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Thousands of individuals have accessed the 2012 Roxbury Crop and Harvest manual, but its production and harvest information are no longer a reliable resource. The following manuals have been rewritten by the original author reflecting current practices from a broader community of farmers while reflecting the latest research and guidelines for safe production, harvest, and post-harvest procedures.

Rewriting and editing were made possible with generous financial support by Northeast SARE, the contributions from a group of exemplary farmers in the Northeast and Midwest, as well as the support from Cornell Cooperative Extension Eastern NY Commercial Horticulture Program.

Participating growers provided parameters on:

- Seed, plant, row, and bed spacing, and tools utilized in production
- Weed, disease, and insect issues and possible controls used
- Yield, unit sizes and harvest tools
- Prices received

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**By Jean-Paul Courtens**

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## Arugula

All prices farmers reported receiving	Retail (Farmer's Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc.)
Value	\$10.00 to \$15.00 per lbs.	\$3.00 to \$5.00 per lbs. Depending on size	\$6.00 to \$8.00/lbs. for 3# boxes or \$10.00-12.00/Lbs. in 8 Oz clamshells
Yield	At 10 to 17 rows per bed expect to harvest 1/3 lbs. per bed foot or 2400 to 2800 lbs. per acre. Yields are much higher (and value much lower) when arugula is harvested beyond 4 inches tall		
Standards	Harvesting: 20-25 lbs. per hour per person @ approximately 100 hrs. per acre plus time to load and unload boxes to washing area. When bunched add time but volume is up as well. Machine harvest up to 300 lbs. per hour or 7-20 hrs. per acre.		
	Washing and sorting: 120 lbs. per person per hour or much more time when using small equipment or when crop is of low quality		
Tools needed	Farmer's Friend handheld harvester, Orthomec Harvester, or knives.		

### Ready to Harvest Indicators and Quality

- ◆ Plants 3-4 inches tall for salad or 5-6 inches tall for cooking green, deep green, and without pungency.
- ◆ Leaves should not have excessive holes due to flea-beetle damage.

### Harvest Procedures

- ◆ Wash hands and sanitize knives before harvesting.
- ◆ Harvest in the morning hours to avoid field heat accumulation.
- ◆ Move crop from dirty harvest bins to new clean bins after washing.
- ◆ When machine harvested:
  - Weed field thoroughly before harvesting as people on machine will not be able to keep up sorting at the speed of harvesting.
  - Walk fields before harvesting to inspect for rodents or feces in crop. Remove any contaminant and mark the spot so the tractor operator can raise the belt approaching this spot.
  - During harvesting remove all yellow leaves off belt before it falls into the crates. When Farmer's Friend harvester is used, sorting will be done after harvesting.
- ◆ When hand harvested with Harvest or Victorinox knife:
  - Walk fields before harvesting to inspect for animal damage and feces in crop. Mark any problem locations so harvesters may avoid them.
  - Hold a small bunch of leaves at the top of the plant with one hand and cut with one motion with the other hand.
  - Shake vigorously to remove any yellow leaves or stems from previous cuttings.
  - Place in box with the stems facing the same direction.
  - Leave behind 1-2 inches for re-growth. For salad mix, the leaves should be small and tender. Cut high enough that only the leaf part is harvested.
  - For braising mix, the leaves can be larger and not as tender, but leave long stems behind.

**Washing and Storage Procedures**

- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men’s](#), or [women’s bib](#). If long sleeve shirt contains soil remove this as well.
- ◆ Add sanitizer like [SaniDate](#) to wash water (first washing). Use [this Guide](#) to establish how much peracetic acid solution to add to water.
- ◆ When a [rinse conveyor](#) washer is not available wash arugula at least twice and preferably three times in clean potable water. The last dunking of the arugula can be used to hydrocool the product by adding ice to the water or having it pre-cooled. Using a [bubbler](#) to agitate the water reduces damage of the leaves
- ◆ Do not leave greens in water for longer than 1 minute. Leaves tend to get waterlogged after a few minutes, which causes them to deteriorate faster.
- ◆ Dry arugula in a centrifuge. For the smaller grower use this [Chef’s salad spinner](#). Larger growers can use the [Hobart version](#).

Packing in the field	Field box Plastic 1½ bushel bin
Packing for delivery	3 lbs. boxes for baby arugula or 12 to 18 bunches in sealed ½ bushel boxes for wholesale. PLU arugula is 94884 clean bin of choice for CSA distribution Line the boxes with a plastic liner to avoid product from losing moisture
Storage	At 32°–41° F, 95 -100% humidity.

**Basil**

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc.)
Value	\$1.50 - \$3.00 per bunch	24 bunches per box @ \$18.00 - \$24.00 a box	No numbers available
Yield	Yields per acre greatly depends on quality in field. Yields reported up to 20,000 bunches and as low as 8,000 bunches per acre		
Standards	Harvesting: 60 bunches per hour @ approximately 150-400 hrs. per acre (depending on yield and quality plus the time to load and unload boxes out of field to packing area)		
	Basil is not washed		
Tools needed	Scissors, knives, bands		

**Ready to Harvest Indicators and Quality**

- ◆ Plants 10-15 inches tall, deep green, without holes due to eating damage by Japanese beetle or black spots (downy mildew).
- ◆ Harvest before frost.
- ◆ Do not harvest flowering stems.

**Harvest and Cleaning Procedures**

- ◆ Basil is harvested in late morning after any dew has evaporated
- ◆ Wash hands and sanitize scissors before harvesting.
- ◆ Cut individual stems with scissors.
- ◆ If crop has high field quality (no Japanese beetle damage or downy mildew) leave 3-4 inches behind for re-growth
- ◆ Do not get wet. Do not harvest in the rain, since leaves will turn black in storage.

Packing in the field	Field box Plastic 1½ bushel bin
Packing for delivery	Pack in a sealed 1½ box at 24 bunches for wholesale. PLU Basil is 94885 Clean bin of choice for CSA or farmers market distribution Line the boxes with a plastic liner to avoid product from losing moisture
Storage	Store at 50° F, 95 -100% humidity with good air circulation

### Beans, Snap

All prices farmers reported receiving	Retail (Farmer's Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	Handpicked Haricot-Vert beans at \$3.75 to \$5.00 per lbs. Regular green beans @ \$2.00 to \$4.00 per lbs.	\$1.20 to \$1.50 per lbs.	Snipped beans at \$2.25 per lbs.
Yield	Greatly depending on variety and growers report between ½ lbs. to .75 lbs. per row foot at 5000 to 10,000 lbs. to the acre		
Standards	Machine harvesting: up to 375 -500 lbs. per person per hour (one person driving a tractor and the second packing boxes plus the time to transport boxes to picker and back to packing barn. Hand harvesting: Haricot Vert 15-20 lbs. per person per hour, regular green beans 30 lbs. per person per hour		
	If machine harvested sorting is required at between 200 and 350 lbs. per person per hour		
Tools needed	Bean picker and large plastic boxes, or when hand harvested buckets		

#### Ready to Harvest Indicators and Quality

- ◆ Wash hands before handling produce and boxes.
- ◆ Depends on variety but for machine harvested beans you want optimum yield whereby most pods are mature without starting to form any beans.
- ◆ Immature beans also lower the overall yield and get easily scratched.
- ◆ When hand harvested you can harvest the plants several times increasing the overall yield.
- ◆ Don't harvest when the plants are wet.
- ◆ Keep stem intact when harvesting by hand.
- ◆ Bring beans in regularly to packing shed or keep in shade to avoid field heat accumulation and wilting of beans.

#### Harvest and Cleaning Procedures when machine harvested

- ◆ [Wholesale Grading and Packing Instructions](#)
- ◆ [U.S. Standards for Grades of Snap Beans](#)
- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men's](#), or [women's bib](#). If long sleeve shirt contains soil remove this as well.
- ◆ Beans are dumped on conveyor that leads to a well-lit sorting line.
- ◆ Remove all broken beans, pin beans, beans with defects and stems that do not fall through the sorting line.
- ◆ If necessary, wash beans in cold water. Add sanitizer like [SaniDate](#). Use [this Guide](#) to establish how much peracetic acid solution to add to water. **Allow beans to dry before placing in storage**
- ◆ Do not store beans wet as any sclerotinia (grey mold) will quickly spread under wet conditions in the cooler.

◆ [Snap Bean Post Harvest Factsheet](#)

Cleaning in the field	When machine picked, adjust blower so only pin beans and leaves blow out of the stack
Packing in the field	One person rides on the bean picker to switch bins and to adjust the machine or signal to the driver to speed up or slow down (depending on yield, and other conditions).
Storage and packing for delivery	Pack beans in a ½ bushel or 1 <sup>1</sup> / <sub>9</sub> -bushel boxes at either 15 or 32 lbs. for wholesale. PLU for green beans is 94066 and waxed is 94533 Clean bin of choice for CSA or famers market distribution Store at 41°F, 95 % humidity but never under wet conditions or under 40°F to avoid chilling injury Beans are sensitive to Ethylene exposure.

**Beets**

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc.)
Value	\$2.00 to \$5.00 per lbs. reported depending on variety and quality	\$0.80 to \$1.20 per lbs. depending on variety	\$0.80 per lbs. for juicing \$1.45 to \$1.75/lbs. depending on variety
Yield	1 lbs. per row foot at 21,600 lbs. to the acre		
Standards	Harvesting: Depends on size, but 175 - 200 lbs. per hour is not unusual plus loading and unloading boxes from and to washing area.		
<a href="#">Post-harvest</a>	Washing: 350 lbs. per hour per person (includes cleaning bins and weighing)		

**Ready to Harvest Indicators**

- ◆ Beets are 2-3 inches in width, round and unblemished. Leave beets in field that have any defects e.g., black cavities due to Boron deficiency.

**Harvest Procedures**

- ◆ By hand:
  - Wash hands before harvesting
  - Beets are pulled out of the ground and leaves are twisted off and packed into buckets.
  - Place full buckets next to the harvest lane.
  - If bulk harvesting in 20-bushel bins drive by with the bulk bin on the tractor and carefully dump the beets into the bulk bin.
- ◆ By Machine:
  - Speeds of conveyors and components will vary a great deal with field conditions. There is no prescribed speed at which to set the flow controls. However, there is an approximate start-up setting, and the operator needs to adjust as needed for conditions.
  - Adjust belt of machine to the speed of the tractor and set digging chisel just below the roots.
  - Set cutting height of beet tops at approx. 1-2 inches
  - Most small carrot harvesters (that also harvest beets) do not allow for a sorting platform. Most likely additional sorting will need to be done before long term storage.

Remove any beet that is damaged or has other defects before placing in long term storage by running it over a conveyor in the packing barn.

**Washing and Sorting Procedures**

- ◆ Wash hands and rinse boots before entering wash and pack shed
- ◆ Wash in [rinse conveyor washer](#) or if very dirty in a [barrel washer](#).
- ◆ Sort for size and culls at a well-lit sorting table.

Packing for delivery	Pack in 25 lbs. plastic bags for wholesale PLU Red Beets 94540, Golden 93273 Pack in any clean crate of choice for CSA or farmer’s market
Storage	At 32° – 41° F, 95 -100% humidity.

**Beets, bunching**

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$2.00 to \$3.50 per bunch at 1 ¼ lbs. per bunch 3 to 5 beets)	\$1.20 to \$2.00 per bunch	No numbers available
Yield	½ bunch per foot at 7200 bunches to the acre		
Standards	Harvesting: 30-60 bunches per hour per person depending on quality of the leaves @ approximately 150-250 hrs. per acre in cutting plus loading and unloading boxes from and to washing area		
	Washing: 100 bunches per hour		
Tools needed	Twisties or rubber bands, enclosed boxes		

**Ready to Harvest Indicators and Quality**

- ◆ Beets 2- 3 inches in width with healthy tops. Leave beets in field that have black cavities on roots due to Boron deficiency. Remove any leaves with Cercospora (leaf blight) injury.

**Harvest and Cleaning Procedures**

- ◆ Wash hands before harvesting beets for fresh use.
- ◆ Harvest in the morning hours to avoid field heat accumulation.
- ◆ Select beets out of rows, clean off the dead leaves, and put 3-5 beets per bunch. Make sure the tops of the beets are even with each other and wrap the twistie or rubber band around the stems just above the beets.
- ◆ Hold the twistie in place and twist the bunch to tighten the twistie. It is important to have neat and tight bunch for washing and distribution. All bunches should be uniform in size.
- ◆ Bunches are left in the wheel-track (4 or 5 bunches to a pile) to be picked up and boxed periodically to avoid over-harvesting. Don’t bunch and count at the same time as this can lead to mistakes in counting.
- ◆ When bunching is not necessary, pull beets, clean and pack in regular (1½ bushel) box.

**Washing Procedures**

- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men’s](#), or [women’s bib](#).
- ◆ Use a [bunch washer](#) to wash the beets, or lay them out on a [mesh table](#) to spray them off by hand or run them through a [rinse conveyor](#) washer. Regarding the last option, make sure you use the

appropriate pressure on the nozzles to avoid damage to the leaves. When a bunch washer is used an additional single pass rinse is necessary to clean the leaves, which may also be eaten.

