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UNIVERSITY OF MARYLAND
COLLEGE PARK•EASTERN SHORE

Fact Sheet

Fact Sheet 844

Growing Fresh Market Sweet Corn

Sweet corn continues to be a popular vegetable at summer cookouts and for meals prepared at home. The strong market demand and ease of production make it a suitable crop for small-scale part-time producers with only half an acre to large-scale producers with several hundred acres. Maryland farmers harvest an average of 5,000 acres of fresh market sweet corn with an annual gross value nearing $8 million. While sweet corn can be a profitable addition to your farm, careful attention must be paid to pest control, labor costs, and access to market. Many of the cultural requirements of sweet corn are similar to that of field corn, making much of the equipment easy to obtain. However, producing quality sweet corn requires careful attention to detail. Insects, most notably corn earworms, are major pests, especially during the later season and an adequate crop protection program must be employed.

Choosing a Sweet Corn Variety

Sweet corn varieties are classified by maturity, color, protection attributes, and sweetness gene type. Recent breeding programs have resulted in a tremendous diversity of variety offerings that have significant differences in taste, tenderness, and sugar content of the kernel.

Selecting Color Type

Sweet corn is available in three colors: White, Yellow, or Bi-Color. Color type itself does not affect sweetness; however, differences may be notable among different varieties with color variations. Color selection is primarily based on marketing considerations. White is the most popular roadside variety, but preferences vary by region. Some farmers brand their corn as

Table 1. Sweet Corn Genetics and Isolation Requirements.

Variety Class	Genes	Variety Examples	Kernel Properties	Grow apart from Class(es)
Normal	su	*Silver Queen *Stowells Evergreen	100% normal	*Supersweet *Augmented Shrunken
Sugary Enhanced (heterozygous)	su, se (1 copy)	*Silverado *Argent	75% normal 25% sugary enhanced	*Supersweet *Augmented Shrunken
Sugary Enhanced (homozygous)	su, se (2 copies)	*Table Sweet™ varieties *Silver King, Sugar Snow II *Imaculata *Brilliance	100% sugary enhanced	*Supersweet *Augmented Shrunken
Supersweet	sh_2	*Snow White *Boreal *Millenium	100% supersweet	*Normal *Sugary Enhanced (all) *Synergistic (all)
Synergistic (Heterozygous se with sh_2)	su, se, (1 copy), sh_2 (1 copy)	*Sweet Breed™ varieties	56% normal 19% sugary enhanced 25% supersweet	*Supersweet *Augmented Shrunken
Synergistic (Homozygous se with sh_2)	su, se, (2 copies) sh_2 (1 copy)	*Triple Sweet™ varieties *Cinderella	75% sugary enhanced 25% tender supersweet	*Supersweet *Augmented Shrunken
Synergistic (Homozygous se with bt_2)	su, se, (2 copies) bt_2 (1 copy)	*Misquamicut *Avalon	75% sugary enhanced 25% tender supersweet	*Supersweet *Augmented Shrunken
Augmented Shrunken	se (2 copies) sh_2 (2 copies)	*Gourmet Sweet™ varieties *Multisweet™ varieties *Xtra-Tender™ varieties	100% tender supersweet	*Normal *Sugary Enhanced (all) *Synergistic (all)
Mirai™	su, se (2 copies) sh_2 (2 copies)	*Mirai 002	100% tender supersweet	None necessary

Table 2. Recommended Sweet Corn Varieties.

Varieties	Season	Genotype	Cultivars
Yellow	Early	su	Sundance (BWMS)*
	Medium early		
	Main season	sh_2	Showcase
		sh_2	Supersweet 7210
	Late season		
White	Medium early	sh_2	Ice Queen
		su,se,sh_2	Sweet Ice
	Main season	su,se	Alpine
		su,se	Fantasia
		su,se,sh_2	Avalon (WH0809—Bt version)
		sh_2	Super Sweet 8701
	Medium late	su,se	Argent
		sh_2	Even Sweeter
		sh_2	Frontier
		su,se	Silver King
Bicolor	Main season	su,se	Sensor
		sh_2	Dazzle
		su,se	Temptation
		su,se,sh_2	Sweet Symphony
		su,se,sh_2	Providence (BC0805—Bt version)
		sh_2	Cabaret

different by using bi-color varieties. White and Yellow sweet corn will cross pollinate to produce bi-color corn, so be sure to isolate plantings by color.

