Development



The 4-H Youth Development program uses a learn-by-doing approach to enable youth to develop the knowledge, attitudes, and skills they need to become competent, caring, and contributing citizens of the world. The goals of the 4-H Youth Development Program are to:

- Provide informal educational programs to youth in grades K-13 (one year out of high school).
- Strengthen skills for adults working with youth.
- Improve community collaborations and partnerships.

To best serve our diverse population, Mercer County 4-H offers a variety of programs including community clubs, after-school and summer programs, school enrichment, and special interest and training programs. Additional info and contacts are available through the links below.

Community Clubs

4-H clubs are located throughout the county and are led by trained volunteers. Those interested in becoming a 4-H volunteer should contact our office. Events for 4-H members are listed here, click General Events to see what's in store for 2018!

Mercer County hosts its annual **4-H FAIR** at Howell Living History Farm in August. In addition, Summer 4-H Camp at Stokes State Forest is available to all youth

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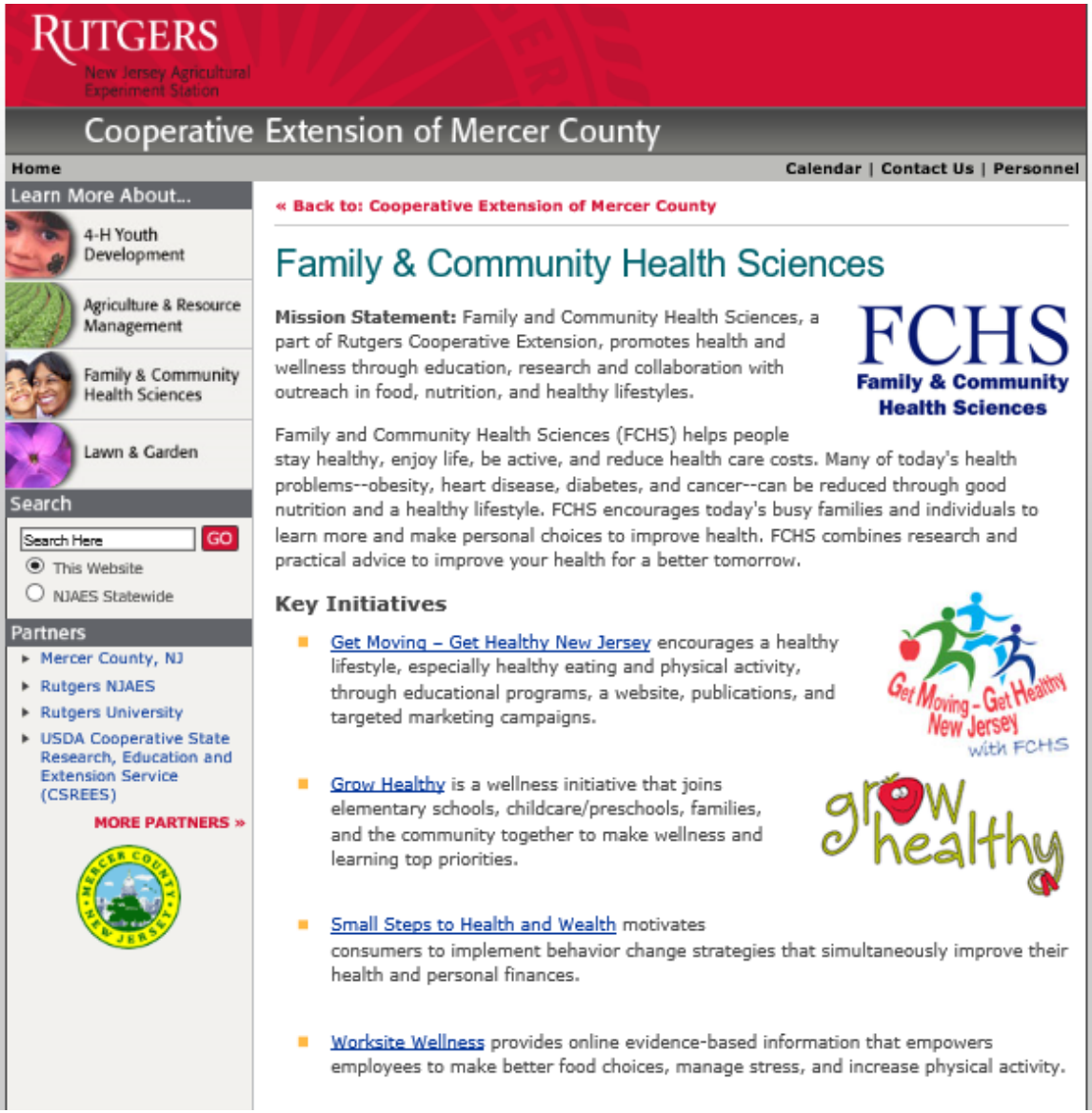

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You cannot improve the quality of produce once it has been picked!

