
AGRICULTURAL ALTERNATIVES

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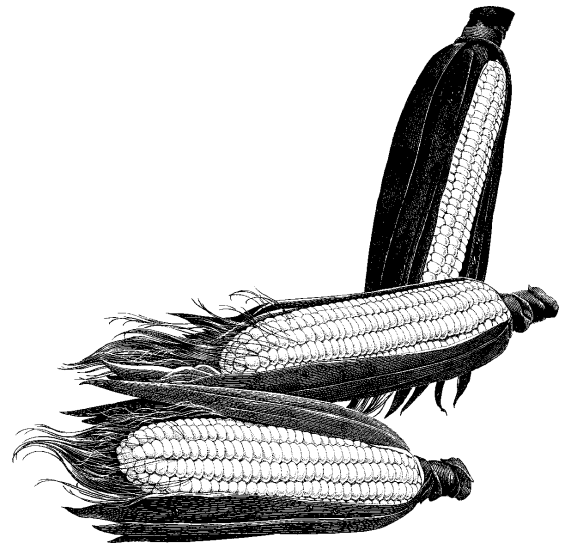
Sweet Corn Production

Sweet corn is a crop that lends itself well to small and part-time farming operations. Initial investment is relatively low, and many field operations, such as land preparation, planting, and harvesting, can be custom hired. Equipment needs on a small-acreage farm are not very great, and most of the equipment can be used for other purposes.

Corn (maize) is native to America and has been cultivated in Central America since 3500 B.C. It was an important food of the Incas, Aztecs, and Mayas of Mexico, as well as the cliff dwellers of the southwestern United States. Iroquois in Pennsylvania and New York grew a variety of sweet corn that turned blue as it matured. Cortes brought corn to Spain, and from there it was quickly introduced into France and Italy. Today, corn is second only to rice in world grain production.

Approximately 2.5 billion pounds of fresh market corn are produced annually in the United States. Although fresh-market sweet corn acreage nationally has increased by slightly more than 29 percent in the past 10 years, Pennsylvania acreage has remained essentially the same. In 1998, Pennsylvania farmers harvested more than 102 million pounds of fresh-market sweet corn on 17,100 acres and generated \$30.3 million of the \$436.8 million in gross receipts nationally. Pennsylvania ranked seventh in gross receipts behind Florida, California, Georgia, New York, Colorado, and Ohio in 1998.

This publication was developed by the Small-scale and Part-time Farming Project at Penn State with support from the U.S. Department of Agriculture-Extension Service.



Marketing

Sweet corn produced in Pennsylvania is usually available from the first of July to the end of September. Fresh-market sweet corn traditionally is sold from open bulk containers or by the dozen in paper or cellophane bags. Six basic marketing alternatives are available to the sweet corn grower: wholesale markets, cooperatives, local retailers (grocery stores), roadside stands, pick-your-own operations, and processing firms.

In wholesale marketing, producers often contract with shippers to market and ship their sweet corn for a predetermined price. If you do not use a contractor and ship your corn to a wholesale market yourself, your product will be subject to the greatest price fluctuations. Marketing cooperatives generally use a daily pooled cost and price, which spreads price fluctuations over all participating producers. Local retailers are another possible market, but you must take the time to contact produce managers and provide good-quality sweet corn when stores require it. Roadside stands (either your own or another grower's) and pick-your-own operations provide opportunities to receive higher than

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wholesale prices for your corn, but you may have some additional expenses for advertising, building and maintaining a facility, and providing service to your customers. With pick-your-own operations, you save on harvest costs, but you must be willing to accept some waste. Depending on your location, processors may or may not be a marketing option. Processors are less likely to contract with small-acreage growers (those with less than 10 acres). For more information on marketing, consult *Agricultural Alternatives: Fruit and Vegetable Marketing for Small-scale and Part-time Growers*.

Site Selection

Sweet corn grows best on well-drained soils that have good water-holding characteristics. If you grow sweet corn on sandy soil, irrigation is important for optimum pollination and kernel development. Soil should have a pH of 5.8 to 6.6. When growing early sweet corn, use soils that warm quickly and locations with a southern exposure to ensure early growth and harvest.