Selecting Maturity Date

Maturity varies greatly with sweet corn with some varieties maturing in as little as 60-65 days and other as much as 85 days. Earlier maturing varieties are generally of poorer quality with smaller ears. Rely on early maturing varieties for early spring season and switch to mid or late maturing varieties for main season plantings.

Selecting Sweet Corn Genotype

The first sweet corn varieties, often referred to as normal or standard varieties, were selected from field corn as a result of a mutation of the su (sugary) gene, resulting in accumulation of sugars in the kernel. Newer varieties contain one, two or varying combinations of the se (sugar enhanced) gene or the sh_2 (Supersweet) gene. Newer varieties currently coming on the market have combinations of sh_2, se, and su genes.

The sugar enhanced (se) varieties contain a modified form of the normal (su) type sweet corn gene, resulting in 2-3 times the sweetness and longer retention of sweetness by 1-4 days. Normal su and Sugar Enhanced se types will grow similarly and do not need to be isolated.

The sh_2 Supersweet varieties, also known as shrunken type, contain 2-3 times more sugar than the sugar enhanced and retain their sweetness for up to 10 days under proper refrigeration, which delays the sugar/starch conversion process. The sh_2 Supersweet are therefore the dominant type used for transport to distant markets.

Sweet corn must be isolated from field corn or popcorn because pollen from these types can affect tenderness of the kernel. It is recommended to isolate by at least 300 feet or at least 12 days in silking time. In addition, the varieties containing the sh_2 (sugar enhanced gene) are recessive and must be separated from other sweet corn varieties. (See Table 1 for a complete listing of isolation requirements for various varieties.)

Each sweet corn type has its place in the market. The standard su types are still in demand at some roadside stands and seed cost is very low; however, their use is dwindling. The Sugar Enhanced varieties are the most popular choice, with very good variety selection, sweetness and ability to retain sweetness 2-3 days. Seed is approximately twice the cost of normal su corn. Super sweet varieties are the sweetest available and their popularity is growing at farm stands. Seed expense, isolation requirements, and seed vigor are the major drawbacks.

Preparing and Fertilizing the Soil

A well-drained loam to silt loam soil is best for sweet corn production. Early plantings should be planted on conventionally tilled, coarse-textured soils that warm rapidly in the spring. Prepare a firm seedbed free of clods and weeds.

A soil test should be completed to determine soil fertility levels prior to planting. Adjust soil pH to 6.2-6.5. Sweet corn is a moderate user of nitrogen, with recommended rates between 125-150 lbs N per acre. Adjust nitrogen rates accordingly for previous carryover N credits from manure applications and legume crops. Growers should follow a nutrient management plan. Nutrient recommendations for Maryland are provided in Table 3.

Growing Ultra-Early Sweet Corn

The use of clear plastic mulch can result in early corn that may receive a market premium. Many producers plant early corn as a marketing retention tool to

Table 3. Recommended Nutrients Based on Soil Tests.

Sweet Corn	Nitrogen (N) Pounds per Acre	Soil Phosphorus Level			Soil Potassium Level			Total Amount of Nutrient Recommended and Suggested Methods of Application
		Low	Med	Opt	Low	Med	Opt	
		Pounds P_2O_5 per Acre			Pounds K_2O per Acre			
Fresh Market	125-150	160	120	80	160	120	80	Total recommended
	40-60	120	100	60	120	100	60	Broadcast before plowing
	20	40	20	20	40	20	20	Band-place with planter
	50-75	0	0	0	0	0	0	Sidedress when corn is 12-18 inches tall

Note: For early plantings when soil temperatures are low, band 20 pounds of P_2O_5 and K_2O per acre when soil test levels are above optimum. On very light sandy soil, sidedress 40 pounds of nitrogen per acre when corn is 6 inches tall and another 40 pounds of nitrogen per acre when the corn is 12-18 inches tall.

attract early buyers who become repeat customers through the summer. The increased revenue must justify the time, expense, and added risk that accompanies this production method. In addition to the specialized equipment expense, producers should expect the following added costs: plastic mulch ($190.00), mulch laying ($100.00), and mulch perforation and splitting labor ($90.00). Producers normally look for a $0.60-1.00 per dozen premium to offset these costs.