Reduce produce loss:

- Before you plant
- When the garden is growing
- Harvest decisions
- Postharvest handling

What are we trying to avoid?

Surface Damage

Postharvest Decay

- Most postharvest decay is from fungi
- Non-visible infection in the field can degrade produce once in storage
- Wet, nutrient providing environments = fungal growth

Botrytis/Gray mold

- Snap beans
  - #1 post harvest issue
  - Overhead irrigation provides a perfect environment

Botrytis/Gray mold

- Lettuce
  - Dense plantings lend to less air flow

Botrytis/Gray mold

- Tomato
  - Can cause "Ghost spotting"
  - Enters through mechanical injury points, growth cracks, stem scar

Botrytis/Gray mold

1. Keep leaves and produce as dry as possible
2. Remove field heat quickly

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Erwinia / Bacterial soft rot

- Thrives in high humidity and high temperatures
- Commonly found in the soil
- Soil remaining on crop while in storage is often a source
- Injury = point of entry
- Soft tissue, often slimy, wet and stinky

Erwinia / Bacterial soft rot

- Onion
  - Do not harvest early
  - Crop rotation
  - Avoid overhead irrigation

Erwinia / Bacterial soft rot

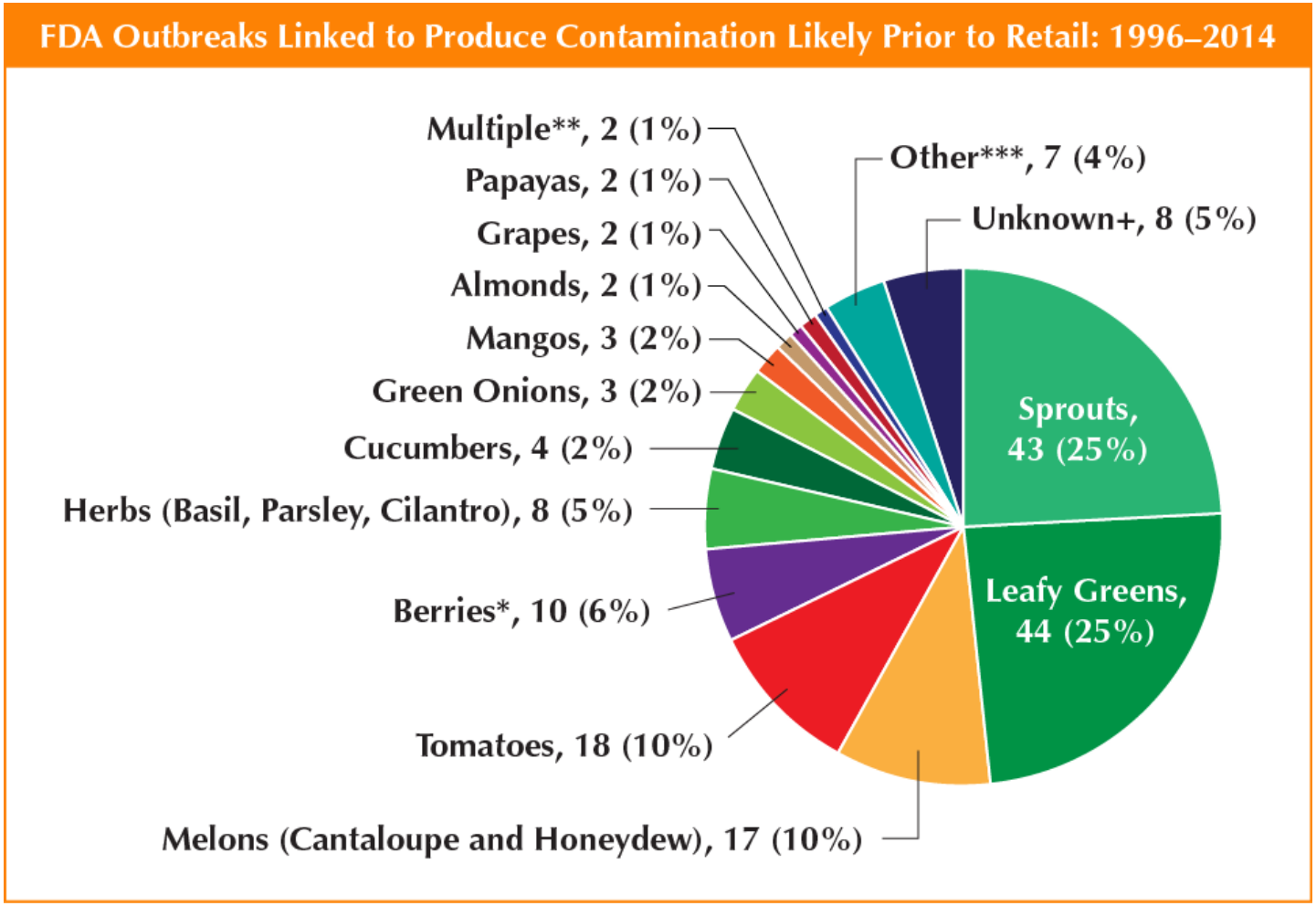
- Potato

Erwinia / Bacterial soft rot

- Cool produce quickly and adequately to prevent moisture condensation
- Limit soil on produce going into storage

"Quality" and "Safety" are two different things.

