



## Winter Squash Growing

**Learn about winter squash. Whether you'd like to grow it, eat it or use as fall décor, the seasons favorite "fruit" offers rewards to small farmers.**

By Rick Gush  
About the Author

Rick Gush is an American small farmer based in Italy. All young agriculture students should be required to grow a field of winter squash for a few seasons. Not only would they raise some money by producing a desirable crop, they would likely have the opportunity to witness firsthand almost every plant pest and disease that afflicts American farmers.

Among the potentially crop-destroying pests that attack winter squash fields are: squash bugs, melon aphids, spider mites, vine borers, nematodes, bacterial wilts, stem blight, black rot, Phytophthora blight, anthracnose, powdery mildew, downy mildew and many viruses. And these are merely the ones that can wipe out the entire crop for a few years.

But squash vines are incredibly tough and prolific, and can produce as much as 25 tons of durable fruit per acre if everything goes right, which is enough to make any farmer smile. In spite of all the potential pest hazards, the key to success for winter squash growers seems to be on the marketing end. A squash grower needs to make a solid commitment to be either a conventional grower and sell his crop to the canneries and the wholesalers, or to become a value-added grower, and spend the extra effort to package his product and sell it at retail.

### WHO'S GROWING IT?

In America, the large commercial winter squash farmers are generally in the Southern states, and most sell their crops to the canneries. In the North, winter squash is more of a fall holiday crop, and is frequently sold directly to retail customers.

When the pumpkin cousins are included in the survey, the most notable winter squash and pumpkin-producing states are Florida, California, Georgia, New Jersey, Texas, Illinois, New York and Pennsylvania. But the top four producing states, based on harvested winter squash acreage alone, are Texas (3,500 acres a year), followed by Tennessee (1,500 acres), and Virginia and North Carolina (over 1,000 acres each).

### GROWING SQUASH

Winter squash grows during the warm season on an annual vine, and in the commercial growing regions is most often not irrigated. Irrigation is highly desirable for the small farmer however, especially one growing for the retail market. Irrigation allows for much more flexible timing, and generally allows the production of larger and healthier fruits.

### Squash Nutrition

Winter squash is a good source of fiber, and low in calories, fat and sodium. One small serving can provide a third of the daily requirement for vitamin C.

Winter squash can be a key ingredient in vegetable dishes, salads, soups, main dishes, breads and desserts.

Spaghetti squash is not just a novelty anymore, but is now considered a serious low carbohydrate pasta substitute.

Winter squash is higher in calories than summer squash but is also higher in vitamin A (beta carotene), vitamin C, potassium, folic acid and niacin.

The high beta-carotene content of winter squash causes the golden-orange color of the flesh. Many farmers grow winter squash on black plastic. The plastic increases the soil temperature, reduces water evaporation from the soil, and is an effective barrier against weeds. Plastic is often used for several successive crops and is most useful in irrigated fields. Some dry-field farmers cover the vines with soil at the leaf joints to promote formation of secondary roots and increase drought tolerance.

A primary concern of squash growers is the inevitable battle with insects and diseases. It's usually a difficult fight. Squash plants are so particularly attractive to insect pests that many melon farmers establish squash plantings near their fields to lure the insect pests away from their melon plants.

In general, adult insects and established diseases are very difficult to eradicate. The timing of pesticide applications is



crucial. Most sprays either provide pre-infestation protection or target the young pest individuals, as these tactics are the only methods that have any possibility of success.

Winter squash farmers must be careful not to leave extra crop residues in their fields, as many diseases and pests reside in the debris. Although many pests are quite mobile, crop rotation is still important. Most squash farmers exclude tomatoes, peppers and eggplants from the rotation, as these crops are also likely to attract many of the same pests that plague squash.

Field selection can also be problematic, as it is most desirable to protect squash crops from exposure to neighboring woodlands, neighboring fallow fields, and neighboring alternate host crops. Some protection from wind is also desirable. U-pick and other retail sites must also consider customer visibility and access.

As if the crop didn't have enough potential difficulties, the male and female flowers appear on the plant at slightly different times, thus making self-pollination by bees and other insects less likely.

### BEES AND POLLINATION

Winter squashes require insects to pollinate their flowers. Unfortunately, even with a few male flowers on some plants, and a few female flowers on some others, there aren't enough flowers in a squash field to attract masses of bees.

