

All species of pumpkin are native to the western hemisphere, with most originating in tropical America. The plants have large leaves and sprawling vines with coiled, modified leaves called tendrils, although these may be absent on some bush varieties. The pumpkin's taproot can grow as deep as 5 feet. Lateral roots, however, are near the surface and are generally longer and more extensive.

Pumpkins are monoecious, which means male and female flowers occur on the same plant. Bees are usually required for effective pollen transfer. Like other cucurbits (plants in the Cucurbitaceae, or gourd, family), the appearance of male and female flowers is affected by day length. The first flowers of the season are usually males, followed later by females that produce the fruit. Pumpkins will cross with other plants of the same species, but will not cross with cucumbers, watermelons, or cantaloupes.

Pumpkins and winter squash have similar characteristics, but pumpkin rinds are generally softer than those of winter squash. When mature, most pumpkins have a characteristically orange color, although the rinds of some winter squash can also be orange. Pumpkin flesh is generally coarser, with a stronger flavor. Most pumpkins are a good source of vitamin A.

Pumpkins were originally grown for their seed, not their flesh. Pumpkin seeds are often roasted and salted, and are a nutritious snack. Some varieties have been developed for their naked seed, a mutation that produces seeds without the normal tough seed coat.

Male pumpkin blossoms can be sautéed in butter, or dipped in egg batter and fried. There are more male blossoms than female blossoms, and limited harvest of male blossoms probably will not affect yields.

TEMPERATURE AND SOIL CONSIDERATIONS

Pumpkins are a warm-season crop, requiring a relatively long, warm growing season. The soil temperature at

a 2-inch depth should be at least 60°F for good seed germination. Plants grow best if daily temperatures are between 60 and 80°F. Pumpkin roots are inefficient in cold soils, which can cause plants to permanently wilt.

Pumpkins are adapted to a wide variety of well-drained soils. Light-textured soils are preferred in colder areas of New Mexico because they warm up more quickly in the spring. Pumpkins do not tolerate wet or poorly aerated soils. Large amounts of soil organic matter and a soil pH of 6.5 to 7.5 favor maximum production.

SEEDBED PREPARATION AND FERTILIZATION

Most soils can be improved by incorporating some organic matter. Composted manure can be applied in the fall at a rate of 10 to 20 tons per acre. Green manure crops (winter rye, wheat, or barley) planted in fall and turned under a month or two before planting are good sources of organic matter. A broadcast application of nitrogen fertilizer at a rate of 30 to 50 pounds per acre of nitrogen will help microorganisms break down the organic matter.

In addition to plowing and disking, chiseling or subsoiling fields before planting promotes deeper root penetration, particularly in compacted soils. Preplant fertilizer treatments can be incorporated in the final disking operation for sprinkler irrigation, or by listing for furrow irrigation. Depending on row spacing, listed beds can be flattened on top (vegetable beds) with a bed shaper or rototiller to keep pumpkins out of irrigation furrows to reduce fruit rots. Fields should be laser leveled if a flat vegetable bed is required.

To avoid salt burn on young seedlings, all potassium (100 to 150 pounds per acre of K_2O) and half the nitrogen (35 to 60 pounds per acre of N) fertilizer requirements for a pumpkin crop should be broadcast as a preplant application. Phosphorous (60 to 100 pounds per acre of P_2O_5) can be broadcast or applied in a band

¹Extension Vegetable Specialist, Department of Extension Plant Sciences, New Mexico State University.

2 inches below and 2 inches to the side of the seed row. Phosphorous rates can be cut in half if banded.

The second application of nitrogen (35 to 60 pounds per acre) should be applied as a sidedressing 8 to 10 inches to the side of plants and 1 inch deep when plants begin to form vines. Nitrogen fertilizer applied too deeply or too close to the vine can cause root damage and reduce yields. All fertilizer application rates, including secondary and minor nutrient requirements, should be based on soil analysis recommendations.

PLANTING

Vining habit and fruit size of each variety should determine distance between rows and plants. Row spacing varies from 5 to 12 feet for large-fruited vining varieties, with 2 to 6 feet between plants. Bush varieties are planted in rows 3 to 6 feet apart, with plants 1 to 3 feet apart within the row.

Seeds should be planted 1 to 2 inches deep, preferably in moist soil (pre-irrigated beds that are dry to the touch on top). Seeds planted in dry soil and left unirrigated for any length of time are subject to attack by rodents. Growers occasionally plant in hills (2 to 3 seeds/hill) and thin to a stand. Plants are thinned when they have 2 or 3 true leaves. To avoid disturbing roots of plants that remain in the hills, cut excess plants off at the soil surface; do not pull them.

IRRIGATION

Pumpkins can be irrigated less often than summer squash because they have deeper root systems. There are, however, three critical growth stages when moisture stress can be a major problem: seedling emergence, early bloom, and 10 days before harvest.