Human Pathogens



Produce Safety ALLIANCE

Produce Safety Challenges

- Fresh produce is often consumed raw (i.e., not cooked)
- Microbial contamination on produce is extremely difficult to remove once present
  - Natural openings, stem scars, bruises, cuts
  - Rough surfaces, folds, netting
- Contamination is often sporadic
- Bacteria can multiply on produce surfaces and in fruit wounds, provided the right conditions are present



Contamination Sources

Humans

Soil

Produce

Animals

Buildings
Equipment
Tools

Water

Produce Safety ALLIANCE

BEFORE YOU PLANT

LETTUCE

HART'S SPECIAL MIX

Pick when young 3-4 weeks

This mix of lettuce favorites is usually harvested young and mixed for salads. Can also be separated after sprouting and transplanted to grow to maturity (approximately 40 - 50 days).

SOWING... Plant seed outdoors as soon as ground can be worked. Plant in rows 4 to 6 inches apart spacing seeds thinly in the row. Can also be broadcast thinly in a section of the garden. Cover with 1/4 inch of fine soil well pressed down. Keep soil moist until the seeds start to grow.

GERMINATION... Germinates in 7 to 14 days depending on soil and temperature conditions.

HARVESTING... Using scissors, snip the young leaves off about 1/2 inch above the soil line. For a continuous supply of lettuce throughout the summer, plant Hart's special mix each week.

REMARKS... Plant enough each planting to last about a week at harvest time. If you like salad, start with about 5 feet of row and adjust each planting as needed. This mild mix contains 20% Lettuce, Black Seeded Simpson, 20% Lettuce, Green Salad Bowl, 20% Lettuce, Oakleaf, 20% Lettuce, Red Salad Bowl, and 20% Lettuce, Romaine.

GE Free

All our seed is untreated
& produced by traditional methods.
For more information www.hartseed.com

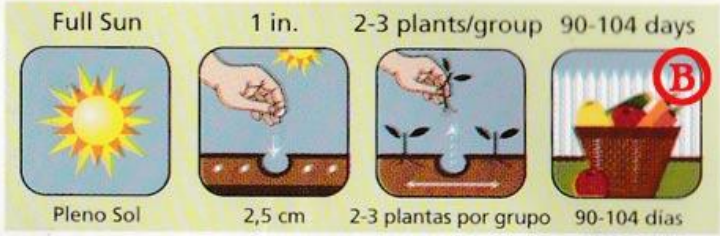
Watermelon *Allsweet*

Sandía *Allsweet*

Large, oblong 25-30 lb. striped melons grow to 17-19" long and 7" in diameter. Deliciously sweet, bright red flesh. Resistant to fusarium wilt and anthracnose.

SOW in thoroughly warmed soil in full sun in spring after all danger of frost. Sow 4-6 seeds about 3" apart in hills 5-7' apart. Cover with 1" of fine soil; firm lightly and keep evenly moist. Seedlings emerge in 7-10 days.

spr
abo



Frutos rayados, grandes, alargados, de 11-13,5 kg, que crecen hasta 43-48 cm de largo y 18 cm de diámetro. Pulpa deliciosamente dulce y de color rojo brillante. Resistente a la putrefacción por fusarium y antracnosa.
SEMBRAR en tierra completamente cálida a pleno sol, en primavera, después de que pase todo peligro de helada. Sembrar 4-6 semillas a una distancia aproximada de 7,5 cm entre sí, en montículos separados por 1,50- 2,00 m. Cubrir con 2,5 cm de tierra de buena calidad; apisonar suavemente y mantener la humedad en forma pareja. Las plántulas aparecen a los 7-10 días.

