PUMPKINS

BY
CHARLES MARR
TERRY SCHAPLOWSKY
NED TISSERAT
BOB BAUERNFEIND

Pumpkins and winter squash are traditional crops for fall production in Kansas. The potential for fall sales at farm markets, roadside stands, sales to local stores, or direct farm sales is expanding. The ease of growing pumpkins make them a crop to consider in farming operations. There are many crops that compliment the fall decorative market, including apples, popcorn, ornamental corn, gourds, flowers, and fall-produced vegetable crops.

Pumpkins and winter squash are members of the Cucurbit family, which includes muskmelon, watermelon, cucumbers and gourds. This group is characterized by sprawling vines and bright yellow flowers (separate male and female flowers produced on the same plant). Pumpkins are warm loving crops, traditionally planted in June in Kansas so the fruit are ready for harvest in late September to mid-October.

IS IT A SQUASH OR PUMPKIN?

The word 'pumpkin' is derived from a French word, originally from the Greek, meaning 'large melons.' The term 'squash' comes from a native American word describing an edible gourd. There are three botanical species involved in the group of squash and pumpkin produced on trailing vines. By common usage, those that are round and orange are called *pumpkins,* while those that are other shapes and colors are called *squash* (or fall or winter squash). The vine habit for pumpkins and squash are similar and the production or cultural practices for growing them is almost identical. This guide can be referred to for the production of both.

POLLINATION

Separate male and female flowers on pumpkins require bees to transfer pollen from male to female flowers. Male flowers outnumber female flowers two to three to 1 and usually appear first. Pollination occurs on a 2 to 3 week period of intense blooming in late summer. Flowers close late in the day—apply spray materials when flowers are closed (and bees are not active) during bloom periods. Poor pollination will result in poorly shaped fruit and excessive blossom drop. Although pumpkins do not require as many bees for pollination, as do cucumbers or muskmelons, since flower numbers are less, a strong hive of bees for every 3 to 5 acres of pumpkins is suggested to ensure adequate pollination.

VARIETIES

Many new varieties of pumpkins are hybrid varieties. Hybrids have seed costs that are about three times that of standard varieties. Earlier fruiting varieties are also being developed.

The type of market may determine characteristics that a producer looks for in selecting varieties. Growers supplying wholesale markets want pumpkins with strong, dark-colored 'handles' (stems), a deep or bright color, and heavy weight with a more consistent size. Growers for local markets or roadside stands may tolerate more variation in size and finish, and stems aren't quite as important. Growers for specialty markets may want unique pumpkins in size, shape or color.

KANSAS STATE UNIVERSITY
AGRICULTURAL EXPERIMENT STATION
AND COOPERATIVE EXTENSION SERVICE

One of the major differences in pumpkin varieties is in size of fruit. There are five general categories of pumpkins based on fruit size. The following table lists some selected varieties in each size category.

During the last several years, there has been an emphasis on earlier maturing pumpkin varieties. Some of these varieties include a genetic trait that encourages the pumpkins to develop color while they are still maturing. Common examples of this type are 'Autumn Gold' and 'Big Autumn' varieties. These types are good if you want mature pumpkins by fall. One weakness, however, is the stems are often less strong and brown in color, rather than the characteristic large and dark green that many markets desire. A strong stem 'handle' with a dark green color is needed for wholesale pumpkin shipments. Local market sales, however, may not require as prominent a green stem. A grower is encouraged to keep track of many new varieties of pumpkins becoming available each year, considering the market needs of their operation, and plant varieties that are best suited to their operation.

The predominant market for pumpkins is for Jack-O-Lantern types. Other varieties can be grown in smaller quantities for specialized markets. Small sized pumpkins are often needed for operation

Common pumpkin varieties.

