Harvest & Post-Harvest

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Harvest of Fruits and Vegetables

- Difference between Fruits and Vegetables

Fruits

- Fruit: The Developed Ovary of a Seed Plant
- The Part of a Plant that Developed from a Flower

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Fruits - Examples

- Apples
- Pears
- Plums
- Peaches
- Oranges
- Grapefruit
- Cherries

Vegetables

- Any Plant whose Fruit, Seeds, Roots, Tubers, Bulbs, Stems, Leaves, or Flower Parts are used for Food

- The Edible Part of a Plant

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Vegetables - Examples

- Watermelon
- Cantaloupe
- Pumpkin
- Squash
- Cucumber
- Tomatoes
- Peppers
- Eggplant
- Sweet Corn
- Beans and Peas

Vegetables - Leaf

- Lettuce
- Spinach
- Swiss Chard
- Kale
- Collards
- Turnip Greens
- Mustard
- Poke
- Dandelion
- Lambs Quarters
- Pigweed

Vegetables - Stems

- Asparagus
- Broccoli (Also flowers)
- Cauliflower (Also flowers)
- Celery
- Garlic
- Leek
- Onion (not a root)
- Potato (not a root)

Vegetables - Roots

- Sweet Potatoes
- Carrot
- Beet
- Radish
- Turnip

Vegetables – Nuts, Seeds, Grains

- All are Formed from Flowers
- All Have Seeds
- All are Fruits

Vegetables

- Nearly All Fruits are Vegetables
- Many Vegetables are Fruits

- All Vegetables and All Fruits are Alive at the Time of Harvest

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Main Objectives

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- Maintain Quality During Shipping
- Maintain Quality on Shelf
- Maintain Quality until Consumption
- Live Long and Prosper

Live Vegetables

- Respiration is Occurring
- Transpiration is Occurring
- Metabolism is Occurring

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Respiration

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- Respiration: Process by which carbohydrates, proteins, fats, etc are broken down into energy plus carbon dioxide plus water vapor.
- Transpiration: Water movement from root through plant to atmosphere
- Metabolism: Buildup or Breakdown of Substances

Life

- Tissue is Being Broken Down
- Water is Being Given Off

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Respiration Rates

- Very Low (Long Storage)
  - Dried Fruits
  - Nuts

Respiration Rates

- Low (Fairly Long Storage)
  - Apples
  - Garlic
  - Onions
  - Potatoes
  - Sweetpotatoes

Respiration Rates

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- Moderate (Moderate Storage)
  - Cabbage
  - Carrots
  - Lettuce
  - Peaches
  - Pears
  - Peppers
  - Plums
  - Tomatoes

Respiration Rates

- High (Short Storage)
  - Brussel Sprouts
  - Green Onions
  - Snap Beans

Respiration Rates

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- Very High (Very Short Storage)
  - Asparagus
  - Broccoli
  - Mushrooms
  - Peas
  - Sweet Corn

Avoid Dehydration

- Lower the Temperature
- Raise the Humidity

Cooling

- Forced Cold Air
  - Good Air Movement
- Cold Water
  - Avoid Bacterial Contamination

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Chilling Injury (Don't Overdo It)

Storage Temperatures (Cold 30-40°F)

- Beans
- Broccoli
- Cabbage
- Green Onions
- Leafy Greens
- Peas
- Sweet Corn
- Turnips

Storage Temperatures (Cool 40-50°F)

- Cucumbers
- Eggplant
- Okra
- Peppers
- Squash
- Sweetpotatoes
- Tomatoes
- Watermelons

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Storage Humidity (95-100%)

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- Asparagus
- Beets
- Broccoli
- Cabbage
- Green Onions
- Leafy Greens
- Peas
- Sweet Corn

Storage Humidity (90-95%)