So, in most large operations the squash growers need to assist in the pollination process. Sometimes growers will plant other flower-intensive crops in patches within their fields, hoping that the bees that are attracted to the target crops will also stop along the way and pollinate the squash flowers too. Some small growers have their own beehives, which they move into the fields during the pollination period, but the largest growers—with many acres of squash—are frequent customers of traveling beehive rental services that visit their areas in the spring.

### PESTS

The squash bug is the squash plant's single most serious pest. Adult squash bugs overwinter in organic debris, crop residues, under boards or rocks and in other protected niches. They emerge when the weather warms up and they reproduce early in spring. The orange or yellow egg masses are laid on the underside of leaves, and the red-headed nymphs hatch in about two weeks. Squash bugs stink when they are crushed. Both adults and juveniles suck plant juices and in the process they inject a toxic substance that causes the plants to die back.

Many smart squash growers wait until late in the season to plant their squash seeds. (This is one reason being able to irrigate is desirable.) Delayed planting can be one of the most effective means of avoiding squash bug damage; if the overwintering bugs are unable to find host plants when they emerge from winter dormancy, they will starve or fly away.

Field sanitation techniques are important in depriving the adults of overwintering sites. Crop rotation is generally recommended for farm fields, but this tactic provides little control against squash bugs because they can move easily from one location to another.

Mulch piles will actually attract squash bugs, but a healthy community will reduce infestation problems. Organic growers are advised to compost everything before applying it as mulch, use parasitic wasps and encourage a lively field ecosystem that will include other squash bug-controlling organisms.

Most insecticides have generally proven to be only marginally effective against squash bugs. If sprays such as insecticidal soaps are used, they must be sprayed to target the young nymphs soon after they hatch, because this is the most susceptible phase of the squash bug life cycle. Even the harsh artificial pesticides used by commercial growers are difficult to apply effectively, and must rely more on good timing than brute force.

### YIELDS

#### Corn, Beans and Squash Agriculture

In most of the early North American civilizations, corn, beans and winter squash were planted together in the same cropping system. The plants grow well together and a diet of the three vegetables provides a balance of essential amino acids. When grown together, these three crops optimize available resources. Tall corn provides a support for the bean vines and the squash spreads across the ground. The mutual benefits include weed suppression, water conservation, nitrogen fixation, and increased resistance to insects and disease.

Scientists think the first domestication of cucurbits was about 10,000 years ago in South and Central America. They also think that this is about the same time and place that corn was first domesticated.



The Hopi and other Southwestern natives have used dry farming for over 1,000 years. Corn, beans and squash are still planted today in a variety of locations where rain or floodwater may collect, and multiple areas are planted with the expectation that some plantings will thrive while others will wither from lack of water.

The East Coast native people, such as the Algonquin, also grew corn, beans and squash among their active agriculture systems. These three crops were favored because of their ability to be stored for sustenance during the winter months. Native American culture usually abandoned planting areas every few years because they felt that continual cultivation would ruin the soil. This may have been the first crop rotation system in human agriculture.

Even today, the intercropping system of corn, beans and squash is common in the tropics among rural farmers. The low-input, high-yield system is in direct contrast with the imported western agricultural practices.

The number of squash plants per acre varies widely, from 1,000 to 7,000, and plants can produce from one to seven fruits per vine. The bigger fruits can weigh 20 pounds each. Commercial processing varieties average about 10 pounds each, while the fruits commonly sold these days at retail are smaller than they used to be, averaging two to three pounds each. The larger winter squashes are usually sold now in roadside markets or pumpkin patches, and the practice of selling single slices of the larger fruits is common at farmers' markets.

Normal winter squash crops of regular large-fruited varieties should yield about 12 tons per acre, or from 1,000 to 2,000 fruits. Of course, with excellent management and nice weather, yields of 15 to 20 tons per acre are possible. And every once in a while, growers can coax 25 tons per acre of harvested squash from their fields. The popular smaller varieties usually yield less: about five to seven tons per acre, or 2,000 to 5,000 fruit.

#### HARVEST

Winter squash need a 120-day growing season for the fruits to reach maturity. Harvest is usually done by hand to avoid bruising the fruits, and for best flavor and texture, winter squash should be allowed to ripen fully on the vine. A light frost can further improve the flavor by changing some of the starches to sugars. In general, once the vines begin to die back and the shells are hard, the squash is ready to harvest.