Variety	Days to Maturity	Comments
Giant (>20 lb)		
Prizewinner	120	Dark orange, attractive
Atlantic Giant	120	Medium orange, very large
Big Max	120	Bright orange
Big Moon	120	Medium orange
Jack O Lantern (7–20 lb)		
Conn. Field	110	Medium orange, variable
Howden	105	Good handle, medium orange
Ghost Rider	115	Bright orange, medium size
Wizard	115	Dark orange, good handle
Aspen	100	Good stem, medium orange
Big Autumn	100	Early coloring, fair stem
Frosty	100	Bright orange, compact vine
Lumina	100	White color
Jackpot	100	Strong handle, dark color
Tallman	110	Elongated shape, bright orange
Small (5–7 lb)		
Spookie	105	Smooth, excellent yields
Small Sugar	115	Standard 'pie' pumpkin
Baby (2–4 lb)		
Oz	105	Smooth, good stem
Spooktacular	95	Attractive, bright orange
Baby Bear	105	Deep orange
Gremlin	100	Small, uniform
Baby Pam	100	Very small
Miniature (<1 lb)		
Jack Be Little	100	Medium orange
Munchkin	110	Medium orange
Sweetie Pie	100	Bright orange
Baby Boo	100	White

Common winter squash varieties.

Variety	Days to Maturity	Comments
Table Queen/Acorn		
Table Ace	70	Early
Table King	80	Compact vine
Table Queen	80	Standard acorn
Butternut		
Waltham Butternut	95	Large, uniform
Ponca	90	Early, uniform
Miscellaneous		
Turk's Turban	115	Ornamental, keeps well
Golden Delicious	100	Heart shaped, orange
Vegetable Spaghetti	95	Cream colored
Buttercup	100	Dark green
Hubbard	105	Green, yellow, or gray
Sweet Dumpling	100	Green mottled, sweet

sspecializing in school tours (where each child gets a pumpkin). White or dark orange skinned varieties are novelty types that are increasing in popularity. Smooth pumpkins are preferred for painting or coloring. Winter squash and other decorative items are often used to round out a line of fall decorative items including decorative corn (and / or corn stalks), popcorn, honey, autumn flowers, gourds, and related items.

YIELD AND PRICES

As documented by Kansas State University research trials and grower experience, estimated yields for the various types of pumpkins are as follows:

Giant Pumpkins	20–30,000 l / A marketable
Jack O Lantern types	20–30,000 lb / A marketable
Baby types	9–15,000 lb / A marketable
Miniature types	6–9,000 lb / A marketable

Yields increase with good management and production practices. Greater marketable yields are usually recorded by local market growers that can sell a variety of pumpkin shapes and sizes—often not acceptable for wholesale shipments. Wholesale pumpkins are usually sold by the pound (or ton) with 7 to 8 cents / pound being a common recent price for field run, marketable pumpkins. Local market sales usually price pumpkins by size grade into a price per pumpkin to eliminate the need to weigh each fruit. Small pumpkins are often priced at $1 to $2 each, with larger pumpkins priced from $2 to $6 each. Giant specimen pumpkins often can sell for $15 to $30 each (or more depending on size).

SOIL PREPARATION AND FERTILIZATION

Select areas with no perennial weed problems, and with good soil drainage for growing pumpkins. Long rotations of three to four years between crops of pumpkins are suggested. Avoid fields where a previous herbicide application may carryover (read the label on planting restrictions the next year).

A soil test should be used as a guide for applying Phosphate and Potassium. These materials should be broadcast and incorporated with spring tillage. Pumpkins will require from 75 to 100 pounds of total nitrogen. It is usually best to apply 40 to 50 lb /A at planting time, and sidedress with an additional 20 to 40 pounds per acre applied along the rows when the vines start to run (6 to 12 inches long). An ideal pH for pumpkins is 6 to 6.5, however, corrections in high pH need not occur unless pH is >7.5 or <5.5.

Since the planting season for pumpkins is late in the season (early June), make sure a final tillage, just prior to planting, is used to kill any late germinating weeds. Avoid planting pumpkins in areas with poor drainage where water may stand after heavy rainfall.

PLANTING AND SPACING

Since the pumpkin market begins in late September to early October, the planting season for most varieties is in early June for most of Kansas. In recent years, however, many markets want pumpkins starting in mid-September. Therefore, careful market analysis must be coupled with days to maturity of the pumpkin variety chosen when determining the date for planting pumpkins. It is not unusual for each summer season to include a week or so of below normal temperature weather which will slow down pumpkin development. When faced with a choice of earlier or later, always lean to the earlier side since pumpkins will hold in the field until a market is ready, but there is no way to hasten the ripening of green pumpkins.