Sweet Corn Types

Corn is classified as sweet, pop, flour, silage, and feed corn, depending on the type of carbohydrate stored in the ear. Sweet corn gets its name from a special gene that prevents or retards the normal conversion of sugar to starch during kernel development. Four sweet corn genotypes determine the sugar content of commercially available cultivars:

- normal sugar types (Su)
- sugar-enhanced cultivars (Se) with 25 to 50 percent more sugar in the kernels than Su types
- shrunken 2 cultivars (Sh₂) with 50 to 100 percent more sugar in the kernels than Su types
- mixed genotype kernel (SB) super sweet

In addition to the genetically controlled sugar types, sweet corn cultivars differ in kernel color (yellow, white, and bicolor) and maturation times—early (less than 70 days), midseason (70 to 84 days), and late (more than 84 days). Shrunken 2 varieties should be planted at least 400 feet from all other corn types or planted at least two weeks earlier or later than other types, because shrunken 2 varieties pollinated by other corn types will produce starchy kernels. Major sweet corn breeding companies offer various combinations of genotype, color, and maturity (Table 1).

Table 1. Recommended sweet corn cultivars for Pennsylvania.

COLOR/CULTIVAR	GENOTYPE	COLOR/CULTIVAR	GENOTYPE
Yellow			
Seneca Horizon (BWMS)	Su	Super Sweet 8701	Sh ₂
Champ	Se	Even Sweeter	Sh ₂
King Arthur	Se	Viva	Se
Bodacious	Se	Silverado (BWMS)	Se
Legend	Se	Silver King	Se
Tuxedo	Se	Silver Queen (BWMS)	Su
Incredible (BWR)	Se	Bicolor	
Showcase	Sh ₂	Sensor	Se
Super Sweet 7210	Sh ₂	Temptation	Se
White			
Seneca Starshine	Se	Sweet Symphony	SB
Ice Queen	Sh ₂	Sweet Rhythm	SB
Quick Silver (BWMS)	Su	Lancelot	Se
Sweet Ice	SB	Cabaret	Sh ₂
Fantasia	Sh ₂	Summer Flavor 79BC	Se
		Twice As Nice	Sh ₂

NOTE: All cultivars within a color grouping are listed in order of maturation (early to late).

BWMS—bacterial wilt moderately susceptible.

Planting and Fertilization

Sweet corn seed generally is planted when soil temperatures reach at least 55°F and the possibility of hard frosts (24°F or less) has passed in the area. In southern Pennsylvania, try to plant in early to mid-April and in northern Pennsylvania, in mid to late May. Depending on cultivar and planting equipment, the optimal plant population is between 14,000 and 24,000 plants per acre. It is recommended that you sow 10 pounds of corn seed per acre 8 to 12 inches apart in rows 30 to 44 inches apart. Spacing decisions depend on the row spacing of your equipment and the ability to irrigate.

You can produce early sweet corn (ready by July 4) in Pennsylvania by planting short-season varieties and using clear plastic mulch. The mulch can be put down in early spring and the corn planted through the plastic with a special planter, or the corn can be planted in double rows approximately 18 inches apart in furrows, with the plastic placed over the two rows of planted corn. You should put soil along the edges of the double rows to increase the distance between the bottom of the seed furrow and the top of the plastic (ideally 6 to 8 inches). Remove the plastic from the sweet corn rows when air temperature under the mulch exceeds 90°F for three consecutive days. Sweet corn transplants also can be used to get an early crop, but they are not practical on a large scale (more than an acre). If sweet corn transplants are ready for planting, but conditions are not favorable, the corn grows too fast and cannot be transplanted easily 12 to 18 days after emergence.

Fertilizer rates should be based on soil test results and type of sweet corn planted. Banding fertilizer is recommended over broadcast fertilizer applications. Some of the nitrogen should be sidedressed during cultivation. The plants should be 24 inches high when sidedressed.

