PUMPKINS & SQUASHES

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Origin & History

- Genus *Cucurbita* is native of tropical America.
- *C. pepo* probably originated in southwest USA and Mexico.
- *C. argyrosperma* originated in central America and Mexico.
- *C. moschata* may have developed further in central America and Northern South America.
- *C. maxima* originated in central and southern regions of South America.

Botany & Life Cycle

- Cultivated Cucurbita spp. are:
  - Warm-season and frost sensitive annuals
  - Monoecious
  - Have long trailing vines
  - Prostrate growth habit unless supported

- *C. foetidissima* HBK is perennial.

- *C. pepo* includes Pumpkin, winter squash, summer squash and gourd.

- *C. moschata* include pumpkin and winter squash

- *C. maxima* includes pumpkin and winter squash

- *C. argyrosperma* includes pumpkin, winter squash and gourds.

Squashes

- Summer squashes are the cucurbits whose fruit is harvested at immature stage before the fruit rind becomes hard, e.g. Zucchini.

- Winter squashes are the cucurbits whose:
  - Fruit are physiologically mature
  - Fruit hard is rind that cannot be penetrated with fingernail
  - Seeds are viable at harvest
  - Can be stored for several months at room temperature if properly cured

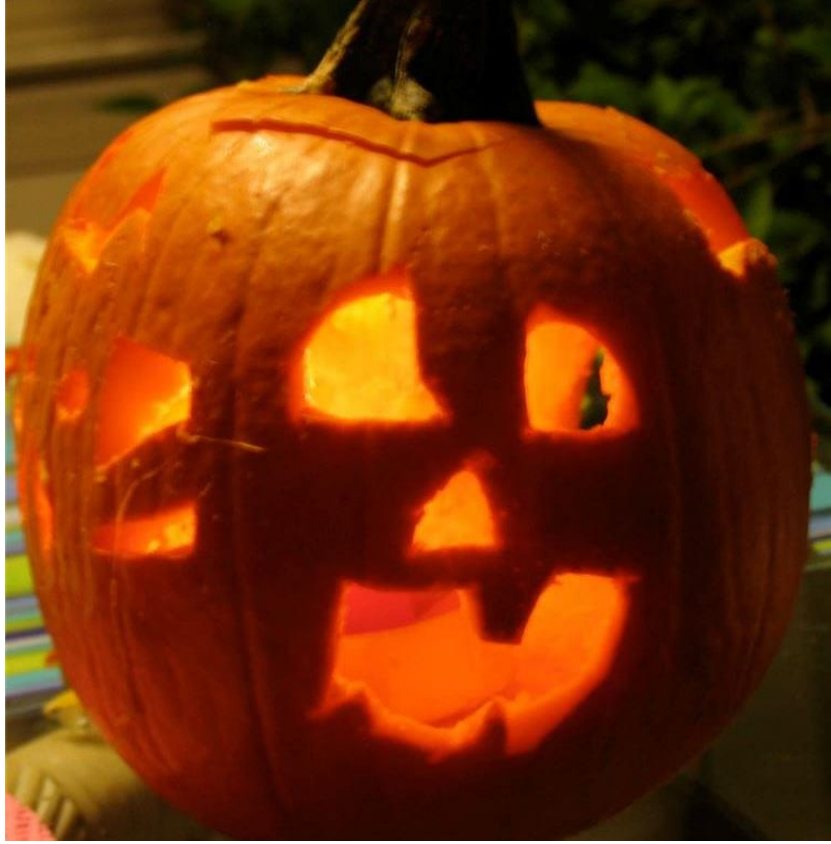
Pumpkins

- Pumpkin is another term for winter squash in most parts of the world.
  - Pumpkins are essentially winter squash in N America
  - Fruit has bright orange rind and stringy flesh
  - Grown as a decoration for fall festival Halloween or for pie making

- For Halloween festivals, orange or white immature pumpkin fruits of predominantly *C. pepo* and *C. maxima* are decorated or carved.

Gourds

- Have distinctive shapes & colour
- Not edible because of their very hard, thin rinds
- Ornamental gourds of *C. pepo* are also use for decoration



Vegetable Marrow Zucchini

- **Zucchini**

- **Winter Squash decorated for Halloween**

Giant Pumpkin

Pumpkin windrowed for mechanical harvesting

Differences among various *Cucurbita* spp. are subtle based on seed anatomy and leaf and stem characteristics

Cucurbita species	Leaves	Fruit stems (peduncle)	Seeds
C. pepo	Prickly, deep sinuses between lobes	Not noticeably flaring or enlarged at attachment to fruit	Tan colored Seed scar horizontal or rounded
C. moschata	Not prickly, sinuses indistinct or absent, lobes pointed; with rare exceptions, leaves soft hairy, with white spots at the intersections of veins	Distinctly five-sided, regularly grooved, hard Flaring at attachment to fruit Roughly cylindrical, not definitely, irregular grooves, not flaring or noticeably enlarged at attachment to fruit; hard	Color, grayish white to tan; margin thickened deeper in color and different texture from body of seed; seed scar slanting, rounded, or horizontal
C. maxima	Lobes rounded; rough hairy, kidney shaped, white spots never present	Cylindrical, soft and spongy, yielding readily to thumbnail	Margin, when present, identical in color and texture with body of seed; white or brown to bronze, seed scar slanting

Uses

- *C. pepo* is the most versatile and widely used spp.
  - Comprise cvs. of both summer and winter squash

- Certain summer squash cultivars of *C. pepo* have short internodes & a bushy growth habit.

- Some bush cvs are grown:
  - For their immature fruits (summer squash, courgettes, vegetable marrow)
  - At anthesis (baby squash) that are steamed, boiled, baked or fried.
    - Time to harvest for this stage of development depends on environment and cv but generally ranges from 35-50 days.