Days to Maturity of Pumpkins by Types:

TYPE	DAYS TO MATURITY
Mini	85–95
Small	90–95
Medium	90–100
Large	100–110
Xtra Large	120–130

Most pumpkins are planted from June 5 to 15, with June 10 being the most common planting time. However, depending on days to maturity some pumpkin varieties may need to be planted earlier or later than that date. Pumpkins are usually grown in wide rows—from 12 to 15 feet apart, with plants spaced 2 to 4 feet in the row. A goal for direct seeding is to drop a seed every 2 feet in the row. Closer in-row spacing encourages faster vine coverage in the row which can be useful for weed control.

Suggested Spacings for Pumpkin Types:

Type	Between Rows (ft)	In-Row (ft)
Mini	5–6	1–2
Small	5–6	2–3
Medium	6–8	2–4
Large	8–12	2–4
Xtra Large	12–15	4

Pumpkins can be planted with 'air planting' equipment, with modified plate planters, by transplanters, or by hand, using a hoe. For wide row spacings, use every three or four planter boxes. Make sure the plate planting mechanism does not break or damage the seed. Using the furrow opening and covering mechanism of a transplanter or conventional planter, and dropping the seed by hand, is possible in planting pumpkins and might be a preferred method, if a variety of seed sizes are to be planted. Some growers have sat atop a conventional 'corn' planter, with a plastic hose run down into the furrow shoe, and dropped seeds in a funnel inserted into the hose. This is an inexpensive way to rapidly plant pumpkins of varied seed sizes. Some transplanters allow water to be added with each hill. Plant seeds from ¾ to 1 inch deep into moist but not wet soil. Water after planting to encourage quick and even emergence in dry weather.

DETERMINING SEED NEEDED

There can be significant variation in size among pumpkin seeds depending on the variety and type. Thus, it is difficult to estimate how much seed is needed by weight per acre. The first estimate that you need to make is how many seeds per acre are needed. This can be done by determining the number of hills per acre and how many seeds per hill that you plan to drop.

Determine the Number of Hills/Acre
43,560 (square feet / acre) divided by row width times in-row spacing
Examples:
(43,560 / 12 feet) × 2 feet = 1,815 hills
(43,560 / 8 feet) × 3 feet = 1,815 hills
(43,560 / 6 feet) × 2 feet = 3,630 hills

Times Seeds/Hill
Examples:
1815 hills × 2 seeds / hill = 3630 seeds
1815 hills × 3 seeds / hill = 5445 seeds

Some seed companies now offer seeds sold by the count (usually by thousand seed lots) rather than by the pound. Seed count per pound can vary greatly by variety. Check with your seed supplier when ordering seeds to get an approximate seed count per pound of seed.

How Much Seed Do I Need?

Type	Approximate Seed Count/Pound
Mini	6–7,000
Small	3–4,000
Medium	3–4,000
Large	2–3,000
Xtra Large	1–2,000

Hybrid varieties cost about three times as much as standard or open pollinated varieties. However, many newer varieties of pumpkins are hybrids and the small amount invested in seeds can be rapidly recovered in higher yields or quality. It is best to check on seed supplies in December to January when other vegetable seeds are traditionally ordered. It may be possible that certain varieties you want can be sold out if you wait until just before planting time to order. Some seed companies will take orders for later shipment and / or payment.

WEED CONTROL

Weed control is the most critical management practice for growing pumpkins. Weeds can become a serious problem since pumpkins are planted late—when many annual broadleaf weeds are rapidly germinating—and the vining habit makes cultivation difficult later in the season. Few herbicide materials are available for pumpkins and the soft, succulent nature of the plant is not tolerant to improper herbicide applications. The use of herbicides, with mechanical cultivation, need to be combined for best weed control.

HERBICIDES

Applied Before Planting and Incorporated

Prefar 4E	5–6 qt / A	Apply to dry, well worked soil prior to planting and incorporate 1–2 inches deep before seeding.
Command 4E	.5–1.5 pt / A	Apply and incorporate 1 inch deep prior to seeding. Some squash varieties may be sensitive and may require lower rates. A white discoloration of seedling plants may occur; however, plants will rapidly outgrow this and return to a normal color—especially standard medium–large Jack-O-Lantern types.