### **Grading Procedures**

◆ [U.S. Standards for Grading of Beets](#)

Cleaning in the field	Pull off damaged or yellow leaves
Packing in the field	In multiples of 4 or 5
Packing for delivery	Depending on customer but wholesale is usually a 12 or 24 ct. in a 1 <sup>1</sup> / <sub>9</sub> or 1 <sup>3</sup> / <sub>4</sub> Box PLU bunched red beets 94539
Storage	At 32° – 41° F, 95 -100% humidity. Pack with ice in closed containers for storage longer than a week

## Broccoli

All prices farmers reported receiving	Retail (Farmer's Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$3.00 to \$5.00 per bunch or \$3.00 to \$4.50 per lbs. or \$2.00 to \$5.00 each	\$1.00 to \$1.85 per lbs.	No numbers available
Yield	½ bunch per row foot at 5000 bunches to the acre. Average yield of organic broccoli on the east coast is 3600 lbs. per acre		
Standards	Harvesting: 100 heads of broccoli per hour per person (not including small ones), all stripped from leaves in pickle barrel @ approximately 120 hrs. per acre in cutting plus loading and unloading boxes from and to washing area. Bunching takes place in washing area.		
Post-Harvest	Washing: Includes counting and possibly bunching, 200 bunches per hour		
Tools needed	Use a clean and sharp knife. Picking crates plus enclosed boxes to transport to washing shed		

### Ready to Harvest Indicators

- ◆ For a full head: Florets are a dark green and still tightly bunched, about 2 mm in size. Heads are usually domed. Once the florets are loose, they may flower in cooler and do not store very long. Do not harvest heads with traces of head rot or brown bead.
- ◆ When broccoli is exposed to warm nights for a prolonged period flowers will become sterile resulting in an unmarketable product.

### Harvest Procedure

- ◆ Wash hands and sanitize knives before harvesting.
- ◆ Harvest in the morning hours to avoid field heat accumulation.
- ◆ Harvest with great care twice a week for optimum product.
- ◆ Separate and discard any broccoli that might have been contaminated with bird feces.
- ◆ Do not expose broccoli to warm temperatures and make regular trips to wash and pack house during harvest.

### Washing and Sorting Procedures

- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men's](#), or [women's bib](#). If long sleeve shirt contains soil remove this as well.
- ◆ Place broccoli in room temperature water with appropriate sanitizer to wash. Use [this Guide](#) to establish how much peracetic acid solution to add to water. When broccoli is warm, it is advisable to slowly cool the broccoli down before exposing it to ice water as the florets will absorb the water. Any contaminant in the water will then enter the broccoli.
- ◆ Hydrocool broccoli in a washing tub filled with iced water to remove field heat.
- ◆ Smaller heads are bunched together with a strong rubber band or can be sorted out and counted at a higher rate per box, if each head in the box is about the same size and weight.

Cleaning in the field	Remove leaves from stem
Packing in the field	Prevent any damage by handling broccoli very carefully in picking crates
Packing for delivery	<a href="#">Wholesale Broccoli Packing</a> Bunched 21 Lbs. 14s and 18s. Crown Cut 10 or 20 lbs. loose, all packed in waxed 1 1/9 boxes PLU Broccoli is 94060 and for crowns 93082 CSA and farmers' market use clean boxes of choice
Storage	In cooler at 32° F packed with ice when available <a href="#">Post Harvest Factsheet</a>

## Broccoli Rabe

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$3.00 to \$5.00 per bunch	\$1.50 a bunch	\$2.50 a bunch
Yield	½ bunch per row foot at 7200 bunches to the acre		
Standards	Harvesting: 40-50 bunches per hour per person depending on quality of the crop @ approximately 160 hrs. per person in cutting and bunching not including loading and washing. When harvested loose; 75 -100 lb. per hour @ approximately 100 hrs. per acre		
	Washing: 150 -200 bunches per hour which includes re-packing. Passthrough conveyor washers will increase efficiency.		
Tools needed	Knives and twisties or rubber bands and enclosed boxes		

### Ready to Harvest Indicators and Quality

- ◆ Greens 12-18 inches tall with small broccoli heads for mature harvest. Greens 8-10 inches tall for young tender leaves. Leaves are dark green without any sign of yellowing or necrosis. Stems should be pale green on the inside without any sign of a white fibrous core.

### Harvest Procedures

- ◆ Wash hands and sanitize knives before harvesting.
- ◆ Harvest in the morning hours to avoid field heat accumulation.
- ◆ Broccoli Rabe harvested should be tender with no white core. To check cutting height, look at the cut stem to see if there is a solid white core in the stem. If there is, cut a little bit higher on the stem.
- ◆ Bunch size is usually as much as you can hold together in one hand (a large hand). After bunching trim stems evenly. Weigh bunches according to customer’s needs but usually about 1 lbs.
- ◆ When packing bunches in a box put 4 bunches in a layer and pack leaves to stems so they fit in tightly for stacking of boxes.

### Washing and Storage Procedures

- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men’s](#), or [women’s bib](#). If long sleeve shirt contains soil remove this as well.
- ◆ Add sanitizer to first wash water. Use [this Guide](#) to establish how much peracetic acid solution to add to water
- ◆ Wash rabe at least twice in clean tubs. The last dunking of the raab can be used to hydrocool the product by adding ice to the water or having water pre-cooled.
- ◆ Do not leave bunches in water for longer than 1 minute or until the core of the stems are properly cooled down. Rabe can get waterlogged after a few minutes, which causes it to deteriorate faster
- ◆ Pack in sealed boxes or line the boxes with a plastic liner to avoid product from losing moisture for longer storage.

Cleaning in the field	remove dead and yellow leaves
Packing in the field	16 to 24 bunches per box. Industry standard is 20 count boxes with each bunch weighing 1 lb.
Packing for delivery	16 to 24 bunches per 1 <sup>1</sup> / <sub>9</sub> box for wholesale PLU is 94547
Storage	At 32° – 41° F, 95 –100% humidity. Pack in closed containers for storage longer than a few days.

## Brussels Sprouts

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc.)
Value	\$3.00-\$5.00 per stalk or \$8 per quart	\$2.10 to \$3.00 per 8 Oz package	\$5.00-\$6.00/lbs.
Yield	¼ marketable stalk per row foot at 3560 stalks to the acre or 1.5 lbs. per bedfoot.		
Standards	60 stalks per hour per person @ approximately 65-100 hrs. per acre, (includes cleaning in the field). Or 30 quarts per hour per person		
Tools needed	Pruning shears/loppers or machete, boxes		

### Ready to Harvest Indicators and Quality

- ◆ [Wholesale grading and Packing Instructions](#)
- ◆ Sprouts are firm, solid, and round without any sign of Alternaria on the center leaves of the sprouts. Some of the outer leaves can have some black spots that will need to be cleaned off during packing.
- ◆ Harvesting Brussels Sprouts after the 1<sup>st</sup> frost increases the sweet flavor of the sprouts

### Harvest and Cleaning Procedures

- ◆ Wash hands and sanitize pruning shears before harvesting.
- ◆ One person snaps the leaves off the stalks and removes the diseased sprouts at the bottom of the stalk. This person also snaps the top of the stalk off.
- ◆ A second person cuts the stalk with the pruning shears and places them in a box.
- ◆ When the cutter catches up with the person snapping off the leaves, they then count the stalks into a regular green box at 10 to 12 stalks to a box.
- ◆ When sprouts are sold off the stalk sort them, so they average 1.25 inches in diameter (no smaller than 1 inch and no bigger than 1.5).
- ◆ Brussels sprouts are not washed.
- ◆ Wash hands and rinse boots before entering wash and pack shed.
- ◆ Repack in well-lit wash and pack house into clean boxes for delivery

Cleaning in the field	Remove leaves and diseased sprouts from stalk
Packing in the field	10-12 stalks to a large green box (1¼ bushel)
Packing for delivery	10-12 stalks to a large green box (1¼ bushel) for both wholesale and CSA 12 x 8 Oz packages for loose sprouts wholesale PLU is 94550
Storage	At 32° – 41° F, 95 -100% humidity but needs good air circulation, don’t pack in closed containers for long-term storage. <a href="#">Postharvest Factsheet Brussels Sprouts</a>

## Cabbage

(Green, Red, Savoy, Arrowhead, & Mini)

All prices farmers reported receiving	Retail (Farmer's Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op)
Value	\$1.25 to \$2.00 per lbs., \$1.75 to \$5.00 each	\$0.55 to \$0.85 lbs. (red cabbage is higher than green and the premium is for mini-cabbage)	\$0.90 to \$1.75 per lbs. depending on variety
Yield	Green and red: ¾ head to the row foot at 10,800 marketable heads to the acre with yields varying between 30 to 50,000 lbs. per acre		
	Arrowhead and mini: 0.6 heads per row foot at @ 2lbs. each (24,000 marketable heads) to the acre		
Standards	Harvesting: 200 heads per hour per person depending on quality of the crop and size of cabbage @ approximately 60-120 hrs. per acre plus hauling from the field @ approximately 60 hrs. per acre in small boxes and about 20 hrs. per acre in 20-bushel bins		
Tools needed	Knives (make sure they are very sharp) regular 1½ bushel boxes or 20-bushel bulk bins		

### Ready to Harvest Indicators and Quality

- ◆ Firm heads, the top of the head must be hard and solid, and the basal stem has no hollow cavity. Firmness is more an indicator than size.
- ◆ A good spraying program should avoid any presence of cabbage worms, or damage by other insects at this point.
- ◆ Cabbage heads infected with Alternaria or black rot will not store and should not be harvested. Some Alternaria in older wrapper leaves might not affect long term storage.

### Harvest Procedures

- ◆ [Wholesale Grading and Packing Instructions](#)
- ◆ Wash hands and sanitize knives before harvesting.
- ◆ Cut heads with a few wrapper leaves to protect the head during transportation. Use clean and sharp cabbage knives and only used for this purpose.
- ◆ Slightly push plant to one side and with smooth motion cut the cabbage high enough to remove the damaged leaves but allow for a few healthy wrapper leaves to remain. Cut should be straight across.
- ◆ If harvesting for one delivery count into regular green boxes.
- ◆ If harvesting for bulk storage place first on windrows to be picked later and paced in 20-bushel bulk bin
- ◆ If cut at the right height, no additional cleaning needs to be done before delivery. Remove any damaged leaves. Cleaning cabbage in the field greatly increases distribution efficiency.

### Cleaning Procedures

- ◆ Wash hands and sanitize knives before cleaning cabbage
- ◆ Cabbage is not washed. If cabbage is coming out of storage it usually needs to be re-trimmed.
- ◆ Use very sharp knives. Hold a head of cabbage in one hand against your body. With your knife hand brace your thumb against the stem and carefully pull the knife towards your thumb. Cut just above the damaged outer leaves. If you are not comfortable with this method place clean cardboard or a cutting board on the table and place the cabbage on the table to trim. Make sure you cut is straight across.

- ◆ Peel the leaves from the bottom of the plant instead from the top. When you cut at the correct height, the leaves will come off without much effort.

Cleaning in the field	Remove damaged leaves
Packing in the field	10-15 Arrowhead or 6-8 Red in a regular green box OR 800 lbs. in a 20 bushel bulk bin
Packing for delivery	45-50 lbs. in cabbage box (1¼ Bu) for wholesale. CSA use a 1¼ Bu plastic crate for distribution PLU Green is 94069, Savoy 94555, and Red 94554, Spring cabbage is usually 93051
Storage	At 32° – 41° F, 95 -100% humidity but needs good air circulation, don't pack in closed containers for long-term storage. <a href="#">Postharvest Factsheet Cabbage</a>

### Carrots, bunching

All prices farmers reported receiving	Retail (Farmer's Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$3.00 to \$5.00 per bunch	\$1.10-1.60 a bunch	\$1.60-\$2.00 a bunch
Yield	0.4 bunch per row foot at 14,400 bunches to the acre.		
Standards	Harvesting: 35-60 bunches per hour per person depending on quality of the crop @ approximately 240 hrs. per person in harvesting plus loading and unloading boxes from and to washing area		
	Washing: 80-100 bunches per hour		
Tools needed	Tractor with bed lifter. Digging fork, twisties, and regular 1¼ bushel boxes		

#### Ready to Harvest Indicators and Quality

- ◆ Healthy, green tops, and carrots 5-6 inches long (depending on variety) and with filled tips, and always wait until they are sweet. Don't allow carrots to become over mature and grow fine root hairs, either. For best quality plant many successions for continuous harvest.
- ◆ Carrots harvested are straight without forks or other defects.

#### Harvest Procedure

- ◆ Wash hands before harvesting carrots
- ◆ Carrots are usually dug up with a bedlifter (see procedure for carrots for storage), but if conditions do not allow for the use, here are the procedures if a digging fork is needed:
  - Place fork near carrots but not close enough to cut them. Two people dig up the carrots while the rest of the crew pulls the carrots out of the ground and bunches them.
- ◆ Try to pull out enough carrots for one bunch with each pull. Remove any forked or misshapen carrots. Clean off any brown leaves.
- ◆ Put 5-7 carrots in each bunch (depending on variety) but make sure all bunches are similar in size and are at least 5 inches long and a diameter of ¾ inch. Make sure tops of carrots are even with each other and wrap twisty or rubber band around the stems just above the carrots. Then twist the bunch to tighten the twistie. It is important to have neat and tight bunch for washing and distribution. If the bunches are loose, the carrots will break off during washing.
- ◆ Place bunches in piles of 6 to facilitate an even count of 12 or 24 to a box.

### Washing Procedures

- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men's](#), or [women's bib](#).
- ◆ Bunching carrots are cleaned either a [bunch washer](#), by hand with a handheld nozzle and placing them on a wire [mesh table](#) or you can run them through a [rinse conveyor](#) washer. Make sure you use the appropriate pressure on the nozzles to avoid crop damage.

