

Meet the Cucurbit Cousins – Colorful, Crunchy and Heat Loving

John Biernbaum, MSU Horticulture and Student Organic Farm

Common Vegetable Crops in the family Cucurbitaceae: The cucumber, melon, gourd, pumpkin family.

For general information see: <http://en.wikipedia.org/wiki/Cucurbitaceae>

The family *Cucurbitaceae* has over 100 genera and close to 1000 species. The limited number of food crops represent only a small fraction of the family. These warm season vegetables that produce delicious fruit are valuable additions to the garden and farm and foods that most people enjoy eating.

1. Cucumber; slicing and pickling; *Cucumis sativa* <http://en.wikipedia.org/wiki/Cucumber>
<http://www.learn2grow.com/gardeningguides/edibles/vegetables/PutUpCukes.aspx>
2. Summer Squash; zucchini, yellow squash, patty pan and others; *Cucurbita* sp.
http://en.wikipedia.org/wiki/Summer_squash
<http://www.learn2grow.com/gardeningguides/edibles/vegetables/SummerSquash.aspx>
3. Muskmelon or Cantaloupe *Cucumis melo* <https://en.wikipedia.org/wiki/Cantaloupe>
<http://www.learn2grow.com/plants/cucumis-melo/>
4. Water melon *Citrullus lanatus* var. *lanatus* <http://en.wikipedia.org/wiki/Watermelon>
5. Winter Squash *Cucurbita pepo* http://en.wikipedia.org/wiki/Winter_squash
6. Pumpkin *Cucurbita pepo* <http://en.wikipedia.org/wiki/Pumpkin>

General Questions to Address:

1. What to grow? (crop and varieties)
2. How many/much to grow?
3. When to grow them?
4. Where to grow them?
5. How to grow them?
6. How to harvest?
7. How to store / protect?
8. How to market?

Crop Topics:

1. History, background and folklore
 - Mostly from the tropics or subtropics, both the northern and southern hemisphere.
 - Cucumber from India and grown for more than 3,000 years. One reference stated that cucumbers are the 4th most common vegetable in the world after tomato, cabbage and onion.
 - Summer and winter squash from the western hemisphere or “new world” / north-south America. Archeological evidence of seeds found in caves in Mexico from over 10,000 years ago.
 - Melons most likely from Northern Africa, but may also be from India and China. Evidence of use in Egypt about 2500 years ago. General consumption has been more recent compared to other vegetables/fruits.
 - Good source of antioxidants and other phytochemicals (similar to onions and brassicas).
 - Sensitive to cold temperatures (less than 50° Fahrenheit) and show chilling damage at temperatures well above frost temperature.
 - While called vegetables, the plant part consumed is a fruit. Usually contains many edible seeds which also have health and nutrition benefits.
 - Most are annuals (grow one year).
 - Separate male and female flowers on either the same or separate plants. Flowers are yellow. Flowers are insect pollinated; seed are easily collected;
 - Cucumber and summer squash are picked when fruit is immature or not fully developed. Cantaloupe and melon are picked when mostly mature (half or full slip). Winter squash and pumpkins are harvested when fully mature and then cured or slightly dried to prolong storage.
 - Good source of vitamin C, minerals and fiber as well as health promoting phytochemicals;
 - These crops do best in high light and warm temperatures.

2. Crop and Cultivar selection – **(What?)** how many types? Possible priority if space limited?
 - How much garden space is available? Selecting which to grow will depend on personal eating preferences or for commercial sales the market preference and price.
 - Cucumbers and summer squash can fit in almost any garden.
 - Cucumbers and some melons can be grown vertically on a trellis or fence to save space. Some varieties are more compact and selected for limited space.
 - Watermelon and pumpkin typically require a large amount of space or larger garden / production area, but a few plants can be creatively trained to grow down a long narrow space or aisle.
 - Cucumber and summer squash are harvested from the same plant over several weeks. Winter squash are usually harvested once at the end of the season. Cantaloupe and watermelon harvest is more variable.
 - Cucumber types: American slicing (48-58 days), American pickling (48-58 days), European pickling (47-50 days) and specialty – lemon, Japanese, Striped Armenian, seedless, thin skinned. Some seeds can cost from \$0.50 to \$1.00 each for specialty types. Marketmore 76 is a popular productive non-hybrid slicing cucumber; seed costs less than \$0.01 each.
 - Summer squash types: zucchini (45 to 50 days) (green, light green, striped, yellow), yellow summer (48 to 58 days), round (50 days), patty pan / scallop (50 days).
 - Muskmelon or cantaloupe types: cantaloupe, ananas, Asian, butterscotch, French Charentais, tropical, Crenshaw (68-80 days). Cantaloupe has netting and no ribs; also referred to as western melon and is able to ship and hold quality for a longer period of time – 10 to 14 days. Muskmelon has ribs; also referred to as an eastern melon, and does not ship or store as well (5 to 8 days) so is often used for local production.
 - Watermelon types: red, yellow, seedless (70 to 85 days).
 - Winter squash types: acorn (85 days), delicata/dumpling (100 days), kabocha (95 days), spaghetti (85 days), hubbard (90-100 days), buttercup (95 days), butternut (100 to 105 days).
 - Pumpkin types: pie (105 days), jack-o-lantern (85-10 days), specialty (85-125 days) – includes orange, tan, white, green striped, smooth, segmented and others).