Corn is planted 15-20 days earlier than standard planting. Choose early maturing varieties that have good seed vigor and cold-hardiness. Use either normal or sugar enhanced varieties with larger kernels for the first plantings, as super sweet varieties and small kernel varieties have poor seed vigor. Sites with sandy or loamy soil texture that will warm fast in the spring are best. A raised bed is normally not utilized. A specialized planter with two units mounted on a 15-20 inch center should be used to maximize plastic use efficiency. These rows are repeated on a 5-6 foot center. Four-foot-wide clear plastic mulch is laid over the rows. Herbicide must be applied before the plastic is laid or weed growth will result. Pre-plant incorporated or pre-emergence herbicides such as Dual II Magnum, Bicep II Magnum, Bicep II Magnum Lite, and/or Atrazine are recommended. The corn is left to emerge and grow toward the plastic. If unusually high temperatures exist, holes must be punched in the solid plastic to avoid overheating and burning of the plants. After the corn is pressing against the plastic or 30 days after germination,

slice through the plastic and move to the side. Biodegradable, photodegradable and/or pre-punched plastic is available, which breaks down in 30-60 days and greatly minimizes the amount of labor involved in plastic removal. Occasionally, growers have transplanted sweet corn plants started in the greenhouse through plastic for early market. This technique is very labor intensive and is generally not recommended due to the high plant population required.

Planting and Spacing

Early varieties of sweet corn are planted around April 1-10 (normal planting practices without plastic mulch). Early short-season varieties are more difficult to manage than other varieties and often are not as flavorful. Main season sweet corn is usually planted between April 20 and June 1. The planting season can be extended through early July. Corn planted after mid-May will have more problems with insects, especially with fall armyworm and corn earworm. Use successive plantings 10 days apart for continuous harvest throughout the summer. Be sure to take into consideration varieties with different maturity dates when planning a continuous harvest schedule.

Normal planting depth for sweet corn is 1-1½ inches. Early planted corn and super sweet varieties are planted ½ inch shallower. Soil temperature should be 50°F at 2-inch depth before planting. When using Prowl (Pendimethalin) herbicide, corn must be planted at least 2 inches deep to avoid crop injury. Ideal population seeding rates are between 14,500 and 19,000 seeds per acre. This normally equates to 12-15 lbs. of the sugar enhanced or standard variety seed or 5-6 lbs. of supersweet variety seed per acre, though kernel size and number of seeds per pound varies tremendously. The smaller-eared early varieties should be planted in rows 36 inches apart with 8-10 inches between each plant in the row. The two-eared varieties and the later large-eared varieties also should be planted in rows 36 inches apart, but each plant in the row should be 10-12 inches apart. If using the narrow spaced dual row system, plant at the same spacing with 6 feet between dual rows.

Sweet corn will perform well using No-till or Strip-Till production systems in later plantings. If planting no-till, be sure to use an adequate no-till planter to ensure accurate seed placement and good seed-to-soil contact.

Irrigating

Sweet corn is a heavy user of water, requiring up to 2 inches per week at later growth stages. During tasselling, silking and ear fill, corn will require ¼ to ⅓ inch of water per day. Most production years will require some supplemental irrigation. Soil moisture is needed for germination and early establishment and is critical during the silking and ear development stage. Overhead irrigation is the favored method using a traveling irrigation reel, set pipes, or pivot system. Some growers will use trickle with the dual row system, though the cost of drip line is often cost prohibitive. Lack of moisture will result in poor pollination, irregular ears, poor quality, and a reduction in yield. The use of poor quality water has resulted in bacterial stalk rot.

Controlling Weeds

There are numerous herbicide programs available to control weeds in sweet corn. Be sure to apply the correct herbicide or combination of herbicides to control both grass and broadleaf weeds. Identify the weeds in each field before you choose

Table 4. Weed Control in Sweet Corn.