Cleaning in the field	remove dead and yellow leaves
Packing in the field	12 or 24 bunches in an RPC
Packing for delivery	24 bunches per 1 <sup>1</sup> / <sub>9</sub> box at 26 lbs. PLU bunched is 94094
Storage	At 32° – 41° F, 95 –100% humidity. Pack with ice in closed containers for storage longer than a few days.

### **Carrots, storage**

All prices farmers reported receiving	Retail (Farmer's Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc.)
Value	\$1.70 to \$4.00 per lbs.	\$0.90 to \$1.30 per lbs.	Juicing \$1.25 per lbs., Restaurant \$2 per lbs. Mini wholesale \$1.50- \$1.75 lbs.
Yield	1.2 lbs. per row foot at 26,000 lbs. per acre		
Standards	Hand Harvesting: 100- 250 lbs. per hour per person depending on quality of the crop. Three people can fill up a bulk bin in 1.5 hours @ approximately 150 hrs. per acre (not including the time to undercut and remove bins to storage). Machine Harvesting: 500-2000 lbs. per hour with three people and a one row harvester. Numbers vary greatly due to age of the machine and the conditions of the soil. These numbers do not include incidental sorting after harvest before long term storage.		
	Washing: 300 lbs. per person per hour		
	Bagging: 100 2 lbs. bags per person per hour.		
Tools needed	Tractor with bed lifter. Green ⅝ bushel buckets and regular crates OR 20-bushel bulk bin Tractor with three-point hitch forklift		

### Ready to Harvest Indicators and Quality

- ◆ Carrots are full size, straight without forks or eating damage due to carrot fly or other defects.
- ◆ When tops are not as healthy looking as when bunched, this might not affect hand harvesting but will greatly affect the efficiency of a mechanical harvester that depends on healthy tops.

### Harvest Procedures

#### Hand Harvest:

- ◆ Wash hands before harvesting
- ◆ Undercut carrots with tractor and bedlifter.
- ◆ Make sure the blade is set at an angle to lift the carrots and is let down deep enough to avoid cutting the carrots.

- ◆ After lifting, grab a bunch of carrots and place them in your lap to remove tops. Place bucket in front of you so you don't have to twist your body to put them in a bucket.
- ◆ Only take straight carrots with no forks. Stunted, diseased, forked, and split carrots are left in the field. Small carrots do not store well so discard those or distribute them immediately as baby carrots.
- ◆ If harvesting for bulk and storage, empty buckets into 20-bushel bulk bin.
- ◆ When all the buckets are full, drive the tractor with a 20-bushel bulk bin down the driving lane and carefully dump the carrots into the 20-bushel bin. The buckets are laid out over the full length of the bed so the entire crop from one bed is dumped in the 20-bushel bin at one time.
- ◆ Leave the buckets at the same place to be filled up with carrots from the next bed. Drive the tractor with bin close to the buckets to facilitate easy loading.

**Machine Harvest:**

- ◆ Speeds of conveyors and components will vary a great deal with field conditions. There is no prescribed speed at which to set the flow controls. However, there is an approximate start-up setting, and the operator needs to adjust as needed for conditions.
- ◆ Most small carrot harvesters do not allow for a sorting platform. Most likely additional sorting will need to be done before long term storage. Remove any carrot that is forked, damaged by harvester or by carrot fly by sorting on conveyor sorting table.

**Washing Procedures**

- ◆ Do not wash until ready to deliver, as soil may help keep carrots from decaying in storage. Put through [barrel washer](#) to clean.
- ◆ This washer works best if filled up with approx. 300 lbs. of carrots.
- ◆ Hose the carrots before entering the washer, so any dirt on the carrots is soft.
- ◆ Sorting is done on the receiving end. Barrel washer should have a well-lit sorting table at the end.
- ◆ Sort out the carrots with large, soft, and brown spots. Sort carrots by size into separate bins if needed.

**Grading Procedures**

- ◆ [U.S. Grade for Carrots](#)

Cleaning in the field	Remove tops, discard forked or diseased carrots
Packing in the field	45 lbs. per regular box or 800 lbs. per 20 bu. bulk bin
Packing for delivery	25 lbs. per plastic bag PLU for loose orange is 94562 and for red or purple 93424
Storage	At 32° – 41° F, 95 -100% humidity. Pack in closed containers or bags for long-term storage. Carrots are sensitive to ethylene damage (carrots turn bitter) so store away from crops that produce ethylene like apples, tomatoes, and melons. <a href="#">Postharvest Factsheet Carrots</a>

## Cauliflower (white and Green)

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc.)
Value	\$3.00 to \$8.00 per head.	\$1.20 to \$2.00 per head for 12 ct. \$1.60 to \$2.25 for 9 ct.	\$2.00-\$3.00 per head
Yield	⅓ marketable head per row foot at 4800 heads to the acre		
Standards	Harvesting: 40 heads per hour per person depending on quality of the crop @ approximately 120 hrs. per acre plus lugging boxes out of field to packing barn		
Tools needed	Knives, rubber bands, large green boxes (1¼ bushel)		

### Ready to Harvest Indicators

- ◆ Firm, white heads over 4 inches in diameter without any presence of worms. When harvested too late, heads become loose and turn yellow.
- ◆ One week before harvesting the heads need to be kept out of direct sun light. This is done by folding several large leaves over the small white head or by tying the leaves with a large rubber band. If rubber bands are used choose three different colors that are used on three different harvesting days. Tying is done at the same time as harvesting. *Many varieties no longer require this step as they are “self-blanching”.*

### Harvest and Cleaning Procedures

- ◆ [Wholesale Grading and Packing Instructions](#)
- ◆ Wash hands and sanitize knives before harvesting
- ◆ Cut stem just under the head, leaving some leaves attached.
- ◆ Cut off tops of wrapper leaves surrounding head. Do this so there is a complete circle of leaves surrounding the head. They will protect the outside of the head from bruising and provide a nice appearance. Any bruises turn into brown spots in less than six hours.
- ◆ If harvested for CSA or farmers’ market: place 6 heads on the first layer in the box face up. Place a layer of cauliflower leaves or cardboard between the two layers. Place the next layer six heads of cauliflower on top of the leaves face up.
- ◆ For wholesale use appropriate container in field then sort and re-pack in packing barn. Cauliflower are sorted by size and packed from 12 to 24 heads with the 12’s being most common

Cleaning in the field	Cut off tops of wrapper leaves
Packing in the field	N/A
Packing for delivery	9 or 12 in a single layer box. Many buyers require wrapping cauliflower in plastic jackets to reduce post-harvest losses. For CSA most packing is done in the field to avoid damage from handling. PLU small 94079, PLU large 94572, PLU green 94567, PLU purple 94568
Storage	At 32° – 41° F, 95 -100% humidity. Pack in closed containers or wrap cauliflower heads in plastic bags for storage longer than 3 days. Cauliflower is highly sensitive to ethylene so store away from apples, melons, and tomatoes. <a href="#">Postharvest Factsheet Cauliflower</a>

## Celeriac

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc.)
Value	\$2.00 to \$4.00 per lbs.	\$1.45 to \$2.00 per lbs.	\$2.40/lbs.
Yield	2/3 piece (@1 lbs. each) per row foot at 14,000 lbs. to the acre		
Standards	Harvesting: 100 lbs. per hour per person or in other words, a crew of three fills up a 20-bushel bin of 800 lbs. in 2½ hours @ approximately 135 hrs. per acre.		
	Washing: 350 lbs. per person per hour		
Tools needed	Knives and ¼ bushel green buckets and bulk bins		

### Ready to Harvest Indicators and Quality

- ◆ Roots 3-6 inches in diameter. Usually late in the fall.

### Harvest Procedures

- ◆ Wash hands and sanitize knives before harvesting
- ◆ One crew cuts the celeriac out of the ground. Cut below the surface just enough to remove most of the soil & tangled roots, but not too high or the bulb will be damaged. If this is too difficult first go through with the bed lifter to lift the celeriac out of the ground.
- ◆ The rest of the crew removes the tops and puts the roots in buckets.
- ◆ If harvesting for one delivery empty buckets into green bins on the truck.
- ◆ If harvesting for bulk, empty buckets into a bulk bin. When the buckets are full, drive the tractor with a 20-bushel bulk bin down the driving lane and carefully dump the celeriac into the 20 bushel bin. The buckets are laid out over the full length of the bed so the entire crop from one bed is dumped in the 20-bushel bin at one time. Leave the buckets at the same place to be used for the next bed of celeriac

### Washing Procedures

- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men’s](#), or [women’s bib](#).
- ◆ Do not wash until ready to deliver. Then put through [barrel washer](#).
- ◆ This washer works best if filled up with approx. 300 lbs. of product.
- ◆ Hose the celeriac before entering the washer, so any dirt on the celeriac is soft.
- ◆ Sorting is done on the receiving end. [Barrel washer](#) should have the well-lit sorting table at the end.
- ◆ Sort celeriac by size (15 large, 20 medium) into regular green box.

Cleaning in the field	remove dead and yellow leaves
Packing in the field	35 lbs. per regular green box or 800 lbs. per bulk bin
Packing for delivery	20 lbs. plastic bag whereby each root has a minimum diameter of 3 inches PLU Celeriac with leaves: 93321, PLU Celeriac Roots only: 94585
Storage	At 32° – 41°F, 95 -100% humidity. Pack in closed containers or bags for long-term storage

## Celery

All prices farmers reported receiving	Retail (Farmer's Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$2.00 to \$4.00 per stalk	\$1.50 to \$2.00 each	No numbers available
Yield	1 stalk per row foot at 14,000 bulbs per acre		
Standards	Harvesting: 150 stalks per person per hour @ approximately 100 hrs. per acre in harvesting plus loading and unloading boxes from and to washing area		
	Washing: 300 stalks per hour		
Tools needed	Sharp knives and large green boxes (1¾ bushel)		

### Ready to Harvest Indicators and Quality

- ◆ Harvest when celery has fully developed thick petioles and is well formed, free from blackheart, brown stem, soft rot doubles and free from damage or defects. Harvest before stalks develop pithiness (spongy tissue on the inside of the leaf stalk).

### Harvest Procedures

- ◆ Wash hands and sanitize knives before harvesting
- ◆ Harvest in the morning hours to avoid field heat accumulation
- ◆ Plant is cut at the root, hold the knife in a level position so the stem being cut is nice and smooth at the bottom. If the immediate outside leaves are blemished cut slightly higher so those are easily removed.
- ◆ Extra leaves are cut off in the field by a second person at the length of the bin. Same person packs and loads on the truck
- ◆ Stalks brought back to the barn are free from blemishes or soft spots, and only need some slight washing by spraying off the bottom part of the stalk. Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men's](#), or [women's bib](#). If long sleeve shirt contains soil remove this as well.

Packing in the field	Regular 1¾ bushel bins, 20- 24 stalks per bin
Packing for delivery	Industry standard 24, 30 or 36 count in a 1 <sup>1</sup> / <sub>9</sub> . or celery box. PLU 94071 for small, PLU 94582 for large
Storage	At 32°F, 98-100% humidity.

## Chard, Swiss

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$3.00 to \$4.00 per bunch	\$1.20 to \$1.75 per bunch	\$2.00 a bunch
Yield	1 bunch per row foot at 21,600 bunches to the acre. (Higher yields are recorded from multiple cuttings but quality is much lower)		
Standards	Harvesting: 60 - 80 bunches per hour per person depending on quality of the crop @ approximately 210-250 hrs. per acre (half the labor is needed when harvesting loose)		
	Washing: 240 bunches per hour per person		
Tools needed	Sharp clean knives, 1½ bushel boxes and twisties.		

### Ready to Harvest Indicators and Quality

- ◆ Plants 15-18 inches tall, bottom leaves are large enough to make a bunch.
- ◆ Chard has good color, free from yellowing leaves or old stems with eating damage from leaf-miners.

### Harvest Procedures

- ◆ Wash hands and sanitize knives before harvesting.
- ◆ Harvest in the morning hours to avoid field heat accumulation.
- ◆ Use different harvest boxes in field from the boxes used to distribute in.
- ◆ Hold onto all the leaves you will put in the bunch before cutting close to the ground.
- ◆ Inspect bunch for dead or diseased leaves and discard of them
- ◆ Alternatively, pick each individual chard leaf for better bunches and regrowth. One bunch will contain about five mature leaves.
- ◆ Place a twistie or rubber band around the bunch and make one final straight cut to length of box
- ◆ Layer the bunches in the crate lengthwise alternating directing of the leaves.

### Washing and Storage Procedures

- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men’s](#), or [women’s bib](#). If long sleeve shirt contains soil remove this as well.
- ◆ Add sanitizer to wash water. Use [this Guide](#) to establish how much peracetic acid solution to add to water
- ◆ Wash chard at least twice in clean tubs. The last dunking of the chard can be used to hydrocool the product by adding ice to the water or having it pre-cooled.
- ◆ Do not leave bunches in water for longer than 1 minute or until the core of the stems are properly cooled down. Chard can get waterlogged after a few minutes, which causes them to deteriorate faster
- ◆ pack in sealed boxes or line the boxes with a plastic liner to avoid product from losing moisture for longer storage.