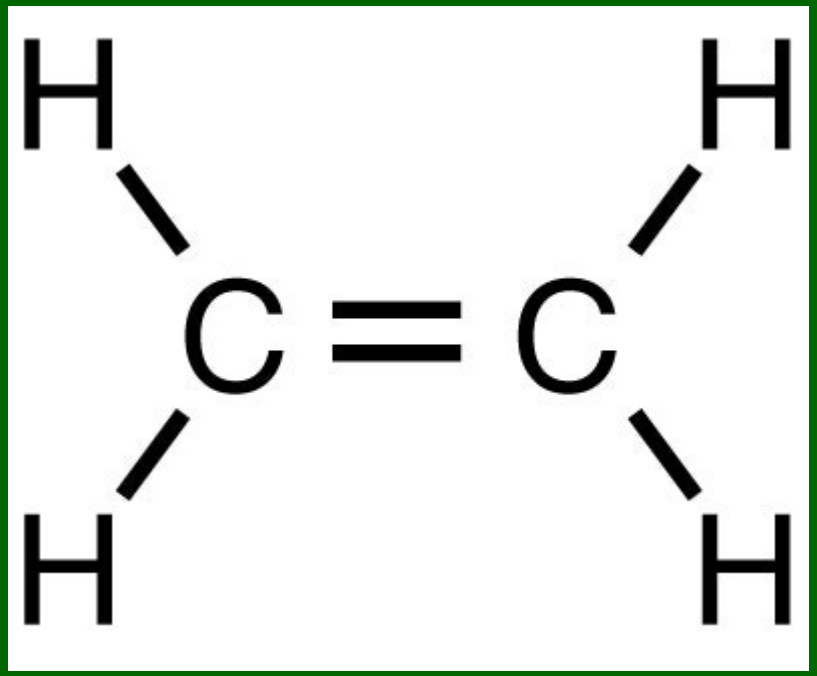
- Beans
- Eggplant
- Okra
- Peaches
- Peppers
- Tomatoes
- Squash
- Sweetpotatoes
- Tomatoes
- Watermelons

Cool and Dry Storage

- Winter Squash
- Pumpkins
- Onions

- (Outer Layer Resists Water Loss)

Ethylene



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Ethylene

- A ripening hormone which promotes senescence (early death)
- Loss of Green Color
- Toughening of Tissues
- Potato Sprouting
- Tissue Softening
- Speeds Ripening (Aging) Process

Producers of Ethylene (Sweet Smell)

- Apples
- Pears
- Plums
- Cantaloupes
- Peaches
- Bananas

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Sensitive to Ethylene (Less Smell)

- Cabbage, Broccoli
- Carrots
- Cucumbers
- Eggplant
- Okra
- Peppers
- Peas
- Summer Squash
- Sweetpotatoes
- Tomatoes
- Watermelons

Ethylene and Vegetable Storage

- Do not Store Ethylene Producers near Ethylene Sensitive Foods
- Just Don’t Do It
- Wouldn’t be Prudent
- But, if you have to do it,

Effect of Ethylene

- Much less pronounced at 32 degrees than at 85 degrees
- Keep it Cool

When to Harvest

- When Outside Temperature is Cool
- Primarily early in the morning
- When Cloudy, if Possible
  - Less Heat stored in Fruit and Vegetable
  - Slower Metabolism, Slower Respiration, Less Heat Produced

When to Harvest – What Stage?

- Beans – Seeds Visible but Small
- Broccoli – Blooms Tightly Closed
- Cabbage – Heads Tight
- Cantaloupes – Stem Separates When Pulled
- Sweet corn – Full Seeds, Soft Seeds
- Cucumber – Green Skin, Soft Seeds
- Eggplant – Glossy, Soft Skin
- Okra – Tender Pods

When to Harvest – What Stage?

- Onions – Yellow tops, ¾ Fallen Over
- Pepper – Full and Firm Fruit
- Potatoes – Tops Begin to Die Back
- Sweet potatoes – Whenever, When roots are Right Size
- Summer Squash – Sufficient Size, Soft Rind
- Winter Squash – Rind Cannot be Penetrated with Finger Nail
- Watermelon - Ground Spot is Yellow, Tendril is Brown
- Tomatoes – Pink to Red Color

Post-Harvest
Curing Sweet Potatoes

- Vegetable is a Root
- Root is Alive
- Root will be Damaged, Cut, Bruised
- Wounds Need to Heal

Curing – Sweet Potato

- Warm Temperatures Increase Respiration
- High Humidity Prevents Dehydration
- Scar Tissue (Callous) Heals Wounds
- 85 degrees, with 90-95% humidity

Summary

- Harvest Early in the Day
- Cool Quickly
- Maintain Temperature According to Vegetable
- Maintain Humidity According to Vegetable
- Quality will not Improve after Harvest

Root Cellar Storage

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Vegetable Dehydration for Storage

- High Temperature
- Low Humidity

Dehydration for Storage

- Just the Opposite of Normal Storage
- We want to remove moisture

Dehydration for Storage

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Temperature 140- 150°**F**

- Humidity as low as possible
  - Below 50%
- Lots of Air Movement
- Remove Exterior (skin, coating, peel)
- Reduce size by cutting, slicing, dicing

DIY Dehydrator

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