Chemical Name	Brand Name	Rate/Acre	Pre-Emergence	Pre-plant Incorporated	Spike	Early Emergence	Post-Emergence	Grass	Broadleaves	Restricted Use	Comments: Always read label for complete instructions and list of precautions.
Conventional Tillage											
Butylate	Sutan+6.7EC	3.75-7.33 pints		x				x	x		Incorporate immediately after application. Combine with Atrazine for improved broadleaf control.
Alachlor	Micro-Tech	1.5-3 quarts	x	x				x	x	x	Primarily annual grass plus pigweed, galinsoga and nightshade. Combine with Atrazine for improved broadleaf control.
	Partner 65DF	2.3-6.4 lb.	x	x				x	x	x	
S-metolachlor	Dual II Magnum 7.64E (or OLF)	1-2 pints	x	x				x	x		Widely used. Good grass control. Weak on broadleaves. Combine with Atrazine for improved broadleaf control. Also available as premix with Atrazine as Bicep Magnum/ Magnum Lite.
Atrazine	Atrazine 4LF or OLF	1-2 quarts	x	x		x	x	x	x	x	Broadleaves only. Do not double crop in season after use. Note plant back restrictions.
Mesotrione	Callisto 4SC	3 fl. oz.	x				x		x		Broadleaves only. Weak on ragweed and m. glory. Combine with Alachlor or Dual for increased grass control. Available as premix with Dual as Lexar or Lumax. Check label for variety sensitivity and more information.
Pendimethalin	Prowl 3.3EC or OLF	1.8-2.5 pints			x			x	x		Controls grasses and some broadleaves. Plant sweet corn at least 2 inches deep or injury may result. Do not use in cold wet soils.
Halosulfuron	Sandea 75WG	.5-.66 dry oz.				x	x		x		Controls broadleaves and yellow nutsedge. Do not use with organophosphate insecticides.
Carfentrazone	Aim 40WG	.33 dry oz.				x			x		Controls many broadleaves. Tank mix with low rate of Atrazine for increased spectrum of control.
Bentazon	Basagran 4SC	1.5-2 pints					x		x		Many broadleaves and suppression of nutsedge.
2, 4-D Amine	2, 4-D 4EC	.5-1 pint					x		X		Broadleaves only. Injury to other crops from drift is a major concern. See label for more information.
Clopyralid	Stinger 3A	2-10.5 fl. oz.					x		x		Controls broadleaves in legume or composite family, including Canada thistle. Apply when corn is less than 18 inches.
Nicosulfuron	Accent 75DF	.66 dry oz.					x	x		x	Control of annual grass escapes. Check label for variety sensitivity and more information.
Topramezone	Impact 2.8SC	.75 fl. Oz.					x	x	x		TRIAL USE ONLY. Control many broadleaves and grasses. Long residual plant back restrictions.

Table 5. Insect Threshold Levels and Control Guide.

Soil and Seedling Pest: Flea Beetle, Grub, Wireworm, Cutworm

Cutworm

- 1-2 leaf—10% damaged plants
- 3-4 leaf—5% damaged & 4 larvae per 100 plants

White Grub

- heavy soils—2 per sq. ft.
- sandy soils—1 per sq. ft.

Wireworm

- 1 per bait station

Corn Rootworm (non-rotated corn only)

- 1 Western or 2 Northern per plant

Flea Beetle

- Stewarts Wilt Susceptible Varieties Only
- Spike stage to silking— > 5% of plants infested

Foliar Pest: FAW, TAW, ECB and CEW

Mid to late season plantings

- Early Whorl Infestation—15% of plants show fresh feeding
- Late Whorl Infestation—30% of plants show fresh feeding
- Early Tassel—More than 15% of emerging tassels

Ear Invading Pest: CEW, ECB, FAW, Sap Beetle

CEW, FAW, ECB—From Silking to Harvest

- First spray at 10% silk and
- Apply subsequent sprays on 1-7 day schedule according to the 5-day trap catch. Repeat applications if heavy rains within 24 hours.
- CEW and ECB MDA Trap Survey Hotline
    - Southern Maryland and Eastern Shore—800-492-2105
    - Central and Western Maryland—800-492-2106
    - http://www.mda.state.md.us/plants-pests/plant_protection_weed_mgmt/plant_pest_survey_detection/

Sap Beetle—Scout at pollen shed

- 5% of ears show adults

an herbicide. Pre-plant or pre-emergence applications are most effective for grass control. Table 4 summarizes herbicides available for sweet corn. Consult Extension Bulletin, EB-236, Commercial Vegetable Production Recommendations, for a current listing of recommended herbicides and a detailed description of their use. Always follow the chemical label.

Controlling Insect Pests

Sweet corn is host to a variety of insect pests. This section is divided into three parts: soil and seedling pests, foliar pests, and ear invading pests. Soil and seedling pests are controlled either before, at, or shortly after emergence. Foliar pests are controlled from emergence through tasselling. Ear invading insect control is needed from ear formation through harvest.