Packing in the field	Field box Plastic 1½ bushel bin
Packing for delivery	24 bunches or 20 lbs. per regular 1½ waxed bushel box PLU is 94586 for green chard, and 94587 for red chard. clean bin of choice for CSA distribution
Storage	At 32°–41° F, 95 -100% humidity. Pack in closed containers for improved storage

## Cilantro

All prices farmers reported receiving	Retail (Farmer's Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc.)
Value	\$1.00 to \$4.00 per bunch	\$1.25 to \$2.50 per bunch	\$1.40 per bunch
Yield	0.1 Lbs. per row foot at 3250 lbs. per acre		
Standards	Harvesting: 3 – 4 bins per hour per person depending on quality of the crop. Orthomec Harvester does not do well with cilantro @ approximately 120 hrs. per acre plus lugging boxes out of field to packing barn		
	Washing: Double dunking and cleaning bins, 15 bins per hour		
Tools needed	Orthomec Harvester or Knives, regular 1½ bushel boxes		

### Ready to Harvest Indicators and Quality

- ◆ 4-5 inches tall, nice green leaves without any signs of yellowing.

### Harvest Procedures:

- ◆ Wash hands and sanitize knives before harvesting.
- ◆ Harvest in the morning hours to avoid field heat accumulation.
- ◆ Use different bins in field and for distribution.
- ◆ When machine harvested:
  - Weed field thoroughly before harvesting as people on machine will not be able to keep up sorting at the speed of harvesting
  - Walk fields before harvesting to inspect for rodents or feces in crop. Remove any contaminant and mark the spot so the tractor operator can raise the belt approaching this spot
  - During harvesting remove all yellow leaves off belt before it falls into the crates. When Farmer's Friend harvester is used, sorting will be done after harvesting.
- ◆ When hand harvested with Harvest or Victorinox knife:
  - Walk fields before harvesting to inspect for animal damage or feces in crop. Mark problem spots so harvesters can avoid them.
  - Hold a small bunch of leaves at the top of the plant with one hand and cut with one motion with the other hand.
  - Shake vigorously to remove any yellow leaves or stems from previous cuttings.
  - If bunches are made with roots attached, pull whole plant, and form a bunch. This will make washing more elaborate.
  - Place in box with the stems facing the same direction.

### Washing and Storage Procedures

- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men's](#), or [women's bib](#). If long sleeve shirt contains soil remove this as well.
- ◆ Add sanitizer like [SaniDate](#) to wash water. Use [this Guide](#) to establish how much peracetic acid solution to add to water
- ◆ Wash cilantro at least twice. Using a [bubbler](#) to agitate the water reduces damage to the leaves.
- ◆ Do not leave greens in water for longer than 1 minute. Leaves tend to get waterlogged after a few minutes, which causes them to deteriorate faster.
- ◆ Dry cut cilantro in a centrifuge. When bunched, shake excess water off the bunches before packing.
- ◆ For the smaller grower use this [Chef's salad spinner](#). Larger growers can use the [Hobart version](#).
- ◆ Weigh according to customer's needs and pack 3 lbs. or 24 to 36 bunches in sealed ½ bushel boxes or line the boxes with a plastic liner to avoid product from losing moisture.
- ◆ Store at 32° – 41° F, 95 -100% humidity.

Cleaning in the field	remove dead and yellow leaves
Packing in the field	Loosely in regular per plastic 1½ bushel field box
Packing for delivery	½ Bu or 1 <sup>1</sup> / <sub>9</sub> waxed box for wholesale PLU Cilantro is 94889 clean bin of choice for CSA distribution.
Storage	At 32° – 41°F, 95 -100% humidity. Pack in closed containers or bags for storage longer than a day.

## Collards

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$3.00 to \$4.00 per bunch	\$1.15 to \$1.60 per bunch	\$2.60 a bunch
Yield	0.7 bunches per row foot at 10,000 bunches per acre (higher yields are recorded when multiple pickings occur from each plant)		
Standards	Harvesting: 40-60 bunches per hour per person depending on quality of the crop. @ Approximately 200 hrs. per acre plus lugging boxes out of field to packing barn		
Tools needed	Large green boxes and twisties if making bunches		

### Ready to Harvest Indicators

- ◆ Leaves 15-18 inches tall, bottom leaves are large enough to make a bunch out of 5 - 6 leaves.

### Harvest Procedures

- ◆ Wash hands and sanitize knives before harvesting
- ◆ Harvest in the morning hours to avoid field heat accumulation
- ◆ Grab a bunch of the biggest leaves near the stem of the plant and snap off the leaves.
- ◆ Do not use the dark green leaves. Leave the smaller leaves at the top of the plant and remove any dead or yellow leaves on the bottom.
- ◆ If making bunches snap off 5-6 leaves, twist the twistie around the stems and twist the bunch to tighten the twisty or use a rubber band.
- ◆ Put 15 bunches in a large green box. If harvesting loose place 90 leaves in a large green bin.

### Washing and Storage Procedures

- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men’s](#), or [women’s bib](#). If long sleeve shirt contains soil remove this as well.
- ◆ Add sanitizer to wash water. Use [this Guide](#) to establish how much peracetic acid solution to add to water
- ◆ Wash collards at least twice in clean tubs. The last dunking of the collards can be used to hydrocool the product by adding ice to the water or having it pre-cooled.
- ◆ Leave bunches in water until the core of the stems are properly cooled down.
- ◆ pack in sealed boxes or line the boxes with a plastic liner to avoid product from losing moisture for longer storage.

Cleaning in the field	remove dead and yellow leaves
Packing in the field	24 bunches in 1 ¾ crate or 80 loose leaves for CSA
Packing for delivery	24 bunches in 1 <sup>1</sup> / <sub>9</sub> waxed box for wholesale PLU is 94614 Any preferred way to pack for CSA
Storage	At 32°–41° F, 95 -100% humidity. Pack with ice in closed containers or bags for storage longer than a day

### Corn, Sweet

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$5.00 to \$9.00 per dozen	No numbers available	No numbers available
Yield	0.75 marketable ears per row foot at 10,500 ears per acre (about 200 bags) @ \$4,000 to \$7,500 per acre		
Standards	Harvesting: with the help pf a <a href="#">harvest aid</a> : 8-10 bins (400-500 ears) per hour per person depending on quality of the crop @ approximately 30 hrs. per acre plus transporting boxes out of field to packing barn. Using a harvest aid takes 6 people; one person on the tractor, one person on the wagon and 4 people harvesting.		
Tools needed	Large green boxes (1¾ bushel) and <a href="#">harvest aid conveyor</a>		

#### Ready to Harvest Indicators and Quality

- ◆ [Wholesale Grading and Packing Instruction Sweet corn](#)
- ◆ Ears should be firm filled out till the tip with no missing kernels; husks should look fresh and silk sticking out of the ears is brown and dead but not eaten by insects or deer. When husks are pulled back, all kernels should be plump and tender.
- ◆ Do not harvest overmature ears, as sugars will be converted to starch.
- ◆ Do not harvest ears with worm damage, damaged husks, missing kernels. To check for incidental worm damage in the field by harvesters: European Corn Borer (ECB) can be detected by a pin hole in the ear and can be felt when pressing the ear in the palm of your hand. Presence of ECB is noticed by a hollow feeling underneath the leaves where there is ECB damage. Corn Ear Worm (CEW) is usually at the tip of the ear and is easier to spot.

#### Harvest Procedures

- ◆ Wash hands before harvesting sweet corn
- ◆ Harvest in the morning hours to avoid field heat accumulation
- ◆ When harvest aid conveyor is not used: take two rows and pull your pickle barrel in the middle.
- ◆ Grab the ear and pull down and out to pull ear off stalk. Remove excess stem at that time or do it when transferring the corn into the bins. Stem removal is done both to save space in box and it has some cosmetic value.
- ◆ Count 52 ears to a barrel to allow for sort out at packing barn.
- ◆ If using the harvest aid conveyor, place the ears on the belt as you pick. The person on the wagon counts the corn into boxes. For 52 ears pick up 4 ears at a time and count to 13 to make it less prone to counting mistakes.

### Sorting Procedure:

- ◆ Wash hands and rinse boots before entering wash and pack shed
- ◆ Sort all the ears in a well-lit barn for defects like ECB, CEW, poor tip fill, and other defects before distribution and remove extra stem and flags to 48 ears to a bag or box.

Cleaning in the field	Remove extra stem if possible
Packing in the field	50 ears in a large green box (1¾ bushel)
Packing for delivery	48 ears in box, crate, or bag for wholesale or CSA PLU bicolor 94590, white 94077, yellow 94078
Storage	At 32°–34° F, 95 -98% humidity. Pack with ice in closed containers or bags for storage longer than a few days

## Cucumber

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$0.75 to \$3.00 each or \$1.50 to \$3.00 per lbs.	\$0.85 per lbs.	\$1.50 to \$2.00 per lbs.
Yield	4-7 cucumbers per row foot at 30-50,000 cucumbers per acre		
Standards	Harvesting: 8, ½ bushel red buckets per hour per person depending on quality of the crop @ approximately 200 hrs. per acre plus lugging buckets out of field to packing barn		
	Washing: When needed, 350-500 lbs. per person per hour		
Tools needed	½ bushel red buckets and/or ⅝ bushel buckets		

### Ready to Harvest Indicators

- ◆ 6-7 inches long and firm, dark green, straight, and smooth. Skin is free from cucumber beetle feeding or any other blemishes.

### Harvest Procedures

- ◆ Wash hands before harvesting cucumbers.
- ◆ Make sure you harvest the newest plantings first to prevent the spread of disease.
- ◆ One person harvests each side of a cucumber bed.
- ◆ Go down bed and pull all 6-7-inch-long fruits off the vine without breaking the skin off the cucumber, and place in bucket.
- ◆ When the bucket is full place it in harvest lane for pick up with flatbed
- ◆ Cucumbers are not washed if wheel tracks are mulched with straw.
- ◆ [Wholesale Grading and Packing Instructions Cucumbers Select](#)
- ◆ [Wholesale Grading and Packing Instructions Cucumbers 24 Ct](#)
- ◆ [Wholesale Grading and Packing Instructions Cucumbers 36 Ct](#)
- ◆ [Wholesale Grading and Packing Instructions Cucumbers Super](#)

### Washing and Packing Procedures

- ◆ Wash hands and rinse boots before entering wash and pack shed.
- ◆ If washing is necessary, use a [rinse conveyor](#) washer. Make sure you use the appropriate pressure on the nozzles to avoid crop damage. Using adequate mulch like straw can keep the fruit clean so

washing is not necessary. Don't dunk cucumbers in cold water as this can create cross-contamination of pathogens that are absorbed through the skin of the fruit.

- ◆ Sort fruit by size (see grades above) in a well-lit location
- ◆ Pack fruit for wholesale customers in waxed 1<sup>1</sup>/<sub>9</sub> box.
- ◆ [Postharvest Factsheet Cucumbers](#)

Packing in the field	Fill buckets
Packing for delivery	Average when picked regularly for CSA distribution: 40-60 cucumbers per container weighing 45 lbs. Wholesale use waxed 1 <sup>1</sup> / <sub>9</sub> box. PLU Cucumbers is 94062 and for Seedless Greenhouse Cucumbers 94593
Storage	At 50°–55° F, 95% humidity. Do not store below 50F. Highly sensitive to ethylene. Pack in closed containers for storage during the week.

## Dill

All prices farmers reported receiving	Retail (Farmer's Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$2.00 to \$5.00 per bunch	\$1.40 per bunch	\$2.30 a bunch
Yield	0.07 lbs. per row foot at 2500 lbs. to the acre		
Standards	Harvesting: 3 – 4 bins per hour per person depending on quality of the crop @ approximately 100 hrs. per acre plus lugging boxes out of field to packing barn		
	Washing: 12-15 bins per person per hour		
Tools needed	Orthomec harvester and Knives and regular 1 <sup>1</sup> / <sub>3</sub> bushel boxes		

### Ready to Harvest Indicators and Quality

- ◆ 7-10 inches tall, dark green. Harvest without weeds and before plant bolts.

### Harvest Procedures

- ◆ Wash hands and sanitize knives before harvesting dill
- ◆ Harvest in the morning hours to avoid field heat accumulation
- ◆ Use different bins for field and for distribution.
- ◆ When hand harvested with Harvest or Victorinox knife:
  - Hold a small bunch of leaves at the top of the plant with one hand and cut with one motion with the other hand.
  - If bunches are made with roots attached, pull whole plant, and form a bunch. This will make washing more elaborate.
  - Place in box with the stems facing the same direction.

### Washing and Storage Procedures

- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men's](#), or [women's bib](#). If long sleeve shirt contains soil remove this as well.
- ◆ Add sanitizer like [SaniDate](#) to wash water. Use [this Guide](#) to establish how much peracetic acid solution to add to water. Using a [bubbler](#) to agitate the water reduces damage of the leaves. Rinse dill at least twice. For the last rinse you can use hydrocooled water.
- ◆ Shake excess water off the bunches or allow to drain before packing.
- ◆ Weigh according to customer's needs and pack 3 lbs. or 24 to 36 bunches in sealed ½ bushel boxes. Possibly line the boxes with a plastic bag to avoid product from losing moisture.
- ◆ Store at 32° – 41° F, 95 -100% humidity.