CERTIFIED ORGANIC BY OREGON TILTH

0 41530 60735 2

0 60735

burpee.com

W. Atlee Burpee & Co.
300 Park Ave., Warminster, PA 18974

CANADA NO. 1

LETTUCE

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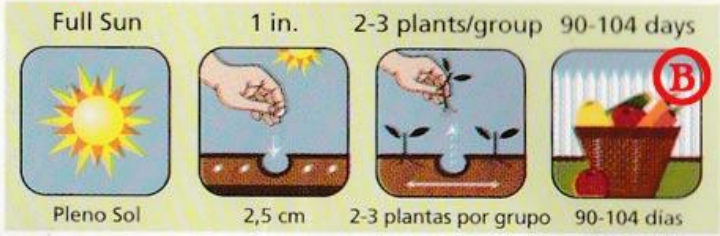

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CANADA NO. 1

Before You Plant

Tomato Disease Resistance Codes

V - Verticillium Wilt
F - Fusarium Wilt (FF - Races 1 & 2; FFF - Races 1, 2, & 3)
N - Nematodes
T - Tobacco Mosaic Virus
A - Alternaria Stem Canker
St - Stemphylium Gray Leaf Spot
TSWV - Tomato Spotted Wilt Virus

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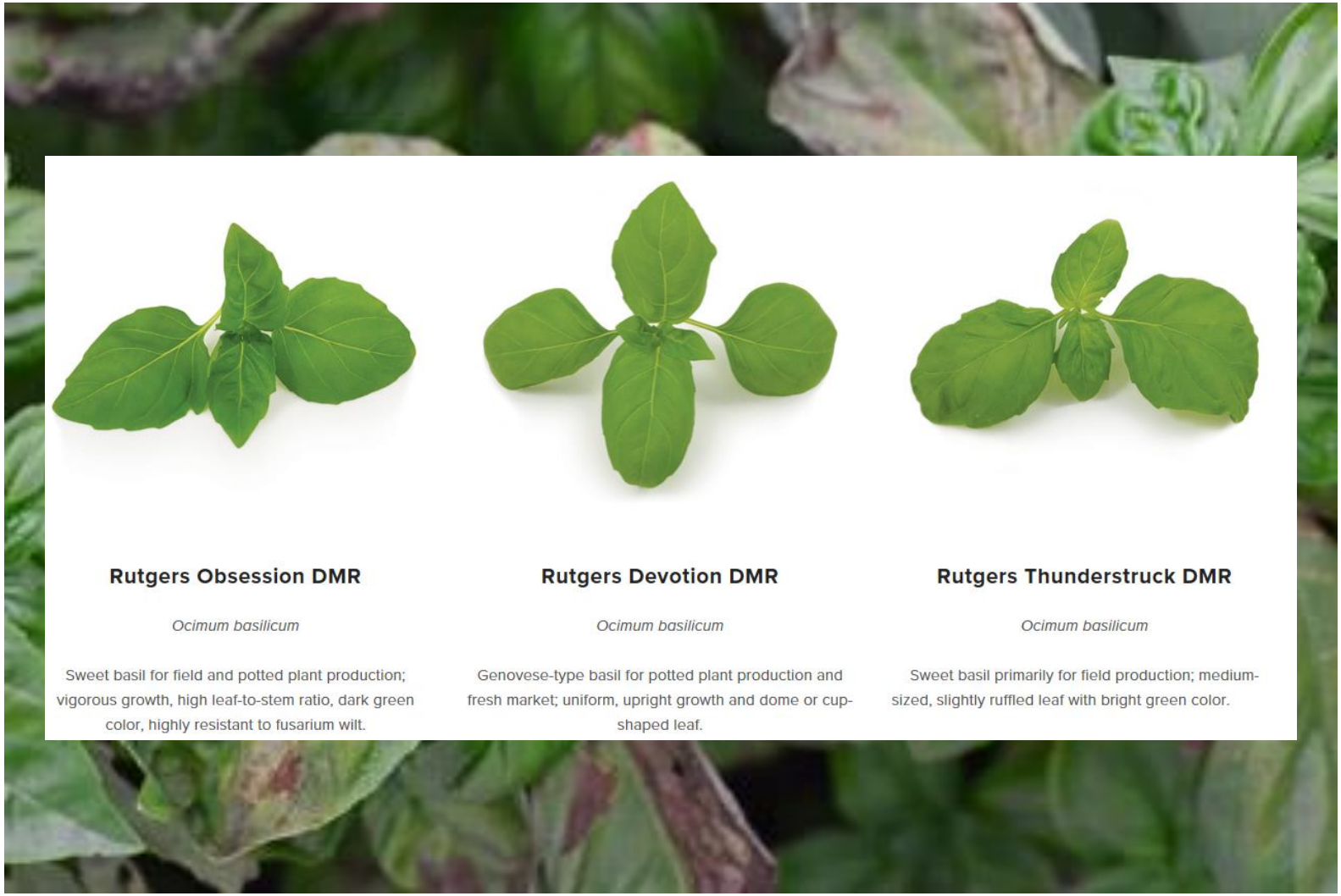


Rutgers Obsession DMR

Ocimum basilicum

Sweet basil for field and potted plant production; vigorous growth, high leaf-to-stem ratio, dark green color, highly resistant to fusarium wilt.