Applied After Planting Over Weeds and Pumpkins

Poast 1.5E	1–1.5 pt / A	Apply to actively growing grasses over the top of pumpkin plants. Use Crop Oil Concentrate to improve coverage of grasses. Note: Only **grassy** weeds are controlled

Applied this technique for problem weeds

Stale Seedbed		Use this technique for problem weeds or to kill germinated weeds without retilling soil prior to planting. Kills weeds or other vegetation; must be done prior to emergence of the pumpkin seedlings if done after seeding.
Gramoxone Extra	2–3 pt / A	
Roundup	2 qt / A	

NOTE: Herbicide injury is increased with small seeded varieties so use careful calibration and as low a rate as possible on mini pumpkins or other small seeded pumpkin or squash varieties.

Pumpkins should be cultivated just prior to vining (before the vines lay over and start to sprawl over the ground). A disc or field cultivator can be used to till row middles until vines cover the area. Use a light scraping or shallow tillage rather than deep cultivation to conserve soil moisture and prevent damage to pumpkin roots. Recent research has indicated that in July (when most cultivation is done) most pumpkin and squash roots are not more than 6 inches deep and about 15 to 18 inches from the plants.

IRRIGATION

Pumpkins are a deeper rooted vegetable crop that will grow with limited amounts of water. However, watering after planting to activate herbicides and encourage rapid, even emergence may be necessary in dry periods. A critical period for water also occurs when blooming and early fruit set is starting to occur (usually in late July to early August). Watering late in the season after mid-August is usually not necessary in most areas of eastern or central Kansas. Drip irrigation can also be used on pumpkins to reduce foliage wetting and for water use efficiency. A fairly wide row spacing of at least 12 or even 15 feet will minimize the amount of drip tape needed per acre. Most drip tapes cannot be used for row lengths greater than 600 to 700 feet to ensure even water distribution.

PUMPKIN DISEASES

Powdery mildew: Powdery mildew is the most common pumpkin disease in Kansas and can result in yield losses exceeding 30 percent if left untreated. The disease is most damaging if it appears three to four weeks before harvest. Actually, two different powdery mildew fungi called *Erysiphe cichoracearum* and *Sphaerotheca fuliginea* can infect pumpkin. The Sphaerotheca fungus is the dominant species in Kansas.

Plants infected with mildew initially develop white, powdery spots or blotches on the lower and upper leaf surface. As the disease progresses, the whole plant may become covered with the white, dusty spores of the fungus. Diseased leaves prematurely turn yellow and die. Though the fruit is not attacked by the fungus, it may become malformed or develop sunscald because of a lack of leaf coverage.

Powdery mildew infection starts in early August and is favored by warm daytime temperatures, cool nights, and high relative humidity. The fungus does not require a film of moisture on the leaf surface for infection and can be a problem even during summer periods of little or no rain.

Fungicides are necessary to prevent powdery mildew infection because pumpkin cultivars currently being grown have little or no resistance to the disease. For effective mildew control, make the first fungicide application in late July or early August, before symptoms appear. Fungicide application after mildew develops is much less effective. Use a fungicide or fungicide combination that is effective in controlling both powdery mildew and another serious pumpkin disease called black rot. Make a second fungicide application for powdery mildew control in mid-August. Apply fungicides at relatively high pressures (i.e., a mist type blower or by airplane) to ensure adequate coverage throughout the plant canopy.

Black rot and other fruit rots: The black rot fungus (*Mycosphaerella melonis*) attacks all parts of the pumpkin plant. Small, brown to black spots form on the leaves and vines in early to mid-July. Vine lesions or cankers often crack and form a brown, gummy fluid. The fungus produces numerous, pinpoint, black fruiting structures on the decaying vines. The fungus also attacks the fruit and causes multiple, light tan to black, roughly circular spots. Secondary soft-rot organisms quickly colonize the decaying tissue, penetrate the rind, and finally result in collapse and rotting of the fruit.