Cleaning in the field	remove dead and yellow leaves
Packing in the field	Loosely in regular green box
Packing for delivery	Wholesale distribution is mostly done in bunches. Pack 24 to 36 bunches to a ½ bushel and 48 to 72 to a waxed 1 <sup>1</sup> / <sub>9</sub> box
Storage	At 32° –41° F, 95 -100% humidity. Pack in closed containers or bags for storage longer than a day

## Eggplant

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$2.50 to \$5.00 per lbs. or \$1.00 to \$3.00 each	\$1.75 to \$3.00 per lbs.	\$2.50 to \$3.00 per lbs.
Yield	1.75 lbs. to the row foot at 25,200 lbs. to the acre		
Standards	Harvesting: 5– 7 buckets (20 lbs. per bucket) per hour per acre depending on quality of the crop@ approximately 200 hrs. per person in harvesting plus loading and unloading buckets to packing area		
	Washing: Eggplant is ideally not washed but carefully sorted and counted		
Tools needed	Scissors or pruning shears and ¾ bushel green or red ½ bushel buckets		

### Ready to Harvest Indicators and Quality

- ◆ Fruits 8-10 inches long, filled out, firm and free from blemishes. Asian and Thai eggplant have similar
- ◆ Eggplant must be firm and heavy in relation to size.

### Harvest Procedures

- ◆ Wash hands and sanitize pruning shears or scissors before harvesting
- ◆ Each person harvests one bed at a time (one row per bed). Mark the spot with a bright flag where you stop harvesting, so you can begin there the next time you harvest.
- ◆ Cut fruit off from plant with scissors or pruning shears leaving a small stem on the fruit. Leave about a ¾ inch stem on the eggplant.
- ◆ if Eggplant is grown on plastic mulch and wheel tracks are mulched with straw or covered with weed fabric, fruit is usually clean, making washing it unnecessary.

### Washing and Packing Procedures

- ◆ Wash hands and rinse boots before entering wash and pack shed.
- ◆ If washing is necessary, use a [rinse conveyor](#) washer or when dealing with smaller quantities rinse off by hand. Make sure you use the appropriate pressure to avoid damage to fruit. Avoid dunking eggplant in cold water as this can create cross-contamination of food borne pathogens that can be absorbed through the skin of the fruit.
- ◆ Make sure fruit has a chance to dry off before being packed in boxes.
- ◆ Sort fruit by size in a well-lit location whereby each box contains approximately 16 to 18 Italian eggplant, 30 to 35 Asian eggplant in waxed 1<sup>1</sup>/<sub>9</sub> box and pack the Thai eggplant in ½ bushels.
- ◆ [Wholesale Grading and Packing Instructions](#)
- ◆ [Postharvest Factsheet Eggplant](#)

Packing in the field	Green or red buckets
Packing for delivery	Traditionally 16-18 count into regular 1 <sup>1</sup> / <sub>9</sub> bushel boxes, count can depend on variety, but box should contain 33 lbs. per 1 <sup>1</sup> / <sub>9</sub> bushel, Thai eggplant in ½ bushels containing 15-16 lbs. PLU regular Eggplant is 94081, Asian Eggplant 94601
Storage	At 50°-54° F, 90 -95% humidity. Do not store below 50F. Moderately sensitive to ethylene (browning will be a problem)

## Fennel

All prices farmers reported receiving	Retail (Farmer's Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$1.00 to \$4.00 per lbs. or \$3.00 to \$5.00 each	\$1.60 to \$2.00 each	\$2.66 each
Yield	1 bulb per row foot at 14,000 bulbs per acre		
Standards	Harvesting: 50 bulbs per person per hour @ approximately 300 hrs. per acre in harvesting plus loading and unloading boxes from and to washing area		
	Washing: 150 bulbs per hour		
Tools needed	Sharp knives and large green boxes (1 <sup>3</sup> / <sub>4</sub> bushel)		

### Ready to Harvest Indicators and Quality

- ◆ Harvest when fennel has filled out to a bulb that weighs about ½lb and has a diameter of at least 2 inches. Stems should be succulent and free from any defects.
- ◆ [U.S. Standards for grades of Sweet Anise](#)

### Harvest and Washing Procedures

- ◆ Wash hands and sanitize knives before harvesting
- ◆ Harvest in the morning hours to avoid field heat accumulation
- ◆ Plant is cut at the root, hold the knife in a level position so the stem being cut is nice and smooth at the bottom. If the immediate outside leaves are affected by crown rot, cut slightly higher so those are easily removed.
- ◆ Extra leaves are cut off in the field by a second person at the length of the bin. Same person packs and loads on the truck

### Washing and Packing Procedures

- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men's](#), or [women's bib](#). If long sleeve shirt contains soil remove this as well.
- ◆ Bulbs brought back to the barn are free from blemishes or soft spots, and only need some slight washing by spraying off the bottom part of the bulb.

Packing in the field	Regular 1 <sup>1</sup> / <sub>9</sub> bushel bins, 15 bulbs per bin
Packing for delivery	Industry standard is 18, 24, 30 or 36 count in a ½ Bushel or 1 <sup>1</sup> / <sub>9</sub> box. But often sold as 12 ct. in NY
Storage	At 32°F, 90 -95% humidity.

## Garlic and Scapes

All prices farmers reported receiving	Retail (Farmer's Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Seed included)
Value	\$1.00 to \$3.00 each depending on size and location	\$4.60 to \$8.00 per lbs.	\$9.00 to \$13.00 per lbs. depending on variety and quantity ordered
Yield	0.2 lbs. dried and cured garlic per row foot at 4000 lbs. to the acre. 20,000 pieces of garlic Scapes to the acre from hardneck varieties		
Standards	Harvesting: 800 pieces garlic scape and 35 lbs. garlic per person per hour. This includes lifting the garlic with bedlifter, removing the tops, and picking them into boxes @ approximately 150 hrs. per acre in harvesting plus loading and unloading boxes from and to drying area (at least another 75 hrs.).		
	Planting: 300 row feet per person per hour Cleaning: 40 - 50 lbs. per hour Splitting: 20-40 lbs. per hour		
Tools needed	Scapes: Buckets and pickle barrels. Garlic harvest: Gloves, serrated knives, regular 1½ bushel bins or old large green boxes (1¾ bushel), Tractor with bedlifter Garlic Cleaning: Gloves, Utility cutter		

### Ready to Harvest Indicators

#### **Scapes:**

- ◆ Scape is curled about 6 inches long with a small bulbul on the end.

#### **Garlic:**

- ◆ The best indicator for harvest readiness is how the cloves are filling the wrapper leaves. To determine this, take a couple of average looking plants from each variety and cut them in half perpendicular to the stem so that you are cutting through all the cloves. For the garlic to be ready to harvest, each clove should be tight in its wrapper leaves. If there is any give when you squeeze the bulb, or if the wrapper leaves seem a little loose around the cloves, the garlic is still growing, and harvest is premature. At time of maturity few of the outer wrapper leaves will probably be breaking down which is normal.
- ◆ You can also look at the shape of each clove. Cloves start out being more or less round and expand to more of a wedge shape. As garlic reaches full maturity, the cloves will pull very slightly away from the scape on hardneck varieties.
- ◆ If you let the garlic stay in the ground too long, too many wrapper leaves will decay, and the cloves will continue to expand until the garlic splits open. At this point the garlic becomes unmarketable.
- ◆ Make sure that you check your garlic every few days.

### Harvest Procedures

- ◆ For a more comprehensive understanding of [Growing, Harvesting, Storing & marketing Garlic in the Northeast](#), please click on the link.
- ◆ To harvest the Scapes, wait until they are longer than 6 inches but before the curl has started to straighten and snap them off the stem just above the main stalk. Mark where you finish so you know where to start the next day.
- ◆ When garlic is ready, mow garlic at about 6 inches to avoid bringing in a lot of wet material in the curing area. Pull garlic out of the ground with the help of a bedlifter or hand fork.
- ◆ Harvest in the morning to avoid sunscald as it is best to field dry the garlic for a few hours before taking it into the curing area. Bring it in before temperatures hit the upper 80's (usually by noon or 1:00 pm).

- ◆ Either cut off the roots with a sharp serrated knife, ½ inch below the bottom of the bulb or shake the dirt off. Never bang the bulbs to remove dirt from the roots. Any bruises will cause decay in storage. Do not twist the roots off as damage to the basal plate of the garlic will introduce [Fusarium Basal Rot](#)
- ◆ Handle all garlic like apples to prevent bruising by gently placing them in a crate for transport.
- ◆ Curing is done best in a high tunnel on [mesh benches](#) with lots of good air circulation. Make sure the mesh is strong enough to prevent sagging in the middle. We have found that using galvanized metal wire 1 by 2 inch works well. Alternatively use a plenum and forced air to save space.
- ◆ The high tunnel should be covered with 60% shade cloth to protect garlic from sunscald and moderate temperature. Garlic is laid flat on greenhouse benches to allow for good aeration. Set the exhaust fan temperature around 80F and always keep the circulation fans on to avoid moisture build up on the plastic.

#### Washing procedures

- ◆ Garlic can be washed straight after harvest, but this is only done when field conditions are very wet (muddy). Never wash garlic that is already drying as this might cause the garlic to spoil.

#### Cleaning and Sorting Procedures

- ◆ When the leaves flake off and the necks are sufficiently dried up, excess stem is cut off with pruning shears or a [utility cutter](#). Necks should be completely dry and there should be no evidence of moisture.
- ◆ Only use a utility cutter for root trimming as blades tend to get dull due to the soil particles left on the roots.
- ◆ Garlic can be cleaned by removing the outer wrapper. Do this under dry conditions so wrappers come off easily.
- ◆ Check garlic for any discolorations, soft spots or other defects and remove it from the curing area.
- ◆ After this the garlic is moved into a cooler, dry area.
- ◆ Sort garlic for size and quality when ready to be shipped in a well-lit location.

Cleaning in the field	Cut tops, lift garlic, pull garlic, and clean off roots
Packing in the field	Fill in boxes for transport
Packing for delivery	Sort to size: small less than 1 ½ inches; medium 1 ½ - 2 inches; large 2 inches and over. Pack in mesh bags or cardboard boxes @20 to 40 lbs. Also see: <a href="#">U.S. Standards for grades of Garlic</a> PLU garlic is 94608
Storage	Seed garlic 70°F at 65 to 75% relative humidity. For long term storage not to be used for seed garlic store ideally at 32° – 41°F, 65 –70% humidity (garlic will sprout after being removed from cold storage). Garlic does not produce ethylene and is not sensitive to ethylene.

## Joi Choy/Bok Choy/Mei Ching Choy

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$1.00 to \$4.00 per lbs. or \$2.00 to \$6.00 per head	\$1.38 to \$2.00 per lbs. for Bok Choi	\$2.00 to \$3.00 per lbs.
Yield	1.2 head to the row foot at 12,000 heads to the acre for Bok Choi and Joi Choy (two rows per bed) and 18,000 for Mei Ching Choy (three rows per bed)		
Standards	Harvesting: 125 – 175 heads per hour per person depending on quality of the crop @ approximately 80-120 hrs. per acre in harvesting plus loading and unloading boxes from and to washing area		
	Washing: 175 heads per person per hour		
Tools needed	Knives. large green boxes (1¾ bushel)		

### Ready to Harvest Indicators and Quality

- ◆ Bok Choy and Joi Choy Heads are 8 -12 inches tall and are 2 – 3 lbs. each free from damaged or yellow leaves. Mei Ching Choy are harvested at about 1 lbs. each

### Harvest and Cleaning Procedures

- ◆ Harvest in the morning to avoid field heat accumulation.
- ◆ Wash hands and sanitize knives before harvesting.
- ◆ Slide knife under head and cut off where root meets stem. Be careful to leave head intact.
- ◆ When cut properly and straight, the bottom of the head is nice and smooth.
- ◆ If the lower leaves are damaged or yellow, cut just above the lower leaves to leave them on the ground. Re-trim if your first cut did not leave behind a nice smooth surface on the bottom.
- ◆ It is important to cut at the correct place, so all the excess leaves fall off. Stripping off leaves after cutting is not correct. Cut a second time if leaves need to be removed.
- ◆ One person cuts the heads, and another person counts and packs the Choys.

### Washing and Storage Procedures

- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men’s](#), or [women’s bib](#). If long sleeve shirt contains soil remove this as well.
- ◆ Add sanitizer to wash water if dunking. Use [this Guide](#) to establish how much peracetic acid solution to add to water.
- ◆ Wash choy cabbage only once preferable only with a hose. If dunking is necessary to remove field heat or dirt, use the second dunking of the choys to hydrocool the product by adding ice to the water or having it pre-cooled.
- ◆ Leave choys in water until the core of the stems are properly cooled down.
- ◆ Pack in sealed boxes to avoid product losing moisture for longer storage.

Cleaning in the field	remove dead and yellow leaves
Packing in the field	12 heads per large green box (1¾ bushel)
Packing for delivery	20 lbs. box in 1¾ bushel box (medium sized heads). No data on Mei Ching Choy PLU Bok Choy 94545 PLU small Bok Choy Joi Choy or Mei Ching Choy 94544
Storage	At 32°–41°F, 95 -100% humidity. Pack in closed containers or bags for storage longer than 5 days

## Kale

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$4.00 to \$8.00 per lbs. or \$2.00 to \$5.00 per bunch	\$1.10 to \$1.60 per bunch. Lacinato has higher value	\$1.50-\$2.66 per bunch Lacinato has higher value
Yield	1 bunch per row foot at 15,400 bunches to the acre		
Standards	Harvesting: 60 – 100 bunches per hour per person depending on quality of the crop @ approximately 200 hrs. per acre in harvesting plus loading and unloading boxes from and to washing area		
	Washing: 175 bunches per person per hour		
Tools needed	Knives. large green boxes (1¼ bushel)		

### Ready to Harvest Indicators and Quality

- ◆ Plants 15-18 inches tall, bottom leaves are dark green and large enough to make a bunch out of 5 - 6 leaves.