No-Till Sweet Corn

For mid- or late-season sweet corn production, no-tillage can be a benefit in relation to time, equipment, and labor. No-till sweet corn can be planted with a no-till planter in a minimally prepared bed with only secondary tillage such as an s-tine cultivator or in a previously tilled field without any tillage treatment, saving both time and labor. Since sweet corn seed germinates and develops when soil temperatures are at least 55°F, early sweet corn production in no-till is difficult because of the cold soil temperatures. However, by mid-June, soil temperatures in a no-till field are warm enough for rapid sweet corn seed germination and growth. In addition, no-till reduces soil moisture loss early in the season and has more water available for corn growth later in the season. If considering no-till sweet corn production, the following factors must be considered to be successful: variety, planting date, soil fertility practices, insect pressure and control, planting equipment, cover crop type and stand, and weed species and population in the field.

Pest Control

Weed control can be achieved with herbicides and a good crop-rotation system. Corn competes well with weeds, but should be kept weed free until plants are at least 24 inches tall. Many preemergence and postemergence herbicides are available for sweet corn, depending on the specific weed problem and the corn growth stage. If infestation levels are mild, cultivation can minimize weed problems.

Insects can be a major problem in sweet corn production. The corn earworm, corn borer, armyworm, flea beetle, Japanese beetle, and corn rootworm have the potential to cause crop losses. Monitoring insect populations with traps or by scouting will help you determine when you should use pesticides and how often you should spray.

Only a few leaf diseases reduce sweet corn yields. Stewart's wilt, a bacterial disease, is transmitted by flea beetles feeding on young plants within 7 to 10 days of plant emergence.

Several animals prefer fresh sweet corn to other succulent green tissue and will eat the young seedlings or wait until the young ear of corn is ready to harvest and will help themselves to a sweet corn meal in the field. Deer, ground-hogs, raccoons, and red-winged blackbirds can cause serious losses in sweet corn if not controlled or accounted for in planning sweet corn production. Planting sweet corn in fields surrounded by woods or heavily vegetated hedgerows can increase sweet corn loss caused by these animals.

Harvest and Storage

Harvesting can be done either mechanically or by hand. New mechanical harvesters usually cost \$18,000 to \$20,000, and hand harvesting costs about \$150 per acre. Depending on your labor situation, it is usually not economical to purchase a mechanical harvester unless you have at least 10 acres of sweet corn. Regardless of the harvesting method, you need to check ears for worms, insects, and bird damage to ensure marketing a high-quality product.

Immediately after harvest, you should refrigerate and store sweet corn in plastic bags, preferably in the husk, to maintain quality. Sweet corn will retain fairly good ear quality for two to three days if stored at 90 percent humidity and 32°F.

Budgeting

Included in this publication are three annual budgets: Early Season Fresh Market Sweet Corn, Mid-Late Season Fresh Market Sweet Corn (hand harvested), and Mid-Late Season Fresh Market Sweet Corn (machine harvested). These sample budgets should help ensure that all costs and receipts are included in your calculations. Costs and returns are often difficult to estimate in budget preparation because they are numerous and variable. Therefore, you should think of these budgets as an approximation and make appropriate adjustments in the "Your Estimate" column to reflect your specific production and resource situation. More information on the use of crop budgets can be found in *Agricultural Alternatives: Enterprise Budget Analysis*.

Prepared by Michael D. Orzolek, professor of horticulture; George L. Greaser, senior research associate in agricultural economics; and Jayson K. Harper, assistant professor of agricultural economics.

Initial resource requirements

- Land: less than 10 acres
- Labor
 - Operator: 4 hours per acre
 - Harvesting and packing: 30 hours per acre
- Capital: \$800 to \$850 per year
- Depreciation on equipment: \$20 to \$25 per year

Early Season Fresh-market Sweet Corn Budget

Summary of estimated costs and returns per acre.