Several other fungi, including *Fusarium* and *Phytophthora*, may also cause significant fruit damage during wet summers. Although conditions necessary for infection by these fungi may vary, they all are favored by excessive rain, poorly drained soils, and continuous planting of pumpkins in the same field.

To control black rot and other fruit rots, follow a three-year rotation with non-cucurbit crops. Avoid planting on poorly-drained soils. The black rot fungus may be seed borne, so purchase only high-quality seed. Fungicides should be applied in mid- and late-July to suppress injury from the black rot fungus. Make sure the fungicide or fungicide combination selected for late July is also effective in controlling powdery mildew. During wet summers, additional fungicide applications may be necessary to suppress fruit rots.

Virus Diseases: Virus diseases have become increasingly important as limiting factors in pumpkin production. Several virus diseases, including cucumber, squash, watermelon, and zucchini yellow mosaics may be present. Disease symptoms vary depending on the particular virus, but generally plants are stunted. Younger leaves may turn yellow or mottled and often are distorted. Older plants develop a distnct mottling of leaves and fruit. Plants severely affected fail to produce fruit.

All of the viruses mentioned above, except squash mosaic (vectored by cucumber bettles) are transmitted from plant to plant by aphids. Also, certain viruses (squash mosaic and cucumber mosaic) may be seed-borne. None of the viruses persist in soil for long periods.

Control of virus diseases is difficult. Certain viruses, such as cucumber mosaic, have a broad host range, so all perennial weeds near the field should be controlled. The use of insecticides on pumpkins to suppress aphid populations has not resulted in effective control of the spread of viruses. However,

Fungicide rates and waiting intervals for control of powdery mildew and black rot of pumpkin.*

Chemical	Rate per acre	Powdery mildew	Black rot	Days to harvest interval
BENOMYL				
Benlate 50 WP	4–8 oz	Yes	Yes	14
CHLOROTHALONIL				0
Bravo 720F	1.5–3 pts	Yes	Yes	
Terranil 6F	1.5–3 pts	Yes	Yes	
CHLOROTHALONIL PLUS METALAXYL				0
Ridomil / Bravo 81W	2–3 lb	Yes**	Yes*	
COPPERS				0
Kocide, Top Cop, others (label and rates will vary with formulation)		Yes***	No	
MANCOZEB				5
Dithane M45, Manzate Penncozeb, Manex II 75 WP	2–3 lb	No	Yes	
Dithane, Manzate, others labeled for black rot on squash, not pumpkins				
THIOPHANATE METHYL				0
Topsin M 70 WP	4–8 oz	Yes	Yes	
TRIADIMEFON				0
Bayleton 50 WP	2–4 oz	Yes	No	

* A protective fungicide program for pumpkins normally includes a fungicide application for black rot in early July, an application in late July or early August for black rot and powdery mildew, and a final application in mid-August for powdery mildew.

** The chlorothalonil plus Metalaxyl combination is most effective against downy mildew and Phytophthora fruit rots. Since these diseases are not common in our state, do not use this combination for routine disease control in pumpkin.

*** Copper based fungicides are not commonly used for powdery mildew control in Kansas.

weed control in and around the pumpkin planting can help suppress aphid populations and decrease viral transmission. Reflective mulches can also reduce aphid feeding and lower the incidence of virus diseases, but this technique is not commonly used in our state. Unfortunately, most commercial varieties do not have resistance to these virus diseases. Avoid planting pumpkins or late season squash crops near fields of muskmelons, cucumbers or other early season cucurbits that may be serving as reservoirs for viruses and insect vectors.

INSECTS AND THEIR CONTROL

Several insect pests are of concern to commercial pumpkin producers. Given their widespread occurrence, striped cucumber beetles and squash bugs might be considered major pests. Generally speaking, squash vine borers and aphids are of lesser concern.

Striped Cucumber Beetles are insects with chewing mouthparts. Having overwintered under debris in and around fields, adult beetles appear early in the season often feeding on various alternate host plants. Eventually, beetles are attracted to newly seeded fields. Beetles may burrow into the soil and destroy plants before they break the surface. Beetles also feed on and kill newly emerged seedlings.