- Butternut squash (*C. moschata*) have less fiber, small seed cavity, mild flavour and intense orange colour.

Climatic Requirements

- Frost intolerant.
- Most cultivated Cucurbita spp. Can be grown at temperature 18-30 °C.
  - Damaged by chilling temperature below 13 ° C.
- Most of these are day neutrals.
- Do not grow well in wet tropics except certain forms of *C. moschata*.
- Summer squash production is more widely dispersed than winter squash.
- Soil temperature should be above 15 °C (min.) for seed germination.
- Seed germination is quick at 30-35 °C.

Soil Requirements

- Pumpkin and squash can be grown on wide range of moderately fertile and well-drained soils.

- Peat and heavy clay soils are not recommended.
  - Due to poor aeration and restricted drainage
  - That inhibit root growth and increases fruit rot.

- Maximum yields are attained on medium textured soils with high water holding capacity.

- Crop rotation of several years between planting members from the family Cucurbitaceae is recommended if pathogen populations are high.
  - Grasses, corn and sorghum are good rotation crops.

- Sensitive to herbicides, acidic conditions and salinity.
  - pH range from 6.5-7.5 is ideal for growth and yield

Land Preparation

- No-till pumpkin production works well and is gaining popularity.
  - Direct seeding or transplanting on mulched soil

- Ploughing to a good tilth because most of the cvs have deep root system.

- Bed preparation (2-3 m wide).

- No bed preparation for non-irrigated crop; seed is sown by drilling in rows 1.5 m apart.
  - Plants are thinned to 1 m apart keeping 1-2 plants per hill.

Seed Rates

- Pumpkin 5-7 kg/ha
- Tinda 2.5-5 kg/ha
- Winter squash 1-2 kg/ha
- Summer squash 2 kg/ha
- Vegetable marrow 9,000 to 11, 000 plants/ha

Sowing and Spacing

- Sowing depth is 2.5 cm in heavy soils and 5 cm in sandy soils.
- Sometimes propagated through cuttings in tropics only.
- Pumpkins and squashes are sometimes transplanted from plug trays with a root ball intact in short-season areas.
- Spacing depends upon cvs, whether bush or vining type.
- Spacing within rows varies greatly depending upon:
  - Plant growth habit
  - Fruit size & number
  - Yield

Spacing

- PXP 50-150 cm
- RXR 2-3 m
- Wide spacing allows intercropping.
- Pumpkins & Squashes can also be planted in hills of 3-5 seeds, each spaced 2-3 m apart.
- Bush cvs are spaced closer
- Population about 2-3 times greater than vining cvs.

Use of Plastics

- Mulches are sometimes used in pumpkins and squashes for:
  - Weed control
  - Clean fruit
  - Moisture conservation
  - Earliness (in summer squashes)
  - Increasing soil temperature (using clear or infra-red transmitting plastic)
  - Direct seeding/transplanting

A maturing pumpkin field using black polythene mulch and drip irrigation

Irrigation

- *Cucurbita* spp. have large leaf area that results in high evaporation.
- Many cvs are drought tolerant due their deep root system and extensive horizontal root proliferation.
- Summer squash have less extensive root system, so susceptible to drought stress.
- During active growth period, 1-inch per week in soils with high water holding capacity.
- Vine types of Cucurbita spp. require 25-35 inch water to produce a high yielding crop.
- Drip irrigation or fertigation in used with plastic-culture.

Fertilizers and Nutrition

- Fertilizers requirements are moderate compared to many other vegetables.
- Nutrient uptake by high yielding winter squash is 168-28-168 NPK/ha.
- Summer squash removes slightly less nutrients than others *Cucurbita* spp.
- Apply fertilizer according to soil test before planting and foliar test (petiole) during the season.

Fertilizers and Nutrition

- Nitrogen is the most commonly required nutrient.
  - Applied as fertigation or
  - Two side dressings
  - At 2-4 leaf stage
  - At vine spread
  - Do not over-fertilize, particularly prior to flowering and fruit-set

- N-levels must be low enough by the time of flowering so that plant can form a fewer new leaves after fruit set and growth begins.
  - This allows more sugars to move towards fruit rather than excessive vegetative growth

Fertilizers and Nutrition

- Phosphorus is sometimes needed to:
  - Promote early season growth particularly in cool soils.
  - Maximize production of high quality fruit
  - Especially in alkaline soils
- P-fertilizers can be applied as fertigation or band placement (6 inch deep) and 4-6 inch apart from seed.
  - Banding is better than broadcasting.

Fertilizers and Nutrition

- Mineral soils contain adequate potassium.
- Potassium should be applied according to soil and foliar tests.
- Can be applied through fertigation or banding during the growing season.

Fertilizers and Nutrition

Crop	FYM (t/ha)	N (kg/ha)	P (kg/ha)	K (kg/ha)
Tinda	20-30	50	100	40
C. moschata	20-25	40	80	40
Summer Squash (vegetable marrow)	20-25	110	20-30	30-40

Pollination

- Male flowers rapidly senesce and abscise the same day.
- Female flowers wither slowly and senesce after a few days.
- Full pollination requires 10-15 bee visits during the day when flower is open.
- 4-5 strong bee colonies/ha.
- Reduced photosynthetic capacity, rains, strong winds and high/low temperature extremes also reduce bee activity and consequently yields.

Harvesting and Marketing

- Summer squash is harvested after 40-50 days.
  - Regularly to avoid large sized fruit
  - Yield is 7-15 t/ha

- Pumpkins and winter cvs are harvested 80-150.
  - Yield of winter squash is 20-30 t/ha