Rutgers Devotion DMR

Ocimum basilicum

Genovese-type basil for potted plant production and fresh market; uniform, upright growth and dome or cup-shaped leaf.

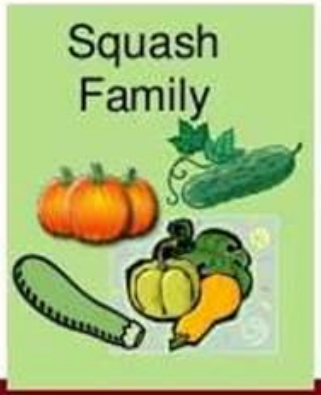
Rutgers Thunderstruck DMR

Ocimum basilicum

Sweet basil primarily for field production; medium-sized, slightly ruffled leaf with bright green color.

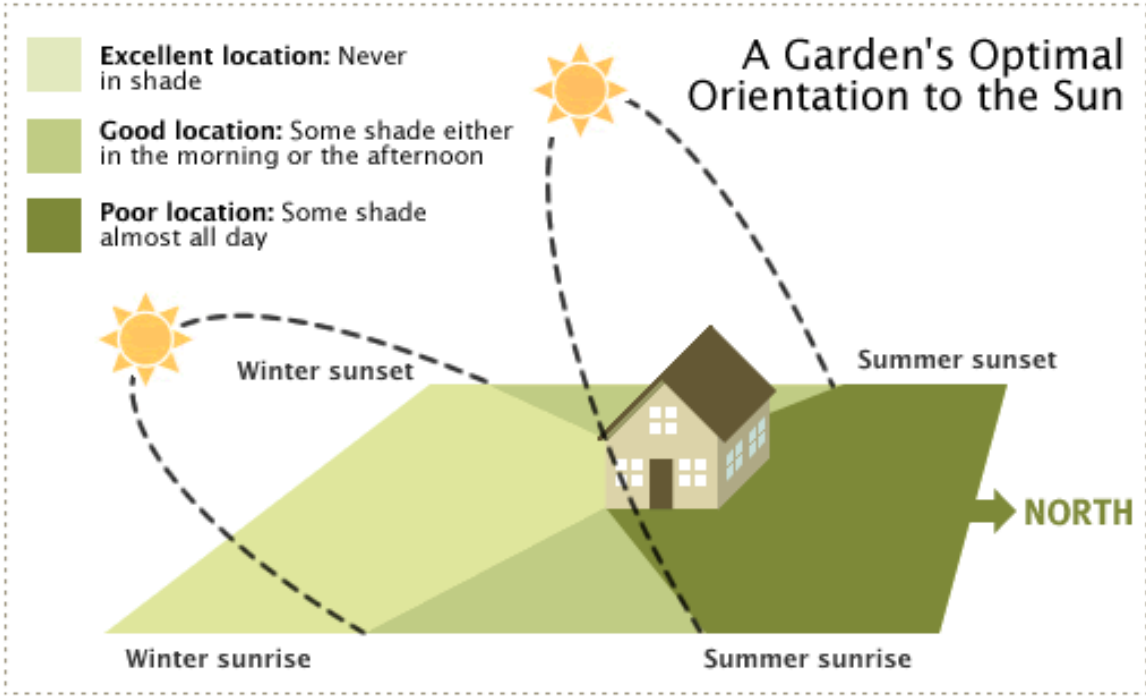
Rotate Crops

- Many pathogens infect all crops in the same family
- Some pathogens infect crops from several families
- Rotate between families at least every 2-3 years