After they are removed from the vine, pumpkins and winter squashes should be cured in a warm, dark location for a week or more prior to being stored. Before storing, squash is also often washed and disinfected by being dipped in hot water or a weak bleach solution. This disinfecting helps prevent fungal and bacterial rots from starting in small cuts or crevices on the skin.

Winter squash should be stored long term in a cool room at about 55 degrees F. Squash should not be stored near apples, pears or other ripening fruit that releases ethylene gas. If stored properly, squash is often wonderfully edible even six or more months after harvest, which explains why there are usually nice winter squash for sale at the markets even in July.

#### SQUASH VARIETIES

Squashes, gourds, cucumbers and pumpkins are known collectively as the cucurbits (kew-cur-beets). These plant parts are usually eaten as vegetables, but botanically they are referred to as fruits. The term "winter squash" refers specifically to the squash cucurbits that are stored for future consumption, as opposed to the summer squash, that are consumed fresh.

There are four main species of squash, and each species has a number of varieties. Hubbard and banana squashes are in the species *Cucurbita maxima*; butternuts are *Cucurbita moschata*; acorn and spaghetti squashes, along with zucchini, yellow summer squash, and common pumpkins belong to *Cucurbita pepo*. Finally, the species *Cucurbita argyrosperma* (*Cucurbita mixta*) is represented by the cushaws and other squashes used for commercial processing.

Although true pumpkins are from the *Cucurbita pepo* species, all four of the winter squash species produce some form of fruits called pumpkins.

Cucumbers are also cucurbits, and they all belong in the *Cucumis* genus. Other non-cucurbit, but squash-type plants that are grown include bottle gourds (*Lagenaria siceraria*), luffa sponge (*Luffa aegyptiaca*), bitter gourds (*Momordica charantia*), and wax gourds (*Benincasa hispida*).

Hubbard is probably the single most commonly grown winter squash variety. It's very large and hard-shelled and has been popular for centuries because it stores well and reliably produces fruits that weigh up to 12 pounds each.

These days, rediscovered "new" varieties, like red kuri from Japan, lakota, a native American variety, and blue ballet, a once rare variety, are showing up in fields more frequently, along with legitimate new varieties such as Cornell University's recent introduction of a new delicata variety that is more pest resistant than the old delicata varieties. Open-pollinated varieties like these are more frequently becoming agricultural breeders' goals and tools. There is also a strong feeling among growers that smaller fruiting varieties will be more popular among retail customers than the old behemoths.



## SQUASH ECONOMICS

It is doubtful that many small farmers will suddenly begin growing squash for the canning industry. We as a nation eat less than a pound per individual of processed squash each year, a figure that has remained relatively steady for many years. Unless your farm is geographically placed among many other farms that are already growing winter squash for the canneries, you are far more likely to take advantage of the value-added marketing strategies for your winter squash. New small farmers are mightily encouraged, via several government publications, to enter the pumpkin and winter squash industry from the “entertainment farming and agritourism” aspect.

Value-added means in this case that you will sell the product at retail, and that you will make some effort to enhance the buying experience for your customers. In short, you will want your customers to be attracted to the romance of the farm and the farm products. If you do it right, your customers will be emotionally enriched by the experience of interfacing with our agricultural past.

If you are selling at the retail level, you’ll appreciate having multiple products with which to tempt your customers. You will probably find it most profitable to grow a selection of the major fall cucurbits. Growing pumpkins, big winter squashes, small winter squashes and gourds all at the same time is advised. Colored “Indian” corn is another complementary product that should be considered.

If the idea of selling at retail is not for you, you might consider the possibilities for supplying products to another farmer who does sell to retail customers. You may find a perfect niche by supplying your products to a roadside stand or a farmer’s market seller.

There are always new angles to use when marketing cucurbits. New varieties, smaller fruits that provide one-meal quantities for two people, and promoting edible pumpkins are some of the current major cucurbit marketing angles. Of course, in America, Halloween and Thanksgiving are two fall holidays that give a strong push to the sale of pumpkins, gourds and winter squash, but there is a greater penetration into the mainstream edible vegetable market.

As with all new crops, farmers are advised to make a diligent survey of the current practices in their area, and determine exactly how they are going to raise the crops and who their customers will be before they plant any seeds.

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