3. How many plants per person or family? (or yield per plant) **(How much?)**
 - Most of these crops can be held for a day or more without refrigeration in a cool place.
 - Cucumbers and summer squash can very quickly go from not having enough to having abundance. When abundance appears, sharing with family and friends is advised.
 - What type of preservation is possible besides eating fresh?
 - Cucumbers can be made into pickles.
 - Summer squash can be sliced, grilled and then frozen.
 - Winter squash is a long term storage crop.
 - Drying or dehydration is not generally an option;
 - A starting point for cucumbers might be 2 to 4 plants on a trellis for a small family.
 - A single “hill” or planting of summer squash with 2 to 4 plants can also be very productive.
 - Harvest may continue for several weeks, but succession plantings are advised to manage pests and diseases. Time between plantings is approximately 2 to 4 weeks.
 - A winter squash vine can produce from 1 to 4 fruit per vine/plant.

4. What location and how much space per plant? **(Where?)**
 - Full sun is best. Cucumber and summer squash may produce in partial shade.
 - Plant spacing is important to get adequate growth and fruiting. The more fertile the soil and the more water provided, the less space needed per plant. If you soil is less fertile and you don’t water very often, use the wider or larger spacing recommended.
 - Cucumber plants typically require about 1 sq foot or 12”x12” as a minimum and 2 sq ft or 18”x18” is recommended for large plants. In row spacing may be 18” and row spacing 36 to 48”.
 - Summer squash plants need more space and can use 24”x24”. Winter squash vine out over large areas and rows are often spaced 6’ with plants spaced 2’ in the row.

- Cucumber and summer squash can be grown in the spring and summer hoophouse; fall hoophouse harvest is also possible when or if there are no field plantings.
- Melons will produce in the hoophouse but productivity is low for the amount of space required. Not recommended for commercial profitability in northern hoophouses.
- Winter squash is not recommended for the hoophouse.

5. Rotation Considerations: With, Before or After What Crops? (**Where?**)

- Recommended to grow in an area where the soil is fertile and well prepared.
- Application of compost prior to planting is recommended.
- Can follow any plants in the rotation.
- Not recommended for planting in area where other cucurbit plants have grown in last 2 or 3 years

6. How Long a Crop Time and **When** to Plant? (Cool or Warm Season?)

- Later start in the season is typical since soil warmth is required. But long season is also required.
- While direct seeding is possible, transplants are recommended for all the crops.
- The initial appearance of the transplants is very similar for all seven of the crops.
- For spring planting, seeds are usually sown in early May to provide 3 weeks of growth prior to transplanting to the field, usually in late May or early June.
- Frost protection fabric can be used to increase early season growth. Fabric must be removed once female flowers are visible.

Crop	Indoor Seeding	Transplanting	Harvest
Cucumber (succession)	May - 3 wks to transplant	No Frost – soil above 50°F	Late June, July, Aug, Sep
Summer Squash (succession)	May - 3 wks to transplant	No Frost – soil above 50°F	Late June, July, Aug, Sep
Melons	May - 3 wks to transplant	No Frost – soil above 50°F	July, Aug, Sept
Water Melon	May - 3 wks to transplant	No Frost – soil above 50°F	July, Aug, Sept
Winter Squash	May - 3 wks to transplant	No Frost – soil above 50°F	Sept – before frost
Pumpkins	May - 3 wks to transplant	No Frost – soil above 50°F	Sept – before frost