Soil and Seedling Pests:

Seed corn maggots are small, whitish maggots up to ¼ inch in length that infest the seed kernel and occasionally the seedling root or stalk. Eggs are laid by several fly species in the organic matter or manure-laden soil. Infested seeds/plants will normally not germinate or will be in a weakened state. They are most prevalent in areas with heavy organic material, cold wet soil, and/or with the recent application of manure. Rescue treatments are not effective and infestations are difficult to predict, so a preventative soil insecticide or seed dressing of insecticide should be used in fields with manure history or previous seed maggot problems. Seed corn treated for storage pests will not be adequate to prevent infestation.

Wireworms infest the kernel seed and young seedlings. They are slender, short-legged larvae with a pale yellow to reddish-brown body and flattened head. Wireworms, which are the larval stage of the Click Beetle, overwinter in the soil and infest seed and kernels in the spring. Infested seeds/plants will not germinate or will turn brown and wilt after germination. The kernel will often be hollowed out and roots pruned. Wireworms can move through the soil horizon relatively quickly depending upon moisture and temperature. Infestation is worse in cool, wet springs in fields with previous sod or grass cover. Wireworm populations can be monitored using bait stations. A mixture of untreated wheat and shelled corn is buried 4 inches in the soil, and then covered with black plastic or a shingle. Use at least one station per acre. The bait is checked in two weeks for wireworms. If one wireworm per station is found, preventative control with a soil or seed dressing insecticide may be warranted. Higher rates of the pre-packaged seed treatments are needed to control heavy infestations. Rescue treatments after the crop is planted are not effective.

Cutworms feed at the base of the stem where they cut or burrow through stems near or below the soil line. Infested plants will wilt or die quickly after. Careful examination near the base of the plant, and under clods or residue during the day will reveal the larvae. The black cutworm is greasy gray to black with a narrow stripe down its back and up to 1¾ inch in length. Moths lay eggs in early spring in surface residue and weeds. If cutworm damage is anticipated, a pre-plant shallow incorporated application of soil insecticide prior to planting will be effective. Post-plant rescue treatment can be effective as well if the soil is not dry. Consult EB-236 for treatment guidelines.

Grubs feed on the roots of plants, causing wilting, stunting, and in some cases death of the plant. Grubs have a C-shaped white body with black head and three

Sweet corn is at highest risk for infestation of ear invading insects during the silking stage, as depicted above. Picture courtesy of Dave Myers.

pairs of legs, and are ¾ to 1¾ inch in length. Grubs prefer conditions similar to wireworms with fields with prior history of sod especially favored. In-furrow treatment with soil or seed dressing insecticides is most effective.

Flea beetles feed on seedling stage corn causing small circular holes that rarely cause economic losses. However, the flea beetle transmits a bacterial disease called Stewarts Wilt, which can cause heavy losses in susceptible varieties. Plant resistant varieties or treat susceptible varieties if 5 percent of plants are infested at the spike stage. Flea beetles resemble fleas and will jump when disturbed. They are 3/32 inch long with a black, oval shape body. Many varieties of sweet corn are resistant or moderately resistant to wilt infection, so controls are usually not needed. For susceptible varieties, a systemic seed treatment is most effective.

Minor Foliar Pests: Japanese Beetle, True Armyworm

Japanese beetles will occasionally feed on the ear silks allowing other insects easy entry into the ear. They are not a consistent pest of sweet corn.

True armyworm cause feeding damage in the spring to small or whorl stage corn plants. The true armyworm is 1¼ inch long with a yellow to brownish-green body with three dark longitudinal stripes. Feeding damage appears as ragged leaves with irregular shaped feeding holes.

Ear Invading Insects:

Several types of caterpillars and sap beetles invade the developing ear and can significantly reduce ear quality and marketability, if not controlled. The caterpillars, especially corn earworms, are difficult to control during periods of peak moth flight. Fresh market sweet corn may require sprays every 5-7 days starting at early silking during low moth activity but as frequent as every 2 days during peak moth activity. Skipping even one application can result in an irreversible worm infestation and unmarketable sweet corn. Commercial growers must use spray application equipment capable of depositing spray at the ear zone. The two most effective sprayer types are the air blast cannon sprayer or a high pressure boom sprayer with drop nozzles. Skip rows are necessary for use of the air blast sprayer or the extended arm boom sprayer. Skip rows also aid in ease of harvest. Blocks between skip rows should not exceed 16 rows to allow sufficient spray coverage of the ear zone, if air blast spraying from both sides.