### Harvest Procedures

- ◆ Wash hands and sanitize knives before harvesting.
- ◆ Harvest in the morning to avoid field heat accumulation.
- ◆ Grab a bunch of the biggest leaves near the stem of the plant and snap off the leaves.
- ◆ Leave the smaller leaves at the top of the plant and any dead or yellow leaves on the bottom.
- ◆ Each bunch takes 5-6 leaves of the curly kale and about 10 of the Toscano Kale.
- ◆ Place the twistie around the stems and then twist the bunch to tighten the twisty or use rubber bands.

### Washing and Storage Procedures

- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men’s](#), or [women’s bib](#). If long sleeve shirt contains soil remove this as well.
- ◆ Kale is not always washed but can be dunked in iced water to remove field heat.
- ◆ Add sanitizer to wash water. Use [this Guide](#) to establish how much peracetic acid solution to add to water
- ◆ Leave bunches in water until the core of the stems are properly cooled down.
- ◆ pack in sealed boxes to avoid product from losing moisture for longer storage.

Cleaning in the field	remove dead and yellow leaves
Packing in the field	12 -16 bunches per large green box (1¼ bushel)
Packing for delivery	12 bunches per 1 <sup>1</sup> / <sub>9</sub> Bushel Box. 24 bunches in 1 ¾ box PLU Kale is 94627
Storage	At 32°–41°F, 95 -100% humidity. Pack with ice in closed containers or bags for storage longer than a day

## Leeks

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$3.00 to \$6.00 per bunch	\$1.30 to \$1.75 per lbs.	\$2.50 per lbs.
Yield	15,000 bunches per acre (at a row spacing of 36 by 7 inches)		
Standards	With a crew of three people a minimum of 80 bunches per hour (or 25 bunches per person) @ 560 hrs. per acre plus loading and unloading boxes from and to washing area.		
	Washing: Depending on where the roots are cut, but when roots are cut short, a minimum of 100 bunches per person per hour.		
Tools needed	Knives, Harvesting Fork, regular 1½ bushel bins and large green boxes for a cutting surface, or tractor with bedlifter		

### Ready to Harvest Indicators and Quality

- ◆ US grade 1 leeks are about 1 inch in diameter with tall dark green leaves free from blemishes and diseases.

### Harvest and Cleaning Procedures

- ◆ Wash hands and sanitize knives before harvesting.
- ◆ Leeks are much easier harvested if a bedlifter precedes the harvesters, otherwise one person needs to fork the leeks loose.
- ◆ The second person pulls the leeks and lays them out in rows with the roots facing the same direction.
- ◆ The third person cuts the roots off, at the place where the roots meet the stem. Do not cut into the plant.
- ◆ The fourth person cleans off any old, diseased, or damaged leaves by peeling it from the bottom.
- ◆ The fifth person trims off the tops by cutting across the leaves at the same height. Do the trimming on a box that allows the trimming of the leaves to be at the same length as the bin.
- ◆ If bunching leeks put 2-4 leeks per bunch making bunches uniform in size. Then place into a box.

### Washing Procedures

- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men’s](#), or [women’s bib](#). If long sleeve shirt contains soil remove this as well.
- ◆ Place leeks on a wire [mesh table](#) and rinse them off by hand with a hose or alternatively run them through a [rinse conveyor](#) washer. Make sure you use the appropriate pressure on the nozzles to avoid crop damage.
- ◆ For commercial leek production there are carrousel rinse conveyors available in Europe that direct their spray only on the roots avoiding any damage to the leaves.

Cleaning in the field	Cut off roots and remove outer leaves
Packing in the field	20 bunches per regular 1 ¾ plastic bushel bins
Packing for delivery	11 Lbs. per regular 1 1/9 Bushel box for wholesale PLU Leeks 93402 regular bunches, PLU 93402 for baby bunches Bunches or by the piece for CSA and farmer’s market
Storage	At 32°–41°F, 95 -100% humidity. Pack with ice in bins for storage longer than a week.

## Lettuce, full size

All prices farmers reported receiving	Retail (Farmer's Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$1.50 to \$4.00 per head	\$.80 to \$1.50 per head depending on weight and variety	\$1.00 to \$3.00 per head depending on weight and variety
Yield	1 marketable head per row foot at 21,600 heads to the acre (numbers are higher for compact varieties that are planted at higher populations). This number drops down under heavy pressure from thrips, white fly and leafhopper causing virus infections during August unless a good spray program is implemented.		
Standards	Harvesting: Large (1 ¼ bushel) green bin with 16-24 heads per box@ approximately 100-150 hrs. per acre for cutting plus approximately 60 hrs. for packing in boxes. Add additional time for loading and unloading boxes from and to washing area.		
	Washing: 150 – 240 heads per person per hour, depending on variety, and quality.		
Tools needed	Knives and large (1 ¼ bushel) harvest bins		

### Ready to Harvest Indicators and Quality

- ◆ Heads firm, weighing anywhere from ½ lbs. (Boston) to ¾ lbs. (Green-leaf, Romaine)
- ◆ [Wholesale Packing and Grading Instructions Romaine Lettuce](#)

### Harvest Procedures

- ◆ Harvest in the morning to avoid field heat accumulation.
- ◆ Wash hands and sanitize knives before harvesting.
- ◆ Determining the correct height of cutting is important and can save time. Cut high enough to remove dead and damaged outer leaves while keeping most of the head intact. Cleaning after cutting is unnecessary when skill is developed in the cutting procedure. One suggestion is to stay close to the place where the cut is made by working on your knees. This way you can easily bend over to see where the knife is entering the plant.
- ◆ After cutting the lettuce cannot touch the ground so cutting and packing should be done in the same motion.
- ◆ Pack lettuce so the bottom of the plant cannot touch any leafy parts. Lettuce excretes a milky juice after cutting that can leave a brown stain on the leaves.
- ◆ For Boston lettuce pack one layer face up and the other face down. For Green, Red leaf, and Romaine, pack all the lettuce in one direction.

### Washing and Packing Procedures

- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men's](#), or [women's bib](#). If long sleeve shirt contains soil remove this as well.
- ◆ If heads are clean in the field only the bottom of the lettuce is rinsed to remove the milky juice. Leaving this on will make the bottom turn brown and it will appear old. Repack in clean boxes and put directly in the cooler.
- ◆ If lettuce is dirty dump heads into the washing tub. Clean tubs thoroughly and add sanitizer to wash water. Use [this Guide](#) to establish how much peracetic acid solution to add to water
- ◆ Make sure to remove dirt from the cut ends either with gloves or with a brush. Shake out any excess water. Make sure the lettuce is only submerged for a short amount of time to avoid getting waterlogged. Stack Red leaf, Greenleaf, and Romaine lettuce upside down to let the water drain

while sitting in the cooler. Boston lettuce is problematic if washing is necessary as it is difficult to remove all water after washing and this will cause premature breakdown.

- ◆ **Packing for CSA:** 12 heads per regular (1 1/3 bushel) green bin. When packed in several layers be sure to pack so that the cut ends face each other, and the leaf ends face each other. The liquid from the cut ends can turn the leaves brown.

Cleaning in the field	Leave dead yellow leaves in the field
Packing in the field	In harvest bins whereby bottom of plants never touch the leaves
Packing for delivery	<p>Boston for wholesale PLU 94632 green, 93098 for red 10 lbs. 1<sup>1</sup>/<sub>9</sub> bushel box 12's 20 lbs. lettuce box, 24s</p> <p>Loose-leaf for wholesale PLU 94076 for green, 94075 for red 22 lbs. lettuce box 24's 12 lbs. 1<sup>1</sup>/<sub>9</sub> bushel box 12's</p> <p>Romaine for wholesale PLU 94640 for green, and 93097 for red 22 lbs. Lettuce box 24's 12 lbs. 1<sup>1</sup>/<sub>9</sub> bushel box 12's</p>
Storage	At 32°–41°F, 95 -100% humidity. Pack in closed containers for storage longer than a few days. Lettuce is generally sensitive to ethylene but varies between varieties.

### Lettuce, Salad Mix

All prices farmers reported receiving	Retail (Farmer's Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$6.00 to \$16.00 per lbs. (sold in ¼ lbs. bags)	No numbers available	\$3.00/lbs. in 12 lbs. boxes \$4.00 per lbs. in 3 lbs. boxes \$6.50/lbs. in 5 Oz clamshells
Yield	1 lbs. per bed foot at 7200 lbs. to the acre		
Standards	<p>Harvesting: 4-5 bins (8 lbs. per bin) per person per hour@ approximately 200 hrs. per acre in harvesting (when crop is free of weeds and other issues) plus loading and unloading boxes from and to washing area.</p> <p>Machine harvest up to 35-50 bins per hour @15- 25 hrs. per acre (for three people) as success greatly depends on conditions.</p>		
	Washing: 8-12 bins per person per hour.		
Tools needed	Orthomec harvester or Knives. Regular 1 <sup>1</sup> / <sub>9</sub> bushel bins		

#### Ready to Harvest Indicators and Quality

- ◆ Leaves are 4 -8 inches tall, healthy, free from weeds, yellowing, necrosis or other blemishes.

#### Harvest Procedures:

- ◆ Wash hands and sanitize knives and equipment before harvesting salad mix.
- ◆ Harvest in the morning hours to avoid field heat accumulation.
- ◆ Use different bins for field as for distribution.

- ◆ When machine harvested:
  - Weed field thoroughly before harvesting as people on machine will not be able to keep up sorting at the speed of harvesting.
  - Walk fields before harvesting to inspect for animal feeding or feces in crop. Mark the spot so the tractor operator can raise the belt approaching this spot.
  - During harvesting remove all yellow leaves off belt before they fall into the crates. When Farmer’s Friend harvester is used, sorting will be done after harvesting.
- ◆ When hand harvested with Harvest or Victorinox knife:
  - Walk fields before harvesting to inspect for animal feeding or feces in crop. Mark the spot so harvesters can avoid it.
  - Hold a small bunch of leaves at the top of the plant with one hand and cut with one motion with the other hand.
  - Shake vigorously to remove any yellow leaves or stems from previous cuttings.
  - Place loosely in box.

**Washing and Packing Procedures**

- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men’s](#), or [women’s bib](#). If long sleeve shirt contains soil remove this as well.
- ◆ Add sanitizer like [SaniDate](#) to wash water. Use [this Guide](#) to establish how much peracetic acid solution to add to water.
- ◆ When a commercial salad washer (whereby water is not circulated) is not available, wash salad mix at least twice (three times is better). Using a [bubbler](#) to agitate the water reduces damage of the leaves. For the last rinse you can use hydrocooled water.
- ◆ Do not leave greens in water for longer than 1 minute. Leaves tend to get waterlogged after a few minutes, which causes them to deteriorate faster.
- ◆ Dry salad mix by use of a centrifuge.
- ◆ For the smaller grower use this [Chef’s salad spinner](#). Larger growers can use the [Hobart version](#).
- ◆ Weigh according to customer’s needs and pack 3 lbs. in sealed ½ bushel boxes or line the boxes with a plastic liner to avoid product from losing moisture.

<a href="#">Cleaning in the field</a>	Inspect crop for weeds, yellow leaves, and contamination
<a href="#">Packing in the field</a>	8 lbs. per regular bushel bins
<a href="#">Packing for delivery</a>	3 lbs. per regular ½ -bushel box PLU for mesclun mix 93328
<a href="#">Storage</a>	At 32°–41°F, 95 -100% humidity. Pack in plastic bags inside closed containers for longer storage. Salad mix is sensitive to ethylene but packing it in a plastic bag at cold temperatures protects it from damage.

## Melon, Cantaloupe

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$2.00 to \$5.00 each	No numbers available	No numbers available
Yield	1 melon per row foot at 7200 melons per acre		
Standards	Harvesting: 75-100 melons per hour per person. It takes a crew of five people about 45 minutes to an hour to harvest and sort 350 melons between leaving the barnyard and unloading in the barn. (Approximately 100 hrs. per acre)		
	Washing: not necessary when mulched is used in between plastic. Sorting should be done in the field to save time in the barn		
Tools needed	large green boxes (1¼ bushel)		

### Ready to Harvest Indicators and Quality

- ◆ Cantaloupes are considered of good quality when they have developed a good netting with full yellow color on the outside, and when its flesh is orange, sweet and juicy. Melons/cantaloupes cannot be overripe, soft, or wilted and must be free of any defects. Good melons/cantaloupes come from a field where the foliage is still healthy while the plants are in full production. At the last picking of a succession, the fruit is smaller and less netted which is an indication that the quality has decreased. Many growers don’t pick until the last melon in the field has ripened but move on to the next succession to maintain a satisfied customer base.
- ◆ Cantaloupes are ready to harvest when the stem is either full-slip or half-slip referring to how easily it is removed with a gentle nudge from your thumb from the fruit. When a melon or cantaloupe is fully ripe, the stem detaches itself from the fruit which is part of the ripening process. For full flavor pick at full slip but if you don’t want to over ripen the fruit as you only pick twice a week, include all the fruit that is half-slip. No all melons respond to this method, and it works best on cantaloupes.

### Harvest Procedures

- ◆ It is important to train the crew on how to pick a ripe melon. Nothing is more disappointing than opening a melon that tastes like a cucumber.
- ◆ 1 or 2 people stand on harvest wagon and the others each take a row of melons.
- ◆ After a picker harvests a melon, they toss the melon to one of the people on the truck. Make sure you have eye contact with the catcher before you toss the melon underhanded.
- ◆ Move the harvest wagon down the harvest lane as you pick.