The ¼ inch long cucumber beetles are conspicuously colored: black head and antennae, straw yellow thorax and yellowish wing covers with 3 distinct parallel and longitudinal black stripes. Beetles deposit their eggs in the soil around the bases of host plants. While root feeding by many beetle larvae may cause plants to be stunted, larval feeding is generally of little concern. Feeding stops when larvae pupate.

Newly emerged first generation beetles (mid-July to early-August) are of lesser concern because by this time, most plants are of sufficient size to tolerate feeding. A second generation of striped cucumber beetles is produced in pumpkin fields, as well as on various alternate hosts including goldenrod, sunflowers, and various ornamentals, such as asters. Second generation adults emerge late in the season and feed until they are forced into hibernation.

The use of insecticides is essential for protecting plantings against direct feeding damage by striped cucumber beetles. There are no currently registered planting time systemic insecticides. Given the almost continual appearance of striped cucumber beetles throughout the season, monitoring programs with action thresholds are considered to be of little use—some states attempt to utilize scouting programs. Initiation of spray treatments is recommended early in the season when beetles first appear. Additional treatments are warranted as long as beetles appear and plants are susceptible to injury. See the table on page 10 for currently registered insecticides.

Barriers (floating row covers) can be utilized by some producers to exclude beetles from newly emerged seedlings and young plants. However, high material costs may render such controls noneconomical for a crop such as pumpkins where per acre returns are not as great as for some other vegetable crops. Also, row covers become impractical in situations under large field acreages.

Squash bugs are ‘true bugs’ which utilize their piercing sucking mouthparts to remove plant juices. Squash bugs generally occur on well-established plants (as opposed to being a pest of seedling plants).

Adult squash bugs move to plants from various adjacent (and sometimes within field) protected overwintering sites. Adult females deposit brownish-red eggs in clusters on a lower leaf surfaces. Newly emerged nymphs are small and greenish with black legs. There are five nymphyl stages. After a final molt, first generation adults appear. Studies have shown that (in Kansas) first generation adults deposit eggs for a second generation, the adults of which overwinter.

High squash bug populations can literally drain plants causing them to die and wilt. Reduced yields and poor quality fruit may result from squash bug feeding activities.

Effective control of squash bugs is contingent upon timely insecticide sprays coupled with thorough coverage. Observe plantings for the presence of adult bugs and scout fields for egg masses on the undersides of leaves. Eggs get darker in color just before hatching. Treat when most eggs have hatched and when nymphs are still small to medium in size. Adult squash bugs have a hard, protective shell which is impervious to insecticide treatments.

Use high pressure when applying insecticides to ensure penetration of the dense plant foliage and thorough coverage to the nymphs which often are on the undersides of leaves. Subsequent treatments are usually required due to the continual presence of egglaying squash bugs. Registered insecticides are included in the table at the end of this section.

It is especially critical to reduce the overwintering population of squash bugs by discing and / or removing foliage and fruit immediately after harvest. This deprives nymphs of the necessary food source to complete their development. Also, recently formed adults are denied a food source with which to build up the sufficient amounts of body food reserves required to see them through the overwintering period.

Squash vine borers are the larvae of a clearwinged moth whose size, shape and flying habit are somewhat akin to wasps for which they are often mistaken. Squash vine borers overwinter as larvae or pupae in cocoons buried in the soil. In Kansas, adult moths emerge in the late spring (probably about mid-June) at a time coinciding with the establishment of pumpkins. Eggs are deposited singly on the underside of the vines and are often concentrated at the base of the plants. Larvae bore into the stems where they tunnel and feed. Matured larvae exit stems and then burrow into the soil, where most prepare their overwintering cocoons (there may be a partial second generation in Kansas depending upon current year conditions).

Due to extensive disruption of conducting tissues, plants often wilt and die. The presence of holes in plant stems, and an accompanying ooze, signal the presence of squash vine borers. Large white worms with brown heads can be seen if stems are cut open. Squash vine borer populations vary from location to location, thus being of a major concern in some areas but inconsequential in others. Insecticidal controls must be implemented before larvae bore into plants. Timing of treatments can be correlated with the observed presence of moths (conspicuous by their appearance and flight activities during daytime hours). Registered insecticides are included in the table at the end of this section.