European corn borer feeds on leaves, bores into the stalk and damages the ear. It is important as an early and late season pest. The larvae are flesh colored ranging from light gray to faint pink with a brown head. First generation larvae attack the plant whorl and stalks starting in early June. Damage resembles a "shot hole" appearance as the leaves unfold. Second generation borers begin to infest the upper stalk and ear shank during late July and August, causing plant standability and ear quality concerns. Early plantings should be monitored during the whorl stages for corn borer activity. Occasionally, whorl feeding may warrant an insecticide application; however, the best time to control this pest prior to silking is when the green tassels are emerging and the larvae are more exposed to the spray.

Fall armyworms feed primarily on leaves but, when populations are high, they can tunnel into the shank or husk leaves of the ear. First damage is noted as ragged shot hole appearance as leaves unfold from the whorl and as the season progresses they may move to the ear. Since they don't overwinter in Maryland, moths migrate northward from overwintering sites in Florida, usually appearing first in early July. Thus, they are mainly a damaging pest on late plantings of sweet corn. Larvae are up to 1½ inch long, vary in color from light tan to green to black, and have a black stripe running down each side and a yellowish gray stripe down the back. Its head has a pale, inverted "Y" marking.

Corn earworms are the most destructive pest of sweet corn. Earworms feed within the ear causing direct damage to the top kernels, which is unacceptable in most marketplaces. Larvae range in size from 1/8 to 1 5/8 inch when full grown. They vary in color from light greenish yellow, pink or brown with distinct longitudinal white or cream colored bands and 5 sets of prolegs. Eggs are laid on the silks and hatching larvae quickly work their way down the silk tube to the ear. This behavior makes it difficult to control earworms because they are exposed to insecticide residues for a short period of time. Peak egg laying activity and damage occurs during late July through early September. Planting varieties with good tip coverage (long, tight silk tube) helps to impede the invasion of young larvae into the ear. Once inside the ear, control is difficult. It should also be noted that populations of earworms that have migrated from the South later in the season have shown some resistance to the pyrethroid class of insecticides.

Table 6. Disease Damage Description and Control.

Disease	Description and damage	Control
Bacterial wilt	Bacteria overwinters in the corn flea beetle and is spread to corn when beetles feed on corn plants. It is more severe on younger plants than old. Pale-green to yellow streaks appear on leaves, which later turn brown. Early infected plants may die while late infected plants may be stunted or merely have streaked leaves.	Use an insecticide at seedling emergence, repeating every 3-5 days until 4-5 applications are made. In areas where this disease is a problem, use resistant varieties of sweet corn, if possible.
Smut	Large, fleshy, irregular galls may be formed on leaves, stems, ears, and tassels. The immature galls are white and spongy. Mature galls are brown and contain powdery, black spores of the fungus.	Fungus overwinters in the soil. Some varieties of corn are more susceptible to this disease than others. Choose a smut-resistant variety, if possible.
Leaf blights	Leaf spots include northern corn leaf blight and southern corn leaf blight. Size and color of the spots help separate the different diseases.	Fungus overwinters in the soil in diseased plant refuse. In most years, leaf blight is not a problem.
Rust	Rust begins as cinnamon brown blisters over both surfaces of leaves. The blisters break and release spores, which can infect additional corn.	In most years, chemical control is not needed. Late-season corn may need spraying if the corn is infected at whorl stage or earlier.

Table 7. Quick Reference Guide

	Insecticide																	
	Asana XL	Avaunt	Baythroid XL	Bifenthrin (Non-Coastal Cty only)	Diazinon AG500	Entrust	Intrepid	Lambda-cyhalothrin (Warrier)	Lannate	Larvin	Lorsban 4E	Metasystox-R	Mustang MAX	Penncap-M	Permethrin	Sevin	Spin Tor	Thionex
Foliar and Ear Invading Pest																		
Corn Rootworm Adults	X		X	X	X			X	X		X	X	X	X	X			
Corn Flea Beetle (Foliar only)	X		X	X	X			X	X		X		X	X	X	X		
Corn Leaf Aphid	X			X	X				X					X				X
Sap Beetle	X			X	X			X	X				X	X				
Japanese Beetle			X	X				X					X	X		X		
Grasshoppers			X	X	X			X					X	X		X		
Worm Pests																		
European Corn Borer	X	X	X	X		X	X	X	X	X			X	X	X		X	
Corn Earworm	X		X	X	X	X		X	X	X			X		X		X	
Fall Armyworm		X	X	X		X		X	X	X					X		X	
True Armyworm	X		X	X		X	X		X				X	X			X	