### Washing Procedures

- ◆ Using adequate mulch like straw can keep the fruit clean so washing won’t be necessary. This is preferred over washing melons.
- ◆ If washing is necessary, wash hands before handling melons and use a rinse conveyor washer or spray melons off.
- ◆ Under no circumstance dunk melons in cold water as this can create cross-contamination of pathogens that are absorbed through the skin of the melon/cantaloupe.
- ◆ Inspect the melons after washing for any defects. Any possible puncture can be a food safety issue and will impact storage life

Cleaning in the field	Brush off any soil or straw mulch
Packing in the field	If possible, sort by size in the field, to accommodate easier sorting in the packing house
Packing for delivery	sort by size, anywhere from 8 - 12 melons per large (1 ¾ bushel) box or 4 to 6 per 1 1/9 Bushel box

	PLU small cantaloupe 94318, PLU large Cantaloupe 94319 PLU Honeydew small 94329, PLU Honeydew large 94034
Storage	Cantaloupes at 37° – 45° F, 95% humidity, Honeydew melons at 45 –54F.

## Onions, Green

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$2.00 to \$4.00 per bunch	\$1.00-\$1.50 per bunch	\$2.00 per bunch
Yield	1 bunches per foot at 20,000 bunches per acre		
Standards	Harvesting: 40-60 bunches per person per hour. A crew of six can harvest about 300 bunches in a little over an hour, including loading it on the truck. (Approximately 450 hrs. per acre)		
	Washing: 80-100 bunches per person per hour		
Tools needed	large green box (1¼ bushel), twisties and knives		

### Ready to Harvest Indicators and Quality

- ◆ Wash hands and sanitize knives before harvesting.
- ◆ Preferred variety is Ailsa Craig. Onions have sized up between 2 to 4 inches.
- ◆ Onion bulbs are firm and have no signs of any defects from insects, bacterial rot, or other pathogens. Leaves are light to deep green, not crushed or damaged and have no signs of any defects.

### Harvest Procedures

- ◆ The first person pulls onions out by grabbing them as low as possible at the stem to avoid crushing the green stems. Place the onions on the top of the bed all facing the same way.
- ◆ The second person cleans off the outer leaves around the bulb which results in a clean white bulb.
- ◆ The third person bunches three to four onions together with twisties or rubber bands.
- ◆ The fourth person cuts off the excess length off the leaves to allow the bunch to fit lengthwise in the box.
- ◆ The last person picks up the finished bunches, counts, and places them in the box.

### Washing Procedures

- ◆ Bunched fresh onions look much nicer when clean. If washing is necessary: wash your hands and place green onions on a wire [mesh table](#) and rinse them off with a spray nozzle. Do not dump into washing tub.
- ◆ Alternatively, run green onions through a [rinse conveyor](#) washer, make sure you use the appropriate pressure on the nozzles to avoid crop damage.

Packing in the field	15 bunches in a regular 1½ bushel box
Packing for delivery	24 bunches in a regular 1¾ Bushel box or 12 bunches in a 1⅞ Bushel box. PLU Fresh Green Onions bunched: 93412 PLU Fresh Red onions bunched: 93331
Storage	32°– 41°F, 95 -100% humidity. Pack in closed containers for storage longer than a week. <a href="#">Postharvest Factsheet Green Onions</a>

## Onions, storage

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$2.00 to \$3.00 per lbs.	\$0.75 to \$1.25 per lbs.	\$1.50/lbs.
Yield	1.5 lbs. per row foot at 32,000 lbs. per acre		
Standards	Harvesting: 175 lbs. per person per hour. This includes pulling the onions, removing the tops, and picking them into boxes. (@approximately 200 hrs. per acre)		
	Curing, cleaning, and sorting: 250 lbs. per person per hour.		
Tools needed	¾ bushel green buckets or regular 1½ bushel boxes and knives		

### Ready to Harvest Indicators and Quality

- ◆ Stop irrigating 3 weeks before anticipated harvest to maintain a healthy crop
- ◆ When the plant does not put on new leaves, the necks get soft and plants start to fall over, and the roots begin to die, onions are almost ready to pull. Generally, it is said that onions are ready when 75% of the plants have lodged but it pays to leave them in the ground until the roots are loose as well. Apparently, they continue to put on size even when the leaves have fully lodged.
- ◆ Pull the plant and see how hard it is to pull them out. If you don’t feel much resistance, they are ready to harvest.
- ◆ Onions should be firm, have good bulb size, and contain no defects from insect damage, sunscald, or bruising. Onions should also have good internal condition with absence of any bacterial rot.

### Harvest Procedures

- ◆ Avoid harvest on hot days when temperatures soar into the high eighties or nineties to avoid sunscald. Do not harvest in the rain or on days when the relative humidity is higher than 90% to avoid [black mold](#).
- ◆ Pull onions out of the ground and place in windrows and orient the leaves so they protect the bulbs from direct sunlight. Ensure onions are not injured to avoid postharvest development of pathogens.
- ◆ For field curing when temperatures are at least 75°F but lower than 90°F.
- ◆ When temperatures are high, avoid field curing and bring in a barn or high tunnel with exposure to temperatures of up to 86°F with optimum relative humidity of 75 to 80%. Ensure good air movement. (Forced air curing with a plenum allows for higher curing temperatures)
- ◆ Cover the high tunnel with 60% shade cloth to protect onions from sunscald.
- ◆ When you can no longer roll any stems between your fingers and the stem tissue feels like paper, onions are cured and can be brought into long term storage.
- ◆ Store onions at close to 32°F at 65 to 70% humidity for long term storage.

Packing in the field	Green buckets
Packing for delivery	Pack in regular 1 <sup>1</sup> / <sub>9</sub> bushel box or mesh bags, 40 lbs. total sorted by size in 2 <sup>3</sup> / <sub>4</sub> and smaller or larger than 3 inches PLU large yellow 94093, PLU small yellow 94665, PLU Red onions 94659, PLU Sweet: 93493
Storage	At 32° –41°F, 65 –70% humidity Onions are moderately sensitive to ethylene exposure. Store away from fruit. <a href="#">Postharvest Factsheet Onions</a>

## Parsley

All prices farmers reported receiving	Retail (Farmer's Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$2.00 to \$5.00 per bunch	\$.80 to \$1.50 per bunch Flat parsley is a bit higher	\$1.33 per bunch for curly parsley \$1.66 per bunch for flat
Yield	1/8 lbs. per foot (per cutting at three rows per bed) at 2700 lbs. or 22,000 bunches per acre (1 bunch weighs about 2 Oz.)		
Standards	Harvesting: Depending on conditions and if bunching is necessary, 4 loose boxes (@ 3-4 lbs. per box) per hour person or 75 bunches per hour @ approximately 150-200 hrs. per acre for loose; or 60 bunches per person @ approximately 360 hrs. per acre.		
	Washing: 12 boxes per hour person		
Tools needed	Knives, regular 1½ bushel boxes		

### Ready to Harvest Indicators and Quality

- ◆ Plants 5-6 inches tall and bushy, dark green free of yellow, diseased, or dead leaves.

### Harvest and Cleaning Procedures

- ◆ Wash hands and sanitize knives before harvesting.
- ◆ Harvest in the morning to avoid field heat accumulation.
- ◆ The hand that holds the knife takes the parsley by the leaf end from the other hand.
- ◆ Remove any yellow leaves or stems and wrap bunch with a rubber band.
- ◆ If necessary, re-cut stems to make an even cut and place in a clean box.
- ◆ If the stems are cut high off the ground make sure you re-cut them again, so only 2-3 inches remain on the plant. This is to avoid cutting dead stems at next harvest. After harvest the parsley plants will need to look evenly cut to accommodate even re-growth.

### Washing and Storage Procedures

- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men's](#), or [women's bib](#). If long sleeve shirt contains soil remove this as well.
- ◆ Add sanitizer like [SaniDate](#) to wash water. Use [this Guide](#) to establish how much peracetic acid solution to add to water
- ◆ When a conveyor washer is not available, wash parsley twice in tubs. Curly parsley can hold a lot of soil-particles. Using a [bubbler](#) to agitate the water reduces damage of the leaves. For the last rinse you can use hydrocooled water.
- ◆ Do not leave parsley in water for longer than a few minutes to avoid water logging and shake water off the bunches before repacking in clean box.
- ◆ Weigh according to customer's needs and pack in 24 or 48 bunch quantities (for restaurants you can pack in bulk in 1 or 3 lbs. boxes).

Packing in the field	Green plastic box
Packing for delivery	½ bushel waxed box 24 bunches 1 <sup>1</sup> / <sub>9</sub> bushel box 48 bunches PLU curly Parsley 94899, PLU flat Parsley 94901 For CSA and farmers market use clean box of choice
Storage	At 32°-41°F, 95 -100% humidity. Pack in closed containers for storage longer than a few days. Sensitive to ethylene exposure

## Parsnip

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$3.00 to \$5.00 per lbs.	\$2.20 to \$3.00 per lbs.	\$3.70 per lbs.
Yield	0.83 lbs. per row foot at 18,000 lbs. per acre.		
Standards	Harvesting: 175 lbs. per person per hour or five people can harvest and fill up a bulk-bin in about an hour @ approximately 100 hrs. per acre.		
	Washing: 300 lbs. per person per hour		
Tools needed	¾ bushel buckets, bulk bins, tractor with bedlifter, tractor with forklift		

### Ready to Harvest Indicators and Quality

- ◆ Root 6 -12 inches long with a minimum diameter of 1.5 inches
- ◆ Harvested roots are white and straight, and free from woodiness, soft rot, or wet breakdown. Any roots with discoloration or with mechanical damage should be left in the field. [U.S. Grade 1 and 2 Standards for Parsnips](#)

### Harvest Procedures

- ◆ Undercut parsnips with the bed lifter.
- ◆ Then pull out parsnips, inspect for defects, twist off tops, and put in buckets.
- ◆ Stunted, diseased, forked, and split parsnips are left in the field. Separate out small parsnips.
- ◆ Small parsnips do not store well and cannot be sold through wholesale markets. They can be given out in CSA shares but as they do not store as well, distribute those quickly after harvest.
- ◆ If harvesting for one day’s share empty buckets into small boxes.
- ◆ If harvesting in bulk, drive the tractor with a bulk bin down the harvest lane and carefully dump the parsnips into the bin. The buckets are laid out over the full length of the bed so the entire crop from one bed is dumped in the bin at one time. Leave the buckets at the same place to be used for the next bed.

### Washing and Sorting Procedures

- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men’s](#), or [women’s bib](#).
- ◆ Do not wash until ready to deliver. Then put through [barrel washer](#).
- ◆ This washer works best if filled up with approx. 300 lbs. of parsnips.
- ◆ Hose the parsnips before entering the washer, so any dirt on the parsnips is soft.
- ◆ Barrell washer should have a sorting table at its end. Sort out parsnips with any defects. Sort by size if needed.

Packing in the field	800 lbs. per bulk bin.
Packing for delivery	25 lbs. in plastic bags PLU Parsnip small: 93053, PLU Parsnip regular: 94672
Storage	At 32°–41°F, 95 -100% humidity. Pack in closed containers or bags for long-term storage.

## Peas (Sugarsnap, Snow peas)

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$4.00 to \$8.00 per quart	N/A	N/A
Yield	0.12 pint per row foot at 2600 pints to the acre for bush types. 0.75 pint per row foot at 5400 pints to the acre for trellised peas Snow-peas yield approximately 30% less than sugarsnaps.		
Standards	Harvesting: 15 lbs. per person per hour @ approximately 175 hrs. for bush type OR 20 lbs. per person per hour trellised type @ approximately 270 hrs. per acre		
Tools needed	¾ bushel green buckets		

### Ready to Harvest Indicators and Quality

- ◆ Peas are plump and have filled out due to swelling of peas inside the pod. Snap peas are 2 ½ to 3 inches long and snow peas are 3 to 3 ½ inches long and do not contain any large seed pods
- ◆ Do not harvest diseased, damaged, overmature or immature pods.

### Harvest Procedures

- ◆ Wash hands before harvesting peas.
- ◆ If peas are trellised only harvest the mature peas into the bucket. If the plants are not trellised and most of the peas are mature, pull out the whole plant and pull off the peas. Double the buckets to prevent peas from falling out the holes.
- ◆ This can be done standing up or kneeling down. Some people sit on a bucket while cleaning the vines. This might not be as efficient but pea harvest might become strenuous after a few hours.

### Washing Procedures

- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men’s](#), or [women’s bib](#). If long sleeve shirt contains soil remove this as well.
- ◆ Peas don’t need to be washed but if needed rinse quickly with cold water to remove field heat. If harvested on a hot day peas can be soaked in the cold water tub to remove the field heat.

Packing in the field	Every bucket weighs about 20 lbs. filled with peas.
Packing for delivery	10 lbs. cartons. PLU snow peas: 94092, PLU Sugarsnap peas: 94675, PLU green peas 94674
Storage	At 32°–34°F, 85 –95% humidity. Cover in closed containers or bags if stored for a few days, moderately sensitive to ethylene exposure. Typical shelf life is 7 to ten days.