Item	Quantity or Number of Operations	Unit	Price	Total	Your Estimate
Variable costs					
Custom					
Applying calcium lime	0.5	ton	\$20.00	\$10.00	_____
Scouting for pests	8	acre	\$10.00	\$80.00	_____
Pesticide spraying	8	acre	\$7.20	\$57.60	_____
Fertilizer					
Nitrogen	100	pound	\$0.22	\$22.00	_____
Phosphorus	80	pound	\$0.28	\$22.40	_____
Potassium	40	pound	\$0.15	\$6.00	_____
Herbicide					
Laddock S-12	0.18	gallon	\$44.00	\$7.92	_____
Dual 8E	0.18	gallon	\$60.80	\$10.94	_____
Insecticide					
Asana XL	0.53	gallon	\$111.00	\$58.83	_____
Lannate LV	1.3	gallon	\$49.00	\$63.70	_____
Baythroid	0.17	pound	\$472.00	\$80.24	_____
Counter 20CR	6.5	pound	\$2.60	\$16.90	_____
Other variable costs					
Sweet corn seed	12	pound	\$8.00	\$96.00	_____
Cultivating	3	acre	\$7.60	\$22.80	_____
Clear plastic mulch	1	acre	\$300.00	\$300.00	_____
Hand harvesting	1	acre	\$180.00	\$180.00	_____
Packing and grading	1	acre	\$150.00	\$150.00	_____
Operator labor	5	hour	\$10.00	\$50.00	_____
Additional labor	5	hour	\$7.00	\$35.00	_____
Fuel	10.21	gallon	\$0.93	\$9.50	_____
Repair and maintenance					
Tractors and implements	1	acre	\$15.00	\$15.00	_____
Interest charge	1	acre	\$0.10	\$32.37	_____
<i>Total variable cost</i>				\$1,327.20	_____
Fixed costs					
Tractors	1	acre	\$15.86	\$12.28	_____
Implements	1	acre	\$12.32	\$9.98	_____
<i>Total fixed cost</i>				\$22.26	_____
Total cost				\$1,349.46	_____

Net returns for five different yields and prices.

Price	Yield (dozens)				
	600	800	1,000	1,100	1,200
\$2.25	\$1	\$451	\$901	\$1,126	\$1,351
\$2.50	\$151	\$651	\$1,151	\$1,401	\$1,651
\$3.50	\$751	\$1,451	\$2,151	\$2,501	\$2,851
\$3.75	\$901	\$1,651	\$2,401	\$2,776	\$3,151
\$4.00	\$1,051	\$1,851	\$2,651	\$3,051	\$3,451

Mid- to Late-season Fresh-market Sweet Corn Budget

Summary of estimated costs and returns per acre (hand harvested).

Item	Quantity or Number of Operations	Unit	Price	Total	Your Estimate
Variable costs					
Custom					
Applying calcium lime	0.5	ton	25.00	\$12.50	_____
Scouting for pests	8	acre	10.00	\$80.00	_____
Pesticide spraying	8	acre	7.20	\$57.60	_____
Fertilizer					
Nitrogen	100	pound	0.22	\$22.00	_____
Phosphorus	80	pound	0.28	\$22.40	_____
Potassium	40	pound	0.15	\$6.00	_____
Herbicide					
Laddock S-12	0.18	gallon	44.00	\$7.90	_____
Dual 8E	0.18	gallon	60.80	\$10.94	_____
Insecticide					
Asana XL	0.53	gallon	111.00	\$58.83	_____
Lannate LV	1.3	gallon	49.00	\$63.70	_____
Baythroid	0.17	pound	472.00	\$80.20	_____
Counter 20CR	6.5	pound	2.39	\$15.50	_____
Other variable costs					
Cultivating	3	acre	7.60	\$22.80	_____
Hand harvesting	1	acre	200.00	\$200.00	_____
Packing and grading	1	acre	180.00	\$180.00	_____
Sweet corn seed	14	pound	8.00	\$112.00	_____
Operator labor	8	hour	10.00	\$80.00	_____
Additional labor	7	hour	7.00	\$49.00	_____
Fuel	10.21	gallon	0.93	\$9.50	_____
Repair and maintenance					
Tractors and implements	1	acre	15.00	\$15.00	_____
Interest charge	1	acre	0.10	\$26.27	_____
<i>Total variable cost</i>				\$1,132.23	_____
Fixed costs					
Tractors	1	acre	12.28	\$12.28	_____
Implements	1	acre	9.98	\$9.98	_____
<i>Total fixed cost</i>				\$22.26	_____
Total cost				\$1,154.49	_____

Net returns for five different yields and prices.