Aphids can be detrimental to pumpkin production because of their ability to transmit several important virus diseases. Watermelon mosaic, cucumber mosaic, and zucchini mosaic viruses are transmitted by viruliferous aphids entering the fields. Aphids complete the transmission process (in a matter of seconds) by landing on plants and utilizing their stylets to probe plant tissues. They may repeat the process by flying to and probing adjacent plants. These aphid vectors rapidly “use up” the virus inoculum on their stylets thus becoming nonviruliferous. Thus, they will not transmit any more virus unless they acquire additional virus particles by feeding on another diseased plant.

Although there are various insecticides registered for use against aphids on pumpkins, none kill aphids rapidly enough to prevent disease transmission. Rather, aphicides are useful for preventing population buildups or reducing already excessive aphid populations, which can decrease plant vigor and produce excessive accumulations of sticky honeydew. Honeydew serves as a substrate for buildups of sooty molds which reduce the marketability of the fruit.

HARVESTING

Pumpkins are ready for harvest when the rind or skin has toughened (use the fingernail to test rind toughness) and the stems have lost their succulence. There should be a minimum of ‘dripping’ from the stems when they are cut from the vine. It is best to cut the fruit from the vine with pruners or clippers (use long handled pruners to avoid stooping) to ensure a long, good, and undamaged stem handle. Pumpkins are then generally windrowed into piles or lines in the field so trailers or trucks can be driven through the field to load pumpkins. Pumpkins can be handled in bulk or cardboard (or wood) bulk bins that can be handled with a fork-lift for unloading.

A light freeze before harvest is not damaging. However, temperatures in the mid to low 20s should be avoided. Store pumpkins in a well ventilated, cool location (50° to 55°F) location for one to two months if necessary; however, most Kansas growers time harvest just prior to market delivery or sales. If longer than one month storage is anticipated, cure pumpkins at 80° to 85°F and high humidity for seven to 10 days. Surface molds and rots can be reduced with a bleach:water (1 part bleach to 4 parts water) sprayed or wiped on the surface.

Insecticides/Miticides for Controlling Pumpkin Pests*

	Aphids	Cucumber Beetles	Mites	Squash Vine Borers	Squash Bugs
carbaryl (Sevin)		X			X
diazinon	X		X		
dicofol (Kelthane)			X		
endosulfan (Thiodan)	X	X		X	X
esfenvalerate (Asana)**		X		X	X
horticultural oils	X		X		
insecticidal soaps	X		X		
malathion	X	X	X	X	X
methoxychlor		X		X	
parathion (ethyl)**	X	X		X	X
permethrin (Ambush, Pounce)**		X		X	X
pyrethrins	X	X	X	X	X
rotenone	X	X	X	X	X
trichlorfon (Dylox, Proxol)					X

***Follow label directions for application rates, precautions and harvest intervals.**

****RUP =** Restriced Use Pesticide for purchase and use by certified personnel

HANDLING AND CONTAINERS

Pumpkins are usually handled in bulk or loaded into bulk bins directly from the field. Pumpkins are usually sold by the pound with trucks being weighed full and empty with scale receipts as a means of payment. Smaller growers may have difficulty weighing small loads or portions of loads so that a per-pumpkin price may be a better means of selling. Pumpkins may be 'sized' into several sizes for marketing since many markets want uniform sized fruit for particular markets.

Small or baby pumpkins can be easily damaged when handling in large bulk containers so they may be packed in standard cardboard 1⅑ bushel vegetable cartons with a count clearly indicated on each box. Miniature pumpkins are usually washed through a standard brusher-washer and packed in cartons either using standard 'tomato lugs' or cardboard cartons containing 10 pounds of pumpkins or gourds. A count per carton should be clearly indicated on the container. Some miniature pumpkins and gourds may be improved in appearance by dipping or spraying them with shellac. The surface must be dry before application and the pumpkins fully matured. After dipping in the shellac, allow the pumpkins to dry before handling.

Be sure to contact your market source well in advance of delivery to work out details of packaging and handling procedures. Tentative prices may be agreed upon at that time or prices may be negotiated closer to the time of delivery.