Sap beetles are black, oblong to oval shape and ¼ inch long. They are attracted to the feeding injury caused by caterpillars and degrading corn pollen located on leaf axils. Adult beetles move to the wilted silk tissue, where they lay eggs that look like tiny rice kernels. After hatch, beetle larvae move down the silk tube to the ear tip. Kernels throughout the upper half of the ear may be hollowed out and the ear quality compromised. Using varieties with tight, long silk tubes will greatly reduce sap beetle damage to the kernels. Sap beetles are drawn to damaged corn, so control of other ear invading pests will also reduce sap beetle incidence.

Bt varieties have the potential to greatly reduce the number of insecticide sprays needed to produce quality sweet corn. These varieties have been genetically modified to express the *Bacillus thuringiensis* endotoxin, which is specifically active on certain caterpillars. Attribute Bt sweet corn is currently available through Syngenta Seeds under the Rogers brand. This insect resistant corn provides 100 percent control of European corn borers; thus, whorl and tassel sprays for this pest can be eliminated. It also greatly reduces injury from other caterpillar pests, including corn earworm and fall armyworm; however, they are more tolerant of the expressed Bt toxin. In addition, brown or wilted silks express less of the Bt toxin, and eggs laid late in the season during peak moth activity have a greater chance of surviving and invading the ear. In these cases, when moth activity is high, normally in late August and early September, 2-3 spray applications may still be needed. Caterpillars that have invaded the Bt ear are normally much smaller and slow moving due to the expressed toxin. Sap beetles, Japanese beetles, and corn rootworm adults are not affected by the Bt toxin, and thus additional controls may be needed if these insects are a problem on your farm.

Controlling Disease

Diseases are normally not a significant problem with sweet corn especially if the precautions noted in Table 6 are followed. Consult Extension Bulletin, EB-236, Commercial Vegetable Production Recommendations, for a current listing of recommended fungicides and detailed description of their use. Always follow the chemical label.

Harvesting

Harvesting sweet corn at the proper stage is critical to maintain sweetness and tenderness. During the summer, sweet corn will remain in prime condition for only 1-2 days. As the ear reaches prime condition the silks begin to dry down, the husk fills out with plump kernels, and the kernel exudes a milky liquid when

Example of sweet corn being cooled with a hydrocooler. Picture courtesy of Ben Beale.

punctured with the thumbnail. Sweet corn will approach maturity 20-22 days after silking and should be picked daily. As the kernel passes prime harvest time, sugars convert to starch and the hull will become tough. Supersweet varieties will maintain sweetness longer than other varieties.

Sweet corn may be harvested by hand or mechanically. One-row mechanical harvesters can pick between 8-10 acres per day. Mechanical harvesters are more efficient; however, they pick the entire crop at one time. When you handpick corn, grasp the ear near the base and sharply twist it downward while rotating your wrist. Corn is normally piled on a wagon in the field and grade/packed at the packing house.

Sweet corn is most commonly packaged in wire bound crates or perforated wax boxes. Burlap bags are also used for local shipment. Pallet or bin boxes are occasionally used; however, corn will retain heat longer in large containers.

Post-harvest Handling

Sweet corn quality, sweetness, and tenderness will deteriorate rapidly after harvest. Sweet corn should be cooled immediately after harvest and kept near 32°F to retain optimum freshness. Farm stands may pick daily and sell the same day. Those shipping corn over any distance must first remove all field heat. There are various cooling methods available as described below:

Hydrocooling: The most efficient and effective method of cooling corn is hydrocooling. Corn is immersed in ice-cold water, which quickly removes all field heat. Hydrocoolers are expensive and require significant economy of scale to be economical. Many growers will ship corn to a central facility to be hydrocooled before shipping. Corn being shipped long distances should be hydrocooled.

Package Icing: For smaller growers and short distance shippers, ice can be added to the crate during packing. The addition of 1 pound of ice per 5 lbs. of sweet corn is normally sufficient. Ice can also be blown on top of the crates when placed in a cooler or refrigerated truck. Commercial grade ice machines are needed to be economically feasible. Once the ice melts, the pack will be heavy and wet.

