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WINTER SQUASH (*Cucurbita pepo*, *C. maxima*, *C. moschata*)

At Johnny's, we devote considerable time and attention to our winter squash breeding, trialing, and seed production programs. We offer acorn, buttercup, delicata, hubbard, butternut, kabocha, and spaghetti squash varieties, from heirlooms to newcomers, many of which we have bred here in Albion, Maine, and all with excellent eating quality. Some varieties are delicious right from the field, whereas others increase in flavor following weeks or months of curing and storage. Follow the recommendations in this tech sheet for best results, and see the additional resources in our Grower's Library to learn more about winter squashes, including how to ensure each type you grow is enjoyed at its peak eating quality.

SITE SELECTION

Winter squash grow best in fertile, well-drained soil with a pH of 6.0–6.8; a pH of 6.5 is ideal. Conducting a soil test prior to planting can indicate whether it is necessary to add any soil amendments. Winter squash plants like consistently warm temperatures, ideally between 65–75°F/18–24°C. Temperatures below 50°F/10°C, or above 90°F/32°C, can be detrimental to plant growth and fruit set. The use of plastic mulch and row covers can aid in achieving optimal growing temperatures, especially for early-season plantings.

Maintaining proper soil moisture is particularly important in the initial stages of growth and during pollination when fruits are setting. Drip irrigation is recommended to prevent excess water on the foliage, which can lead to disease. While water requirements change with plant maturity, soil type, and climactic conditions, a good rule of thumb is to ensure plants receive the equivalent of one inch of rain per week.

DIRECT SEEDING

Sow beginning in late spring, after danger of frost has passed, when soil temperatures are at least 60°F/16°C. The window of optimal germination temperature is 70°F/21°C–90°F/32°C. Seeds will rot in cool, wet soil.

Growers use a wide variety of spacings, both in-row and between-row, for winter squash. Generally, long-vined varieties or those with large fruit require more space than those with a bush or semi-bush habit. For bush or short-vine types, we recommend a combination of between-row and in-row spacing that results in providing about 6–12 sq. ft. per plant.

For varieties with long vines and/or larger fruit, 24–36 sq. ft. per plant is preferable.

Wider spacing may allow for easier harvesting. Tighter spacing can result in production of greater numbers of smaller fruit. 'Butterscotch PMR,' for example, will produce smaller, 1-lb., "single-serving-size" fruits when grown at 6 sq. ft. per plant. The table below offers some common spacings; growers should find a combination that works well for their space restrictions, equipment, and growing system.

Sow 1–2 seeds at a depth of ¾–1½ inches. Thin to one plant at desired spacing. Some growers choose not to thin, and to have multiple plants at each hill, to slightly increase yield and decrease fruit size.

Plant Habit	Between Row Spacing (ft.)	In-Row (Within-Row) Spacing (ft.)
Bush or Short Vine	6'	1½–2'
Long Vine	12'	2–3'
'Butterscotch PMR'	6'	1'

TRANSPLANTING

Transplanting instead of direct seeding can avert the germination problems often associated with direct seeding and allow for an earlier crop in short-season areas. Winter squash can be prone to transplant shock, however, so it is important that seedlings do not become root bound and to ensure ideal transplanting conditions, to the extent possible.

Start seeds indoors in pots or cell-type containers, such as 50-cell plug trays, 3 weeks before transplanting. Sow 1–3 seeds per cell, 1 inch deep, ideally maintaining the temperature between 75°F/24°C–86°F/30°C until germination. Thin to 1–2 plants per cell as soon as possible after germination. Thin by trimming rather than uprooting unwanted seedlings, to avoid disturbing the roots of the remaining seedlings.

After the last frost, or when outside temperatures are consistently above 50°F/10°C, harden off the seedlings for a few days prior to transplanting. Once hardened, transplant at the appropriate spacing for your system and the variety's requirements.

MULCHING & ROW COVER

Plastic mulch and row covers can aid in achieving earlier crops and better yields, especially at higher latitudes. Not only do they add warmth to ensure consistently warm conditions, properly laid row covers can also exclude insect pests. Most growers cover newly transplanted crops with floating row cover immediately after planting.

Remove row covers once the plants bear female flowers, to allow for insect pollination. A female flower can be identified by the tiny fruit developing at the base of the blossom.