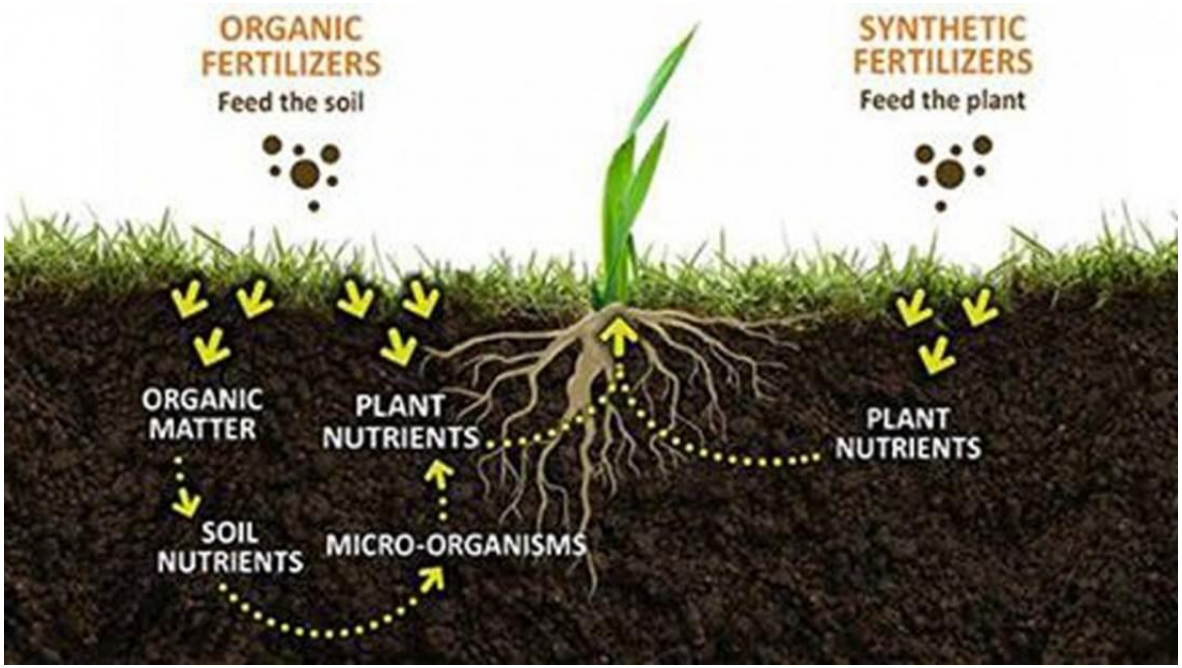
Before You Plant

- Planting location
  - Sun?
  - Watering?
  - Previous disease issues?
  - Previous insect issues?



Before You Plant

- Soil health
  - Soil pH?
  - Soil nutrient analysis?
  - Soil organic matter content?


ORGANIC FERTILIZERS
Feed the soil
SYNTHETIC FERTILIZERS
Feed the plant
ORGANIC MATTER
PLANT NUTRIENTS
PLANT NUTRIENTS
SOIL NUTRIENTS
MICRO-ORGANISMS

High Soil Nitrogen

- Flavor loss
- Decreased firmness
- Increase in produce decay
- Reduction in storage quality
- Increases vegetative growth
- Increases shading and lower wood death
- Does not increase
  - Fruit size
  - Overall yield
  - Soluble solid content

High Soil Nitrogen

- Tomato
  - Gray wall
  - Internal browning

High Soil Nitrogen

- Pepper
  - Stip/color spotting/black spotting (bell, pimento, elongated peppers)

Calcium Deficiency

- Lettuce Tip Burn
  - Physiological

DURING THE GROWING SEASON

During the Growing Season

- Garden sanitation

During the Growing Season

- Row cover

During the Growing Season

- Weed management

During the Growing Season

- Watering close to harvest

Bruising

Disease

Early sprouting in root and bulb crops

Flavor

Foliar Moisture

- Increase in diseases
- Increase in fungal spore spread

AT HARVEST

At Harvest

- Early morning harvest is ideal
- Use clean sharp knife when needed
- Frequent harvests stimulate more production
- Don’t damage the harvest!
- Foliage should be dry
- Ensure correct maturity

Cabbage

- Harvest heads when they are hard and firm.
- Cut the head at the base of the plant.
- Larger heads may split when harvesting on hot days, but the produce is still edible.
- Refrigerate in high humidity areas.
- Use within 1 to 2 weeks of harvest

Photo: Diane Larson

Carrots

Photo: Diane Larson

- Carrots can be harvested when they are at least ½ inch in diameter.
- Use a pitchfork or shovel and dig along side the row.
- Gently lift the carrots out of the soil.
- Remove tops and wash prior to storage

Cucumbers

- Harvest at 4 – 6 inches and dark green.
- Harvest every 2 – 3 days for optimum maturity.
- Hold the vine with one hand and pull the fruit off with the other to avoid damaging the vine.
- Store in the refrigerator for only a few days.

Eggplants

- For the common large dark purple eggplant, harvest at 6 – 10 inches.

- If the common eggplant gets too large they will have a bitter taste.

- Use gloves and scissors as the stems have small thorns.

- Do not refrigerate.

Green Beans

- Green beans should be harvested when they are 3 to 6 inches long and slender.
- Be careful not to break the branches.
- Refrigerate after harvest in a plastic bag.
- Do not wash beans until they are ready to be cooked.

Lettuce

- Harvest loose leaf types before they form a flower shoot.

- Harvest head lettuce when the heads are firm, cut at the soil level and remove any dead or brown leaves.

- Do not get wet.

- Hot days will cause lettuce to become bitter.

- Store in the refrigerator

Peppers

- Harvest peppers when they are firm and dark green. You can leave some varieties on the plant to turn red, orange, yellow or dark purple.

- Harvest when the plants are dry to reduce spread of plant disease.