Inadequate moisture at planting can result in poor and uneven emergence, particularly in areas where soil crusting is a problem. Crusts should be carefully broken mechanically or kept moist by irrigation until plants emerge. Shortages of water at bloom can result in poor fruit set and misshapen fruit. When leaves begin to wilt, blossoms will drop rather than set fruit. Moisture stress 10 days before harvest can result in a rapid decline of vines with a reduction in fruit size.

Furrow irrigation is the best way to apply water because moisture on the leaves from sprinklers can increase the incidence of foliar diseases. Seeds should be planted 2 to 4 inches from the edge (closest to irrigation furrow) of a flat vegetable bed. Water should never be allowed to flow over the top of the bed because it will form a crust; instead, it should be allowed to soak slowly through the beds until they are soaked in the middle. This concentrates salts in the middle of the beds, away from developing seedlings.

If overhead sprinklers are used, apply water in the morning to give leaves a chance to dry before nightfall. Do not sprinkle in midmorning during bloom when bees are active. Sprinkling will reduce bee activity, resulting in poor fruit set and small and misshapen fruit.

POLLINATION AND FRUIT SET

Pollen from male pumpkin flowers is not carried by the wind; bees are usually needed for pollen transfer from male to female flowers. At least one strong honeybee colony per acre is needed for good pollination, although pollen transfer can be accomplished by wild bees. Bee activity may decline during cold, wet, or windy weather. To avoid killing bees, spray insecticides only in late evening or early morning. Hives should be covered with tarps before spraying; remove tarps immediately after spraying.

Although the female flowers are receptive to pollen throughout the day, they generally close in the early afternoon. Whether they set fruit or not depends on whether they were properly pollinated and the plants' condition. Fruit set also depends on the number of fruit already set on the plant. If there are several fruit already set on the plant, further fruit set may be delayed.

HARVESTING AND STORAGE

Pumpkins grown for Halloween sales must be ready for market by early October. Pumpkins will withstand light frosts that can kill vines, but pumpkins should be removed from the field before heavy frosts occur.

Pumpkins should be harvested when fully grown and well-colored. The rind should be hard enough to resist denting by thumbnail. Fruit can be cut from the vines with pruning loopers, leaving approximately 1 1/2 to 2 inches of stem attached to the fruit. Longer stems tend to get broken off in transport, which makes an entry wound for bacteria that cause rot.

New Mexico pumpkins are generally cured in the field for a week before transport. Fruit are put in windrows for easier handling when loading on trucks. Curing pumpkins in a windrow lets small cuts and bruises heal (callous) before transport, which reduces rot in transport and storage. When loading, cull all diseased, insect-damaged, and bruised fruit. Care should be used not to bruise any fruit taken to market. Pumpkins are normally loaded in bulk (loose) in trucks or in large bulk boxes that can be handled with a forklift.

If pumpkins are to be stored for any length of time (pie pumpkins), they should be cured for at least 10 days at 80 to 85°F and 80% relative humidity, then stored in a dry, well-ventilated area between 50 and 60°F.

PEST CONTROL

The squash bug is a major pest on pumpkins, particularly in warmer areas of the state. The flat-backed, brownish-black adults can grow to 5/8 inch long or more. Brownish eggs are deposited in neat rows on the undersides of leaves. Nymphs that emerge, along with existing adults, puncture leaf tissue to feed on plant sap. Heavy infestation will cause vines to wilt and die.

Because adult squash bugs overwinter in plant trash, field sanitation is important to control this pest. Registered insecticides should be sprayed on the underside of leaves to control young nymphs when they first appear.

Both striped and spotted cucumber beetles can be a problem when pumpkins first emerge. These beetles transmit bacterial wilt, which can cause severe losses later in the season. The small (1/5-inch) yellowish-green beetles with longitudinal black stripes or black spots will riddle young plants by chewing on them. Registered insecticides should be applied as soon as plants emerge.

Wilted vines can also be a sign of the squash vine borer. The brown-headed, 1 to 1 1/4 inch-long white caterpillars can be found tunneling inside the stems, causing the plants to suddenly wilt and die. Sawdust-like excrement can often be seen coming from holes in the stem near the soil line. Pupae of this borer overwinter in the soil and emerge about the time vines begin to run. Small, black, wasp-like moths emerge when the pupae split and lay eggs on the stem bases. Larvae hatch in about one or two weeks, then bore into the stems. Registered insecticides should be applied before and during the egg hatch.

Other insects that occasionally cause losses include cutworms, aphids, flea beetles, leafhoppers, and spider mites.

Crop rotation is one of the best ways to prevent or reduce disease infestations on pumpkins. Maximum protection is gained if pumpkins are not planted on any land where cucurbits have been grown during the past 4 years. It also is important to destroy any plant residues after harvest.

Powdery mildew is a fungal disease that first appears on the plants' upper leaf surfaces. Under favorable conditions, the white, powdery spots will spread over the entire leaf. Infected spots eventually turn brown and dry. It is most prevalent in late summer and early fall when warm weather, afternoon showers, and dense foliage create an ideal environment for the disease to develop. Chemical control involves applying registered fungicides at the first sign of infection. Fields under sprinkler irrigation should be watered in the early morning to give foliage a chance to dry before evening.

