Squash and Pumpkin Production

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Productions Requirements

Squash and pumpkin can be grown over the entire state. Low humidity is favorable for production due to lower incidence of fruit and foliar disease. Squash is grown in Oklahoma for both fresh and processing markets. Light sandy loam soils are best for early squash production. High labor requirements for harvesting summer squash and difficulty in controlling virus diseases can limit both squash and pumpkin production.

A good summer squash yield under irrigation in Oklahoma is eight tons per acre or about 400 bushel cartons. Winter squash and pumpkin should yield 12 tons per acre or more with good management and growing conditions. Yields of 15 to 20 tons are possible.

Varieties

Squash

(summer, yellow straightneck)	Lemon Drop L, Gold Bar, Multipik
(summer, yellow crookneck)	Dixie, Goldie, Paro, Tara
(summer, zucchini)	Neptune, President, Senator, Zucchini Elite
(summer, scallop)	Benning's Green Tint, Peter Pan, White Bush Scallop
(winter, acorn)	Ebony, Royal Acorn, Table Ace, Table King
(winter, buttercup)	Buttercup
(winter, butternut)	Ponca, Waltham Butternut

Pumpkin

(field)	Aspen, Big Max, Connecticut Field, Howden, Jackpot, Lumina (white)
(pie)	Jack O'Lantern, Small Sugar, Spookie
(ornamental)	Baby Boo (white), Jack-Be-Little, Munchkin

Soil pH and Fertilizer

Apply lime to maintain a soil pH between 6.0 and 6.8 if pH is too low. Based on OSU soil test results, the following quantities of P_2O_5 and K_2O are recommended.

Phosphorus per acre

When test shows	0 to 19	20 to 39	40 to 69	70 to 99	100+
Add lbs P_2O_5/A	100	75	50	25	0

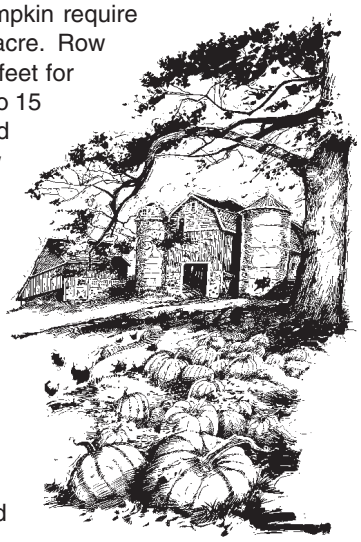
Potassium per acre

When test shows	0 to 99	100 to 149	150 to 199	200 to 249	250+
Add lbs K_2O/A	200	100	50	25	0

Nitrogen. Apply 50 lbs/A N preplant in a band along with recommended P_2O_5 and up to 50 lbs/A K_2O. Broadcast and incorporate any additional K_2O to avoid seedling injury. Three weeks after plants have emerged, sidedress with an additional 30 to 40 lbs N/A. For extended harvest of summer squash an additional 25 lbs N/A may be needed to keep plants growing vigorously.

Spacing and Planting

Bush type squash and pumpkin are usually seeded in single rows at the rate of 2 to 3 pounds per acre. Vine type squash and pumpkin require 1 to 2 pounds of seed per acre. Row spacings vary from 3 to 6 feet for bush type varieties and 6 to 15 feet for vine type squash and pumpkin varieties. In-row plant spacing will vary from 1 to 3 feet for bush types and 3 to 5 feet for vine types. Plant seeds at a depth of 3/4 to 1 inch. Thin seedlings to desired in-row spacing when plants have three or four leaves.



Squash and pumpkin seed will not germinate at soil temperatures below 60°F, and the most rapid

germination occurs at 90°F, so delay planting until after the date of the last spring frost. Pumpkins grown for Halloween should be planted in mid-June for late September and early October harvesting and marketing.