Summer Squash

- Zucchini and Yellow Squash should be harvested at 6-10 inches long and are glossy.
- Zucchini should be cut from the plant with a clean sharp knife. Wear gloves, plants have spines.
- Yellow squash can be hand harvested by twisting and pulling the fruit.
- Both are easily bruised, so be gentle.
- Refrigerate after harvesting.

Photo: Diane Larson

Tomatoes

- Tomatoes can be harvested when they first show pink color if you will be keeping them a long time.
- Gently twist them off the branch.
- Tomatoes should not be refrigerated.
- Ripen picked tomatoes out of sunlight

Watermelons

- Roll the watermelon and look at the bottom. If the "Ground Spot" is yellow, the melon should be ripe.
- The tendrils (short, curly stems) next to a ripe watermelon looks dead or dried.
- Flavor will not be there if harvested too early or too late

Winter Squash

Butternut – deep flesh color

Acorn – underside turns orange yellow

Spaghetti- golden yellow color and hardens

- Harvest after skins have hardened, but before the first frost.
- Use pruning shears to cut stem about ½ inch above the fruit.
- Don’t break the stem.
- Winter squash can be stored for 3-4 months at room temperature.

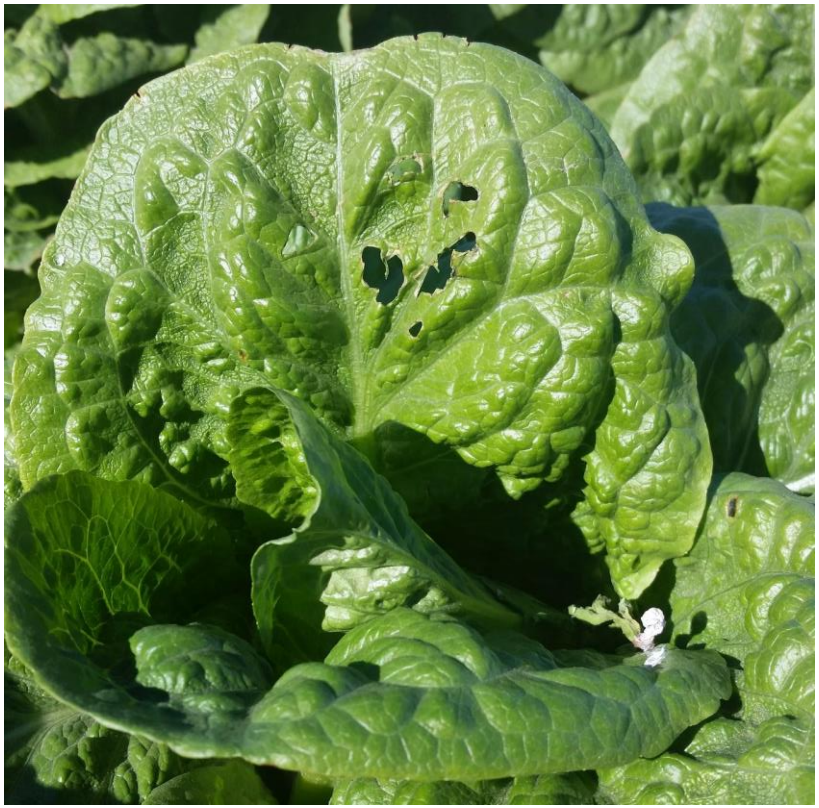
White Potatoes

Photo: Diane Larson

- Harvest when the leaves begin to yellow and die back.
- Use a shovel or pitchfork to lift out of soil.
- Keep in a warm shaded area till the skin dries, keep out of direct sunlight.
- Remove soil but don’t wash.
- Store in a cool area, but do not refrigerate.

At Harvest

- Evidence of contamination?



At Harvest

- Evidence of contamination?

At Harvest

- Surface damage?

At Harvest

- Harvest container sanitation

At Harvest

- Get to cooling temperatures ASAP!

POSTHARVEST

Key Points to Postharvest Handling

- Temperature
- Moisture
- Time

Postharvest

- Washing produce
  - Fruits and vegetables should be stored unwashed!
  - Wash produce just prior to preparation or eating.
  - Only wash if brushing does not remove soil from surface of the item.
    - Rinse under cool water for 20 seconds
    - Dry thoroughly prior to storing

Postharvest

- What about those produce washes?

Postharvest

Postharvest

- Infiltration can increase with deeper submersion and longer contact time
- Wounded or bruised fruit can have a greater risk of infiltration
- Infiltration risks can be higher when the produce is warmer than the tank water

Photo shows colored dye from water moving into produce pulp due to infiltration.