DISEASES

Risk of diseases can be mitigated with adequate soil drainage, good airflow, insect pest control, and crop rotation. Selecting varieties with resistances to the disease pressures in your area can also prove beneficial. For positive identification and control options of suspected disease, please contact your local Cooperative Extension Service agent.

Powdery mildew

Most prevalent midsummer to the end of the season, powdery mildew can be identified by the white powdery spots found on older leaves and stems. The fungus that causes the infection requires live plant tissue to survive. Infection by powdery mildew can also leave plants more susceptible to contracting gummy stem blight.

Downy mildew

The pathogen that causes downy mildew in winter squash is host-specific to members of the cucurbit family. The symptoms are pale spots that follow the

leaf veins on the upper leaf surface and purplish-gray spores on the lower surface, producing black “fuzz” on the underside of the leaf. Due to the damage to the leaves, infection can reduce yields.

Phytophthora

This blight is most common in wet fields with poor drainage and compaction issues. Symptoms on roots, vines, and foliage is a browning of tissue and rot. Lesions will typically form on the fruit, before causing it to rot as well. The disease will spread quickly given the right conditions, and will often destroy whole fields. Spores can survive in the soil for over ten years, so proper cleaning and sanitation should be taken if transferring equipment or traveling between clean and infected fields.

Black rot

This disease is extremely destructive to winter squash fruit that has been put into long-term storage. Fruit develop tan-to-white petrified areas in distinctive concentric rings which typically develop into soft, blackened areas with conspicuous fruiting bodies. Presence of the disease can be minimized through proper crop rotation, early removal of infected plants and fruit, and proper storage conditions.

Bacterial wilt

Infected leaves will wilt and droop, in addition to signs of insect damage, especially when there is heat and water stress. Severe infections cause plant death. Control pressure from cucumber beetles, as they can carry and transmit bacterial wilt — see the Insect Pests section for information on cucumber beetles. Pull up infected plants as soon as they are identified with bacterial wilt and destroy.

Cucumber mosaic virus

Cucumber mosaic virus is spread by aphids. Leaves of infected plants fail to form fully and often droop at the edges, resulting in an umbrella-like appearance. Fruit often show atypical color streaking. Varieties with the precocious yellow gene that are infected with cucumber mosaic virus may not show signs of color streaking.

INSECT PESTS

Insect pests can be excluded from plantings by use of floating row cover. Keep field borders mowed and remove plant debris in the fall. Plow fields in the spring to bury pupae. Pyrethrin sprays may offer some control.

Cucumber beetles

Control of cucumber beetles is important, as they can vector the bacteria that cause bacterial wilt, in addition to causing feeding damage. Beetles are small with yellow bodies and either black spots or stripes. Protect against cucumber beetles with floating row covers applied at transplanting, or control with pyrethrin or azadirachtin.

Squash bugs

Large for insects, adults are gray, with elongated, pentagon-shaped bodies, and can cause significant feeding damage. Squash bug eggs can be found on the underside of leaves and then crushed by hand.

Vine borers

The larvae, light in color with soft bodies and a dark head, cause the most damage by burrowing into the vines, resulting in wilting and progressive damage. Should you find vine borers in your crop, cut the borers out of the vine and then hill soil over the wound.

HARVESTING FRUIT

Appropriate timing of the harvest is important to ensure optimal eating quality of the fruit. If squash is harvested before it is mature, it will not have adequate starch, resulting in lower eating quality. Waiting too long, on the other hand, increases the risk of frost damage and disease. Learning the fruit ripeness indicators of each squash species is key to proper timing of the harvest.

When it is time to harvest the fruit, care should be taken not to bruise or damage the skin, as this will lead to rapid decay in storage. Avoid chilling injury in the field prior to harvest, when temperatures drop below 50°F/10°C, as this will accelerate decay in storage. The further below 50°F/10°C and the longer the fruit is exposed to these conditions, the worse the chilling injury.

STORAGE

Many varieties of squash need to be cured before they can be properly stored and eaten, which requires being stored for 5–10 days at 80–85°F/27–29°C and 75–85% RH. After this they can be moved to long-term storage. Winter squash should be stored in a cool, dry, well-ventilated area. A temperature range of 50–55°F/10–13°C and 50–75% RH is ideal. High temperatures and high relative humidity in storage will promote decay. Long-term storage potential of fruit varies by variety and by species, and ranges from 2–6+ months. Many varieties are not palatable until after some time in storage as well, as the starches in the fruit takes time to convert to sugar. For specifics, please consult our Winter Squash Curing & Storage Chart.