MARKETING PUMPKINS

Marketing should start well ahead of harvest by making contacts with potential buyers or preparing advertising or sales promotions. Most retail markets begin active sales of pumpkins and fall decorative items in early October. Therefore, wholesale sales often begin in mid- to late September to supply these markets. The most active sales period is mid-October, culminating with the Halloween season in late October. Many growers and marketers have observed that, in recent years, the marketing period for fall decorative items is getting earlier. Therefore, mid-September is not too early to establish retail displays. Wholesale market deliveries may begin as early as early September.

Creative displays in retail markets enhance sales so use your creativity. Decorated pumpkins and pumpkins incorporated in arrangements of fall flowers or other items can add considerable value to pumpkins. Painted or decorated pumpkins can add value as well.

Many growers use the fall season to offer tours to the farm for school classes or the public with a per person charge for each participant. A trip to the 'pumpkin patch' is usually accompanied with a discussion of pumpkins and how they grow, or other educational items, along with a trip to the field to allow each child to pick out their own pumpkin. Many growers charge from $1 to $2 per person for such a tour, depending on the time involved. A field of small pumpkins works well for allowing small children to pick out their own pumpkin from the field. Tours need to be scheduled in advance to avoid conflicts. This can be promoted by developing a flyer delivered to teachers at grade schools in surrounding communities. If this type of operation is contemplated, contact your insurance carrier to make sure your policy can cover liability from this type of marketing system. An additional rider may be added to some policies for a nominal costs to increase your coverage.

COST OF PRODUCTION

The following table lists estimated costs of production for commercial pumpkins. Return, yields, prices, and other values represent average or nominal values and need to be adjusted for individual growers.

Fuel consumption is estimated at 1.5 gallons per hour of tractor time. Oil and lubrication is estimated at 15% of fuel cost. Repairs are estimated at $2.25 per hour of tractor time and $17 per acre for irrigation equipment. Fuel, repairs, and taxes for a truck are not included as costs. Depreciation, interest on investment, and insurance for a truck are included as costs.

COST-RETURN PROJECTION FOR PUMPKIN PRODUCTION IN KANSAS

	Variable costs per acre	*Total*
1.	Fertilizer	$ 27.50
2.	Seed, crowns, transplants	30.00
3.	Herbicides	55.00
4.	Insecticides	20.00
5.	Fungicides	23.00
6.	Nematicides	0.00
7.	Labor	125.00
8.	Fuel and Oil	14.66
9.	Repairs	39.50
10.	Water	2.00
11.	Utilities	0.00
12.	Custom Hire	0.00
13.	Supplies	0.00
14.	Marketing	100.00
15.	Other	0.00
A.	**Total variable costs**	$436.66
	Fixed costs per acre	
16.	Interest on land and buildings	$60.00
17.	Taxes on land and buildings	10.00
18.	Rent for rented land	0.00
19.	Depreciation on machinery	75.00
20.	Interest on machinery	45.00
21.	Depreciation on buildings	12.50
22.	Depreciation on irr. equip.	165.00
23.	Interest on irr. equip.	99.00
24.	Insurance	6.63
B.	**Total fixed costs**	$473.13
C.	Total costs	$909.79
D.	Yield per acre (lb)	20,000.00
E.	Price per unit	$0.07
F.	Returns per acre	$1,400.00
G.	Returns over variable costs	$963.34
H.	Returns over total costs	$490.21
I.	Variable costs per unit	$0.02
J.	Total costs per unit	$0.05

Notes:

About the authors: Charles Marr is an extension horticulturist, vegetable crops; Terry Schaplowsky is a research associate, vegetable crops; Ned Tisserat is an extension plant pathologist, plant pathology; Bob Bauernfeind is an extension entomologist, entomology.

Contribution number 95-365-E from the Kansas Agricultural Experiment Station.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

MF-2030 January 1995

Issued in furtherance of Cooperative Extension Work, acts of May 8 and June 30, 1914, as amended. Kansas State University, County Extension Councils,Extension Districts, and United States Department of Agriculture Cooperating, Richard D. Wootton, Associate Director. All educational programs and materials available without discrimination on the basis of race, color, religion, national origin, sex, age, or disability.

File Code: Horticulture & Landscaping—11 AB 2-95—2M;10-97—500