Proper storage temperatures reduce deterioration of produce quality

Storing Fresh Fruits and Vegetables for Better Taste

UCDAVIS POSTHARVEST TECHNOLOGY

Storage Location	Fruits and Melons		Vegetables	
Store in refrigerator	apples (> *7 days*) apricots Asian pears (nashi) blackberries blueberries cherries cut fruits figs grapes raspberries strawberries		artichokes asparagus green beans lima beans beets Belgian endive broccoli Brussels sprouts cabbage carrots cauliflower celery cut vegetables	green onions herbs (not basil) leafy vegetables leeks lettuce mushrooms peas radishes spinach sprouts summer squashes sweet corn
Ripen on the counter first, then store in the refrigerator	avocados kiwifruit nectarines peaches	pears plums plumcots		
Store only at room temperature	apples (< *7 days*) bananas grapefruit lemons limes mandarins mangoes muskmelons	oranges papayas persimmons pineapple plantain pomegranates watermelons	basil (in water) cucumbers† dry onions* eggplant† garlic* ginger jicama	peppers† potatoes* pumpkins sweet potatoes* tomatoes winter squashes

*Store garlic, onions, potatoes, and sweet potatoes in a well ventilated area in the pantry. Protect potatoes from light to avoid greening.
†Cucumbers, eggplant and peppers can be kept in the refrigerator for 1 to 3 days if they are used soon after removal from the refrigerator.

Tips for Storage in the Fridge

- Maintain fridge between 34^{0}F and 40^{0}F.
- Store raw meats in a separate location from cheeses, ready-to-eat foods and produce.
- Clean the refrigerator using a 1TBSP bleach to 1Gallon of water ratio.
- Airflow is important to prevent rapid decay

Tips for Storage in the Fridge

- Store in the refrigerator
  - Apples (greater than 7 days)
  - Berries
  - Cherries
  - Cut fruit
  - Fig

  - Asparagus
  - Beans
  - Beets
  - Broccoli
  - Cabbage
  - Carrots
  - Cauliflower
  - Herbs (not basil!)
  - Leafy vegetables
  - Peas
  - Radishes
  - Summer squash
  - Sweet corn

Tips for Storage in the Fridge

- Ripen on the counter, then store in the fridge
  - Nectarines
  - Peaches
  - Pears
  - Plums

Tips for Storage

- Store only at room temperature
  - Apples (less than 7 days)
  - Cantaloupe
  - Watermelons
  - Basil (stems in water)
  - Cucumbers
  - Dry onions
  - Garlic
  - Ginger
  - Peppers
  - Potatoes
  - Pumpkins
  - Sweet potatoes
  - Tomatoes
  - Winter squash

Postharvest

- Relative humidity
  - Leafy vegetables 95%
  - Onions 70%

Postharvest

- Relative humidity
  - Signs of water loss
    - Wilting, shriveling, loss of crispness, browning, stem separation

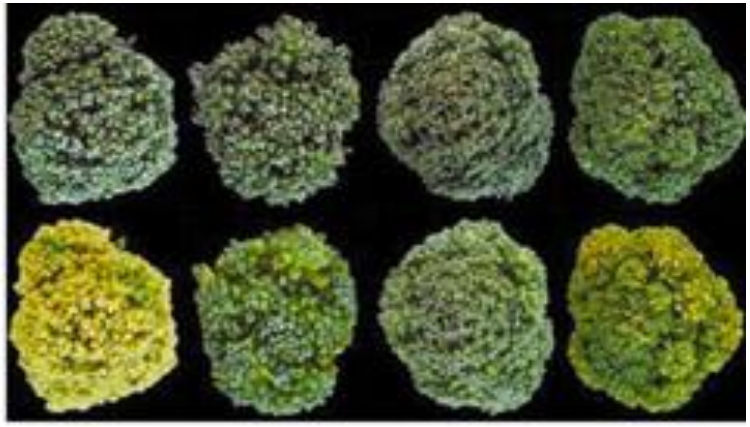
Postharvest

- Ethylene gas producers

Postharvest

- Ethylene gas causes:
  - Toughness in turnips and asparagus
  - Bitterness in carrots and parsnips
  - Yellowing of green vegetables
  - Softening and pitting, off flavor of pepper, summer squash and watermelon
  - Browning of eggplant pulp and seed

  - Some fruits are not impacted by ethylene such as cherries and blueberries



Postharvest

- Ethylene gas in storage
  - Generally fruit produces ethylene and venting helps reduce impacts.
  - Generally vegetables are impacted by ethylene and should be protected from it.

Decision Making

1. Choose varieties that have disease resistance.
2. Minimize leaf and produce surface moisture.
3. Manage disease issues promptly.
4. Reduce weed populations in the garden.
5. Minimize surface damage to produce.
6. Move harvested produce to cooling temps ASAP.
7. Maintain appropriate storage temperatures and relative humidity.

For a copy of this presentation:

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Questions?

Photo: Meredith Melendez