Cultivation and Chemical Weed Control

Shallow mechanical cultivation and hand hoeing are needed to control weeds before plants have vined. Pruning roots and vines with cultivating equipment slows plant development and reduces yield. Several pre-emergence herbicides are available that will control germinating weeds and grasses in seeded and transplanted squash and pumpkin. Consult the most recent revision of OSU Extension Facts No. HLA-6008, *Weed Control in Vegetables,* or the latest edition of Circular E-832, *Extension Agent's Handbook of Insects, Plant Disease, and Weed Control.*

Field Scouting for Plant and Pest Development

Fields should be scouted at minimum once per week after planting by walking across the entire field in a V-shape or X-shape pattern, and recording plant development and weed and insect occurrence and numbers. Results of surveys will be needed to make decisions regarding projection of harvest date, need to bring in honeybees for pollination, and pest control.

If known, scout for diseases in areas of a field in which diseases tend to appear first. Otherwise, use the V-shape or X-shape sampling pattern outlined for insects. Some foliar diseases will appear where air circulation is reduced and leaves remain wet, such as in low areas and along borders sheltered by trees. Foliar diseases typically appear first on crown leaves close to the base of the main stem. Root diseases tend to appear where soil remains wettest, such as in low areas and in heavier soils.

Insects

Fields previously in sod or having heavy infestations of weeds in the prior year should be treated with a soil applied insecticide at planting to control soil insect pests, including cutworms. Small seedlings are extremely susceptible to feeding damage from adult striped and spotted cucumber beetles and may need to be treated with a foliar applied insecticide to prevent complete defoliation and/or infection by bacterial wilt which is transmitted by cucumber beetles.

Squash bug is the key pest of squash and pumpkins and will destroy the crop if not controlled. The squash bugs must be controlled early in the growing season and can best be located by examining the undersides of leaves for eggs which are laid in groups. Young nymphs are the easiest life stage to control and should be targeted for insecticide applications. The nymphs are most easily located in close proximity to egg clusters just after hatching. Aphids and mites can cause damage to leaves and leave deposits on fruit reducing marketable yield. Low numbers can be tolerated throughout most of the season, and scouting results will indicate whether populations are increasing and should be controlled.

Good fruit set and development on squash and pumpkins are dependent upon insects, primarily honeybees and bumblebees, to adequately pollinate the female flowers. Flowers are most receptive to pollination during the morning hours. Flowers should be examined to determine activity of bees. If fewer than one bee per ten flowers is noted during the morning hours, the producer should bring beehives into the field to ensure adequate pollination.

Diseases

Squash and pumpkin are susceptible to several diseases that attack the roots, foliage, and fruit. The most common diseases in Oklahoma have been powdery mildew and virus diseases. Angular leaf spot, downy mildew, Phytophthora rot, other fruit rots, bacterial wilt, root rots/vine declines, and root-knot nematode also have been problems. Consult OSU Extension Circulars E-853 or E-929 to help identify these diseases.

Disease control is essential in the production of high quality squash and pumpkin. A preventive program that combines the use of cultural practices, genetic resistance, and chemical control as needed, usually provides the best results.

Cultural practices are useful for limiting the establishment, spread, and survival of pathogen that cause squash and pumpkin diseases. Many of the fungal, bacterial, and nematode pathogens survive in old crop debris and in soil. Fields should be rotated with non-cucurbit crops for at least three years to reduce pathogen levels. Grass crops are ideal for rotations where nematodes are a problem. Fields with the proper soil characteristics should be selected. Avoid acid soils or fields with a history of Phytophthora rot or root rots/vine declines. The selection of well drained soils is essential for minimizing fruit rots. Late plantings should not be situated nearby and downwind of early planted cucurbit fields where foliar or virus diseases already exist. Avoid the movement of contaminated soil or plant debris into clean fields on workers or farm equipment. Diseases such as angular leaf spot are known to be carried on seed. This can lead to the introduction of disease into fields. Purchase seed from reputable sources and apply a fungicide seed treatment prior to planting. Most foliar diseases are spread by water-splash or favored by long periods of leaf wetness. Utilize drip irrigation or avoid frequent sprinkler irrigation with small amounts of water. Finally, use tillage practices that promote the rapid decomposition of old vines and fruit soon after harvest.

The use of disease-resistant varieties is an economical means of managing diseases. Unfortunately, only a few disease-resistant varieties are available for squash and pumpkin. Varieties have been recently developed and released with either virus or powdery mildew resistance. These should be tested for local adaptation until trial results become available.