Cold Storage: Corn placed in cold storage before being pre-cooled will not retain freshness for nearly as long as hydrocooled or iced corn. It will take many days to remove all of the field heat from the inner pack of corn. Small growers who do not have access to ice or hydrocoolers should still pick corn in the morning and cool it immediately either by placing it in a cooler or by wetting it down and keeping it in the shade.

Budgeting

Sweet corn profitability is most affected by market price, which can vary widely in any given year. Demand for fresh market sweet corn is highest from early season in June through early September. With the advent of Supersweet varieties, sweet corn can be shipped considerable distances and still maintain flavor. Supply gluts in the market will undermine prices on the wholesale level. It is critical to research market outlets and have an outlet established before planting the corn. The greatest expense in sweet corn production is harvesting labor. Labor must be reliable and available when harvest is needed. The budget below provides an estimate of average cost and returns for one acre. It is important to develop your own enterprise budget to determine potential profitability/cash flow.

Table 8.

SWEET CORN-FRESH MARKET **PER ACRE**

ITEM	UNIT	QUANTITY	PRICE	TOTAL
INCOME				
SWEET CORN	**DOZEN**	**1200.00**	**$1.50**	**$1,800.00**
VARIABLE/OPERATING COSTS				
SEED	POUND	10.00	7.50	$75.00
COVER CROP	ACRE	1.00	30.00	30.00
NITROGEN	POUND	150.00	0.50	75.00
PHOSPHATE	POUND	75.00	0.40	30.00
POTASH	POUND	120.00	0.50	60.00
LIME	TON	0.33	27.00	8.91
LORSBAN	POUND	7.00	1.70	11.90
ATRAZINE	QUART	1.00	2.50	2.50
DUAL MAGNUM	PINT	1.50	4.37	6.56
WARRIOR, 6 SPRAYS (3 FLUID OZ. EACH APPL.)	OUNCE	18.00	2.03	36.54
SOIL TEST	ACRE	1.00	1.00	1.00
HARVESTING LABOR	HOUR	40.00	7.00	280.00
CRATES	BOX	250.00	1.00	250.00
INTEREST ON OPERATING CAPITAL	$867.41	0.50	7.0%	30.36
TOTAL VARIABLE COSTS LISTED ABOVE				$897.76
FIXED/OVERHEAD COSTS (CUSTOM RATES ARE USED AS A PROXY FOR FIELD OPERATION COSTS)				
PLOWING	ACRE	1	14.00	14.00
DISKING	ACRE	1	12.00	12.00
PLANTING	ACRE	1	20.00	20.00
FERTILIZER APPLICATION	ACRE	2	5.00	10.00
PESTICIDE APPLICATIONS	ACRE	7	6.00	42.00
IRRIGATION	ACRE	2	20.00	40.00
LAND CHARGE	ACRE	1	65.00	65.00
TOTAL FIXED COST LISTED ABOVE				$203.00
TOTAL VARIABLE AND FIXED COST LISTED ABOVE				$1,100.76
NET INCOME OVER VARIABLE & FIXED COSTS LISTED ABOVE				$699.24

			PRICES	
NET INCOME ABOVE VARIABLE AND	**YIELDS**	$1.00	$1.50	$2.00
FIXED COSTS LISTED ABOVE FOR	750	($350.76)	$24.24	$399.24
VARIOUS YIELDS AND PRICES	1200	$99.24	$699.24	$1,299.24
	1350	$249.24	$924.24	$1,599.24

Sources

Extension Bulletin 236: Commercial Vegetable Production Recommendations; Maryland edition. 2007. University of Maryland Cooperative Extension in cooperation with University of Delaware; Pennsylvania State University; Rutgers, State University of New Jersey; and Virginia Polytechnic Institute. Available from your local Extension office.

Insect Pests of Sweet Corn I and II: Pest Management Pictorial Guide. 1986. Dively, G.P. in cooperation with Extension Entomologists in cooperating Mid-Atlantic states. University of Maryland Cooperative Extension. Available from your local Extension office.

Sweet Corn Production. 1998. Schultheis, J.R. North Carolina Cooperative Extension Service. Available on the web at http://www.ces.ncsu.edu/depts/hort/hil/hil-13.html.

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Use of trade names does not constitute an endorsement by the University of Maryland Cooperative Extension.

Always read and follow the pesticide label. Use pesticides only in accordance with the directions on the label. Labels are subject to change. It is the responsibility of the user to ensure the proper pesticide is used and the label instructions are followed.

Growing Fresh Market Sweet Corn

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