Price	Yield (dozens)				
	660	880	1,100	1,210	1,320
\$2.00	\$166	\$606	\$1,045.51	\$1,266	\$1,486
\$2.25	\$331	\$826	\$1,320.51	\$1,568	\$1,816
\$2.50	\$562	\$1,134	\$1,705.51	\$1,992	\$2,278
\$2.75	\$661	\$1,266	\$1,870.51	\$2,173	\$2,476
\$3.00	\$826	\$1,486	\$2,145.51	\$2,476	\$2,806

Mid- to Late-season Fresh-market Sweet Corn Budget

Summary of estimated costs and returns per acre (machine harvested).

Item	Quantity or Number of Operations	Unit	Price	Total	Your Estimate
Receipts					
Mid- to late-season corn	1100	dozen	\$2.40	\$2,640.00	_____
Total receipts				\$2,640.00	_____
Variable costs					
Custom					
Applying calcium lime	0.5	ton	\$25.00	\$12.50	_____
Scouting for pests	8	acre	\$10.00	\$80.00	_____
Pesticide spraying	8	acre	\$7.20	\$57.60	_____
Fertilizer					
Nitrogen	100	pound	\$0.22	\$22.00	_____
Phosphorus	80	pound	\$0.28	\$22.40	_____
Potassium	40	pound	\$0.15	\$6.00	_____
Herbicide					
Laddock S-12	0.18	gallon	\$44.00	\$7.90	_____
Dual 8E	0.18	gallon	\$60.80	\$10.94	_____
Insecticide					
Asana XL	0.53	gallon	\$111.00	\$58.83	_____
Lannate LV	1.3	gallon	\$49.00	\$63.70	_____
Baythroid	0.17	pound	\$472.00	\$80.20	_____
Counter 20CR	6.5	pound	\$2.39	\$15.54	_____
Other variable costs					
Cultivating	3	acre	\$7.60	\$22.80	_____
Machine harvesting	1	acre	\$62.00	\$62.00	_____
Packing and grading	1	acre	\$180.00	\$180.00	_____
Sweet corn seed	14	pound	\$8.00	\$112.00	_____
Operator labor	8	hour	\$10.00	\$80.00	_____
Additional labor	7	hour	\$7.00	\$49.00	_____
Fuel	10.21	gallon	\$0.93	\$9.50	_____
Repair and maintenance					
Tractors and implements	1	acre	\$15.00	\$15.00	_____
Interest charge	1	acre	9.5%	\$22.99	_____
<i>Total variable cost</i>				\$990.95	_____
Fixed costs					
Tractors	1	acre	\$15.86	\$15.86	_____
Implements	1	acre	\$12.32	\$12.32	_____
<i>Total fixed cost</i>				\$28.18	_____
Total cost				\$1,019.13	_____

continued next page

Net returns for five different yields and prices.

Price	Yield (dozens)				
	660	880	1,100	1,210	1,320
\$2.00	\$301	\$741	\$1,181	\$1,401	\$1,621
\$2.25	\$466	\$961	\$1,456	\$1,703	\$1,951
\$2.40	\$565	\$1,093	\$1,621	\$1,885	\$2,149
\$2.75	\$796	\$1,401	\$2,006	\$2,308	\$2,611
\$3.00	\$961	\$1,621	\$2,281	\$2,611	\$2,941

For More Information

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Association

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Penn State College of Agricultural Sciences research, extension, and resident education programs are funded in part by Pennsylvania counties, the Commonwealth of Pennsylvania, and the U.S. Department of Agriculture.

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Issued in furtherance of Cooperative Extension Work, Acts of Congress May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture and the Pennsylvania Legislature. T. R. Alter, Director of Cooperative Extension, The Pennsylvania State University.

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