Bacterial wilt is spread by both the striped and spotted cucumber beetles that feed on young seedling pumpkins. The first symptoms are dull green patches that appear on leaves, revealing feeding wound damage. Individual leaves eventually wilt, followed by

vines, and then the entire plant. Symptoms can also include extensive blossoming and branching on dwarfed plants. Stems cut with a knife secrete a thick white liquid when squeezed. Treat cucumber beetles with an appropriate insecticide.

Black rot (gummy stem blight) is a fungal disease that affects both pumpkin foliage and fruit. Irregular yellow spots on foliage eventually turn brown, and spots on pumpkins eventually turn black as the fungus penetrates the fruit, causing a dry rot. Elongated streaks on infected stems may produce an amber, gummy liquid. Because the fungus survives in infected seed, control requires planting clean seed. Crop rotation is recommended to reduce disease pressure. Registered fungicides can also be applied.

Weed control can be done with either registered herbicides or cultivation. In wide-row spacing operations, expensive herbicides can be applied in a band over the planted row. Less expensive herbicides can be used as lay-by applications before vines begin to cross. Shallow cultivation and hoeing can be used before plants begin to vine.

VARIETIES

A good pumpkin variety performs well under a wide range of environmental conditions. Deciding which variety to plant also depends on market requirements, including intended use and size of the pumpkins. Table 1 presents a list of pumpkin varieties suitable for New Mexico growing conditions.

Original author: George W. Dickerson, Extension horticulture specialist emeritus



Stephanie Walker is Extension vegetable specialist, and has extensive experience in the food processing industry. Her primary research interests include genetics and breeding of chile peppers, vegetable mechanization, enhancing pigment content, post-harvest quality, and irrigation efficiency. She works to help commercial vegetable growers enhance the sustainability and profitability of their operations through collaboration, experimentation, and information sharing.

Table 1. Pumpkin Varieties Suitable for New Mexico Growing Conditions

Variety	Days to Maturity	Color	Avg. Fruits/Plant	Avg. Weight (lb)
Giant Pumpkins				
'Prizewinner' (F1)	115	Bright Orange	1-2	33-75
'Dill's Atlantic Giant'	120	Pinkish to Orange	1-2	50-100
'Big Max'	120	Bright Orange	1-2	100
Mid-Large Pumpkins				
'Racer' (F1)	85	Dark Orange	2-3	12-16
'Champion' (F1)	90	Dark Orange	1	30
'Big Rock' (F1)	98	Medium Orange	1-2	24-32
'Charisma' PMR	98	Dark Orange	2-3	16-22
'Expert' (F1)	98	Dark Orange	1-2	22-30
'New Rocket' (F1)	98	Dark Orange	2-3	16-22
'Rock Star' (F1)	98	Dark Orange	1-2	20-28
'Tom Fox'	110	Dark Orange	2-3	10-16
'Triple Treat'	110	Deep Orange	2-3	8-10
'Howden Biggie'	115	Medium Orange	1	30-40
'Connecticut Field'	120	Medium Orange	2-3	15
'Wolf'	120	Medium Orange	1-2	16-24
Small/Pie Pumpkins				
'Orange Smoothie' (F1)	95	Medium Orange	4-5	6-9
'Summer Ball' (F1)	95	Medium Orange	20	3-3.5
'Wee-B-Little'	95	Deep Orange	8	10-14 oz
'Jack B Little'	95	Medium Orange	12	6-13 oz
'Winter Luxury'	105	Medium Orange	3-4	5-7
'Baby Bear'	105	Deep Orange	8	1.5-2.5
'Baby Pam'	105	Deep Orange	4-5	4
'Small Sugar'	105	Deep Orange	4-5	5-8
Specialty Pumpkins				
'Lady Godiva'	90	Green/Orange	10-12	4-6
'Autumn Crown'	100	Tan	3-5	2-4
'Speckled Hound'	100	Orange/Blue-Green	8	3-6
'Kakai'	100	Black Striped	2-3	5-8
'Marina Di Chioggia'	100	Blue/Green	2	6-12
'American Tondo'	100	Deep Orange	3	6-14
'Jarrahdale'	100	Gray	2	6-10
'Moonshine' (F1)	100	White	10	8-12
'Knuckle Head' (F1)	105	Deep Orange	2	12-16
'Long Island Cheese'	108	Tan	2	6-10
'Valenciano'	110	White	2	10-18
'Rouge Vif D'Etampes'	115	Scarlet	2	10-15
'Naples Long'	125	Green to Tan	10	20-25
'Bliss' (F1)	125	Green/Orange	6	10-15
'Musque de Provence'	125	Tan	2	8-15

Contents of publications may be freely reproduced for educational purposes. All other rights reserved. For permission to use publications for other purposes, contact pubs@nmsu.edu or the authors listed on the publication.

New Mexico State University is an equal opportunity/affirmative action employer and educator. NMSU and the U.S. Department of Agriculture cooperating.