Management of foliar diseases such as powdery mildew may require fungicide sprays. Fields should be monitored at least weekly for early disease detection. Late planted fields are most vulnerable to powdery mildew. Spray programs should be initiated shortly after the first appearance of disease, or beginning at flowering to prevent disease in late plantings. A 14-day schedule has been effective in most instances, although a 7-day schedule may be required where powdery mildew is severe. Management of bacterial wilt may require the use of insecticide to control cucumber beetles which spread the disease. Consult OSU Extension Circular E-832 for a listing of fungicides approved for use on squash and pumpkin.

Pesticide Applications

Insecticide applications should be made only when necessary as determined using results of field surveys. For control of diseases, fungicides are most effective when applied before disease begins to increase. The potential for very rapid increase is greatest shortly before harvest when the canopy is most dense or anytime during prolonged periods of rainfall. Effective squash bug control is dependent upon sufficient penetration of the leaf canopy by the insecticides to contact and kill the bugs. Insecticides and fungicides should be selected based on proven effectiveness. Ground applications should be made in a minimum spray volume of 20 gallons per acre at 40 psi to ensure adequate canopy penetration and foliar coverage. Aerial applications should be in a minimum of 5 gallons per acre. Chemigation is an effective method for applying some fungicides.

Beehives maintained near fields for pollination must be protected from spray drift by removing the hives or covering them. Additionally, the bees working the fields must be protected by using insecticides with a low toxicity to bees and by withholding applications until late in the day when bees are less active.

Irrigation

Irrigate summer squash with moderate amounts of water since they root only three to four feet deep but have many shallow roots. Winter squash and pumpkin root deeper and require less frequent irrigation. Moisture stress during summer squash harvest can seriously reduce yield. When overhead irrigation is used, water should be applied early in the day so leaves can dry before nightfall to reduce the incidence of fruit-rotting and foliar diseases.

Harvesting and Handling

Summer squash are harvested over several weeks and must be harvested every other day during the peak production season. They are harvested as soon as fruit is of edible size, but before the skin begins to harden. Varieties with long fruits are harvested when less than 3 inches in diameter and up to 6 to 8 inches long. Scallop squash are harvested when 3 to 4 inches in diameter. Summer squash are very tender and must be handled with great care to prevent mechanical damage. Defective and large summer squash fruits should not be allowed to remain on the plant as this reduces additional fruit set. Summer squash should be cooled before shipment to maintain quality.

Winter squash and pumpkin are harvested when mature, and are normally harvested in one or two pickings. The skin is hard and resists denting by thumbnail pressure when mature. Winter squash and pumpkin can remain in the field through a light vine-killing frost but should not remain in the field during a hard freeze. When harvesting, the stem is cut, leaving a stub attached to the fruit. They should be handled carefully to avoid breaking the skin and bruising the fruit. Summer squash is usually packed in 1/2 or 5/9 bushel crates or cartons weighing 21 pounds or in 1 1/9 bushel crates weighing 42 to 45 pounds. Winter squash are commonly packed in 1 1/2 bushel crates weighing 40 to 45 pounds.

Curing and Storage

Summer squash are perishable and should not be stored. They can be held up to one week before marketing at 45° to 50° F and 90 to 95 percent relative humidity. Winter squash and pumpkin can be stored for later marketing. If stored, they should be cured to harden the shell, insure maturity, and to heal any cuts and scratches. To cure, winter squash and pumpkin are held for 10 days at 80° to 85°F and 80 percent relative humidity. Winter squash and pumpkins are stored at 50° to 55°F and 50 to 75 percent relative humidity. Acorn squash can be stored up to two months and butternut squash and pumpkin for two to three months.

Related Extension Publications

E-832 *OSU Extension Agent's Handbook of Insect, Plant Disease, and Weed Control*
E-853 *Cucurbit Production and Pest Management*
E-929 *Guide for Identification and Management of Diseases of Cucurbit Vegetable Crops*

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Extension carries out programs in the broad categories of agriculture, natural resources and environment; family and consumer sciences; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

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