7. Propagation/Getting Started – Seeds, Sets and Transplants (**When and How?**)

- Seeds – germination percentage typically is very good – over 90%
- Seed is large, usually flat and oval shaped.
- Seeds generally store well, several years, if stored cool (<40°F) and dry (< 40% RH)
- Mature seeds can be collected from non hybrid varieties. Squash varieties must be isolated by over 1000 feet to insure no cross pollination.
- Transplants are recommended for all and look very similar for all seven crops.
- Seeds will germinate fastest at a warm temperature (70°F).
- Transplants recommended to have 2 to 3 true leaves which requires 2 to 4 weeks (3 average).
- Compared to other vegetable crops, cucurbits do not recover as quickly from transplanting or root damage that occurs during transplant. Recommendations are to avoid root disturbance.
- Can be direct sown in garden/field if soil is warm (>60°F)

8. Cultivation, management and training: Fertility, Irrigation (**How?**)

- As stated previously, well drained, fertile soils that are irrigated and minimal weeds are very helpful.
- Fertility provides for rapid early season growth and leaf development necessary for fruit formation.
- Organic matter and fertility from compost also helps to increase water absorption and retention. Soil moisture is very important for early crop establishment.
- Water availability is a key to maintaining growth – general recommendation of an inch of water per week applies for irrigation;
- Plastic mulch can help reduce weeding if used in a way that provides for irrigation.
- Cucumber can be trained on a single string, netting or a round cage.
- Pollination by insects or some other method is important for fruit set. Male flowers usually forms first on the plant and female flowers follow.

9. Plant Protection – what herbivores, decomposers and predators to consider?

- Generally not bothered by deer and rabbits. The prickly leaves were traditionally used in the three sister's planting (corn, beans, squash) to provide soil cover and to reduce animal feeding on the corn and beans.
- Minimizing competition from weeds is important to maximize growth.
- Striped or spotted cucumber beetle is a serious threat to growth of young plants. Feeding by the cucumber beetle can spread bacteria leading to bacterial wilt and crop failure. Striped cucumber beetle migrates into fields or northern areas from warmer southern areas. Monitoring trap crops provides an important early indicator of pest activity. Hubbard squash is often recommended as an attractant or trap crop.
- Aphids can also be problematic, particularly if introduced on transplants. Good idea to focus on aphid free or minimal aphid transplants. Natural predators can often manage or reduce the aphid population once the plants are in the garden. Another possible treatment of aphids is soap solution to wash them off the plants. Example soaps are Murphy Oil Soap, Dawn dish detergent or other dish detergents. A rate of 1 teaspoon to 1 tablespoon per gallon of water.
- Stem or squash borer can be an important insect pest. Wasp like insect lays eggs near base of plant. Development of insect in the stem leads to death of the plant.
- Root disease – transplants are susceptible to root rot organisms and damping off.
- Foliar disease – powdery mildew is an important problem. Difficult to control.
- Foliar disease – bacterial wilt – spread by beetles, leads to wilting and then death.

10. Harvest, Storage and Display

- Harvest methods are a key difference for crops in the cucurbit family.
- Cucumber and summer squash are harvested when the fruit is still immature, based on size of the fruit. Smaller is generally considered better. Summer squash can be consumed uncooked.
- Cantaloupe, Muskmelon and Watermelon are harvested when nearly mature. Flavor development is favored by high light, warm temperatures and moderate to low soil moisture. Half slip and full slip – the stem separates from the fruit easily. There may also be softening at the blossom end. Three common observations that are used to help determine harvest time:
 - Tendril near the fruit is drying up and turning brown
 - The spot where the fruit touches the ground turns lighter color or yellow
 - There is hollow sound when the fruit is “thunked” with the finger
- Winter squash and pumpkins are harvested when full mature and often after the foliage has died. It is important that the crop not be exposed to frost conditions if long storage is desired. For best storage the crop is “cured” by holding at 80-85°F and 80-85% RH for 10 days. Acorn storage is about 30 to 50 days while Hubbard squash storage can be 150 to 180 days. Generally cooked before consumption/eating.
- Important to harvest cucumbers and summer squash in cool part of day (early morning).
- Best stored in moderate (55-50°F) to cool (45°F) conditions with high RH (90-95%) for quality.
- Chilling injury is a type of cold damage common with warm season crops like cucurbits and crops in the tomato family. Temperature below 55°F leads to disruption of the plant metabolism.

11. Marketing, Economics and Value (What is the selling price or unit?)

- Cucumber and summer squash may be sold by the fruit or by the pound.
- Melons usually sold per fruit.
- Winter squash and pumpkins usually sold by the pound.

12. Keys to Success

- Grow in bright light and hot weather
- Use transplants for easy scheduling and maintenance
- Provide high soil fertility and moisture; moisture can be lower for melons near harvest.
- Harvest at the “right” time.
- Store properly.