## Peppers, Green, Red and Hot

All prices farmers reported receiving	Retail (Farmer's Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$2.00 to \$5.00 per lbs. or \$3.00 to \$4.00 per quart	\$1.50 to \$3.00 per lbs.	\$2.25 to \$3.00 per lbs.
Yield	2½ lbs. per row foot at 36,000 lbs. to the acre.		
Standards	Harvesting: 10 buckets or 150 lbs. per hour @ approximately 240 hrs. per acre		
Tools needed	¾ bushel green or ½ bushel red buckets		

### Ready to Harvest Indicators and Quality

- ◆ When peppers are firm and large. When the peppers cannot be easily squeezed between the fingers it is a sign of being ready. Yield of peppers is not measured only in size but also in the thickness of the walls. For Carmen peppers only harvest the red peppers.
- ◆ Only peppers that are free of blemishes are taken out of the field. The rest are picked and discarded in the wheel tracks, unless [Alternaria](#) pressure is high. Then culls should be removed from the field.

### Harvest Procedures

- ◆ [Wholesale Grading and Packing Instructions Fancy #1](#)
- ◆ [Wholesale Grading and Packing Instructions Sweet Large](#)
- ◆ [Wholesale Grading and Packing Instructions Sweet Medium](#)
- ◆ [Wholesale Grading and Packing Instructions Hungarian Hot](#)
- ◆ [Wholesale Grading and Packing Instructions Jalapeno](#)
- ◆ [Wholesale Grading and Packing Instructions Poblano](#)
- ◆ Count out the number of buckets needed to harvest.
- ◆ One bucket of green peppers yields approx. 35 peppers or 15 lbs. One bucket of Carmen peppers yields 60 peppers. If you need 750 green peppers (or 320 lbs.) you need to lay out 21 buckets.
- ◆ Move full buckets to the harvest lane as you fill them. When all the buckets are full pick up with tractor or truck.
- ◆ Two people harvest from the same bed, each taking one side of the row. Watch for rot, which might on the outside look like a small blemish but is usually more substantial on the inside.
- ◆ Mark where you stopped harvesting so you can start there the next day.

### Washing Procedures

- ◆ Using adequate mulch like straw can keep the fruit clean so washing is not necessary. Peppers are sorted and distributed in well lit packing shed. Many blemishes are discovered during this process.
- ◆ If washing is necessary, use a [rinse conveyor](#) washer. Wash hands and rinse boots before entering wash and pack shed and cover up or change out of field clothes. Make sure you use the appropriate pressure on the nozzles to avoid crop damage. Under no circumstance dunk peppers in cold water as this can create cross-contamination of pathogens that are absorbed through the skin of the fruit.

Packing in the field	Harvest in buckets and fill up in regular (1 1/3 bushel) green boxes, either by count or volume.
Packing for delivery	In regular 1 or 1 <sup>1</sup> / <sub>9</sub> Bushel boxes at 28 lbs. or in ½ bushel at 14 to 15 lbs. PLU Green large 94065, PLU small and medium 94681, PLU red 94088, PLU orange 94682, PLU yellow, 94680
Storage	<a href="#">Postharvest Factsheet Bell Pepper</a> . Store peppers at 45°F, 95-100% humidity. Peppers are sensitive to ethylene exposure and chilling injury.

## Potatoes

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$1.50 to \$5.00 per lbs. (Includes fingerlings)	\$0.36 to \$0.48 per lbs. for red and white. Fingerlings at \$0.85 to \$1.20 per lbs. )	\$1.00-\$1.10 per lbs. (Not including fingerlings)
Yield	1.3 lbs. per row foot at 18,750 lbs. per acre		
Standards	Harvesting: 300-400 lbs. per person per hour or 10-16 buckets @ approximately 50 - 65hrs per acre.		
	Washing and sorting: 500 lbs. per person per hour.		
Tools needed	¾ bushel green buckets, digging forks, tractor with potato digger, tractor with forklift, 20 bu. bulk-bins		

### Ready to Harvest Indicators and Quality

- ◆ Most organic potatoes do not require vine killing as the leaf hoppers tend to do this. Even a good spraying program does not control all the leaf hoppers. Inspect the crop before dying down for pathogen like rhizoctonia and late blight as they will continue to cause problems in storage. If vine kill is needed mow vines 10 days to two weeks before harvest.
- ◆ Allow potatoes to develop a good skin set which means that the skin will not easily rub off during handling. Dig up a few plants to inspect to determine the tubers can handle the harvest equipment.
- ◆ For early harvest: potatoes have sized up to make a harvest worthwhile (August). Treat the potatoes very gently as they have not developed any skin yet
- ◆ Harvest for storage: the vines are starting to die back, and the potatoes start forming a firm skin that doesn’t get easily damaged by the harvester (Middle to late September, into October). Daytime air temperatures should have dropped to around 60°F. When tuber core temperature is between 60-65°F they are less susceptible to bruising.
- ◆ Potatoes to be brought in are firm, firm, free from defects, and have an intact skin.

### Harvest Procedures

- ◆ If harvesting for new potatoes dig them with a bedlifter or fork. Bring them in a barn and dry them with a high speed fan.
- ◆ Use a chain type harvester for fall harvest. If potatoes are picked up by hand instruct crew how to select in the field. If harvester has a conveyor that places them in a bin, set up a conveyor in the barn to sort culls before going into long term storage
- ◆ Curing of potatoes for long term storage is done at 59°F for one to two weeks at a 95% relative humidity. Prevent condensation and allow for fresh air intake.

### Washing Procedures

- ◆ Wash hands and sanitize equipment before cleaning potatoes.
- ◆ It is best to not wash or brush new potatoes as it removes their skin.
- ◆ In general, if possible, only dry brush potatoes to clean.
- ◆ If this is not an option they can be washed by using a brusher conveyor washer.
- ◆ Potatoes are sorted for quality and size ([U.S. Standards for grades of Potatoes](#)) Size A potatoes must be greater in size than 1 7/8 inch.
- ◆ Put two fans blowing at high speed towards the pallets with washed potatoes for drying.
- ◆ Distribute washed potatoes within a week.

Cleaning in the field	Select potatoes that are free from blemishes, bruises or rot
Packing in the field	N/A

Packing for delivery	50 lbs. in paper bags sorted by size PLU white potato 94083, PLU red potato 94073, PLU yellow potato 94727
Storage	<a href="#">Potato Harvest and Storage Factsheet</a> Potatoes need to be stored in absolute darkness to avoid greening of skin. Potatoes need to be cured at 50° – 60°F and the temperatures should gradually be brought down. Extended storage of potatoes is best at 39-41°F at 90 –95% humidity for tablestock. Be aware that potatoes stored under those conditions will result in dark brown French fries as carbohydrates convert to sugars at those temperatures.

## Radishes

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$2.00 to \$5.00 per bunch	\$1.50 to \$1.80 per bunch (watermelon radishes higher), or \$1.00 a lbs.	\$1.40/lbs. for Watermelon radishes No numbers for red
Yield	0.5 bunches per row foot at 10,800 bunches per acre. This is based on 3 rows per bed, but this yield can be higher when planted at 4 or 5 rows per bed for small radishes. Watermelon radishes yields are lower		
Standards	Harvesting: 60-80 bunches per person hour		
	Washing: 150 bunches per person per hour.		
Tools needed	Rubber bands and regular 1½ bushel box		

### Ready to Harvest Indicators and Quality

- ◆ When radishes are about ¾ to 1 inch in diameter.
- ◆ Radishes are round, similar in size, have good color, and are free of blemishes and cracks and contain no pithiness.

### Harvest Procedures

- ◆ Wash hands before harvesting radishes.
- ◆ One person harvests several rows of radishes, preferably in the morning. Keep harvested radishes in the shade.
- ◆ Depending on size, one bunch contains approx. 8-12 radishes which is common in CSA shares and farmers markets. When wholesaling a bunch needs to contain 6-9 radishes.
- ◆ Only radishes that are free of blemishes and without splits are taken.
- ◆ Hold the radish bunch with one hand and put the rubber band over the radish end of the bunch two times.
- ◆ Make sure all radishes will stay in the bunch but not so tight that it breaks the stems.
- ◆ No counting is done while bunching. Place 5 bunches in a pile. When there are quite a few piles on the ground, someone picks them up and counts them into small green boxes. 25 to 50 bunches per box.

### Washing Procedures

- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men’s](#), or [women’s bib](#). If long sleeve shirt contains soil remove this as well.
- ◆ To wash radishes use a [bunch washer](#) or a [mesh table](#) to properly clean off the soil from the roots. Treat radishes gently as they can easily break off the stem.
- ◆ Radish leaves are quite fragile and protect the leaves with your hand when spraying directly at the bunch.

- ◆ Dunking radishes to clean off the leaves is not recommended but when necessary, add sanitizer like [SaniDate](#) to wash water. Use [this Guide](#) to establish how much peracetic acid solution to add to water

Cleaning in the field	Yellow leaves are discarded or pulled out of the bunch.
Packing in the field	48 bunches to a picking crate
Packing for delivery	48 bunches weighing 20 lbs. Or 24 bunches weighing 10 lbs. to a regular 1 <sup>1</sup> / <sub>9</sub> Bushel box. PLU bunched red 94089, PLU bunched white 94740
Storage	<a href="#">Radish Postharvest Factsheet</a> 32°F at 95% humidity. Radishes are not sensitive to ethylene exposure and produce very low levels of ethylene.

## Rutabaga

All prices farmers reported receiving	Retail (Farmer's Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$2.00 per lbs.	\$0.56/lbs.	\$1.75/Lb.
Yield	2.55 lbs. per row foot at 36,720 lbs. to the acre (two rows per bed)		
Standards	Harvesting: Depends on size, but 400 lbs. per hour is not unusual. When rutabagas are large expect to harvest more than 400 lbs. @ approximately 80-100 hrs. per acre.		
	Washing: 350-400 lbs. per hour per person (includes cleaning boxes and weighing). or in other words, two people wash 1000 lbs. in 1 ½ hour		
Tools needed	Tractor with forklift, 20-bushel bulk bins and sharp knives		

### Ready to Harvest Indicators and Quality

- ◆ Seasonal, before the grounds gets frozen or before the tubers get too big for consumption. Rutabagas should not weigh more than 3 lbs.
- ◆ Rutabaga isn't a pretty looking crop to begin with but only tubers that are relatively round and do not weigh more than 3 lbs. are taken out of the field. Larger ones can be fed to farm animals.

### Harvest Procedures

- ◆ Pull rutabaga out of ground, trim off the root then cut the stem about an inch above the tuber and leave them in a windrow or put in a bucket.
- ◆ When enough is harvested to fill a few bins, pick up the product and place in bulk bin.

### Washing Procedures

- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men's](#), or [women's bib](#). If long sleeve shirt contains soil remove this as well.
- ◆ Wash in [barrel washer](#) or conveyor washer.

Cleaning in the field	Dirt is rubbed or cut off the bottom part of the tuber
Packing in the field	1000 lbs. per bulk bin
Packing for delivery	25 lbs. per plastic bag PLU Rutabaga: 94748
Storage	At 32° – 41° F, 95 -100% humidity. Pack in closed containers or bags for long-term storage.

## Scallions

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$2.00 to \$4.00 per bunch	\$1.00 per bunch	\$1.50 per bunch
Yield	1 bunch per row foot at 21,600 bunches per acre		
Standards	Harvesting: 50 bunches per hour @ approximately 300-450 hrs. per acre		
	Washing: 100 bunches per hour		
Tools needed	Rubber bands, regular 1½ bushel boxes, serrated knives		

### Ready to Harvest Indicators and Quality

- ◆ When scallions are about pencil size to ½ inch in diameter with tops at least 8 inches. Each bunch should be a small handful of 6-8 scallions (at least ½ inch thick), weighing about 4 Oz.
- ◆ Scallions have dark green foliage, not crushed or damaged and have no signs of any defects from insects, bacterial rot, or other pathogens. Roots are pure white.

### Harvest Procedures

- ◆ Wash hands and sanitize knives before harvesting
- ◆ Harvest in the morning hours to avoid field heat accumulation
- ◆ Pull scallions out by grabbing them as low as possible at the stem to avoid crushing the green stems. If possible, precede harvest with a bedlifter.
- ◆ Each bunch contains about 5-7 scallions. If needed clean off any yellow leaves before placing a rubber band around the bunch making sure all scallions are even at the root base .
- ◆ Shake off some of the soil particles off the roots and cut them at approximately half an inch with a serrated knife.

### Washing Procedures

- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men’s](#), or [women’s bib](#). If long sleeve shirt contains soil remove this as well.
- ◆ Place scallions on a wire [mesh table](#) and rinse them off by hand but do not dump into washing tub.
- ◆ Alternatively, run scallions through a [rinse conveyor](#) washer, make sure you use the appropriate pressure on the nozzles to avoid crop damage.

Cleaning in the field	Yellow leaves are removed. Cut roots at ½ inch. Leaves are cut to the length of the box if needed (not preferred)
Packing in the field	40-50 bunches to a regular 1½ bushel box.
Packing for delivery	24 or 48 bunches to a regular ½ or 1½ bushel box weighing approx. 5-6 lbs. or 10 -12 lbs. PLU scallions: 94068
Storage	<a href="#">Postharvest Factsheet Scallions</a> At 32°–42°F, 95 –98% humidity. Cover in closed containers or bags if stored for a few days. Not sensitive to ethylene.

## Spinach

All prices farmers reported receiving	Retail (Farmer's Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$6.00 to 16.00 per lbs. for baby spinach	\$2.80 to \$4.00 per lbs. for baby spinach	\$3.60-\$4.50 for baby spinach \$6.75/lbs. if sold in 5 Oz clamshells
Yield	0.14 lbs. per row foot at 5,400 lbs. per acre		
Standards	Harvesting: 5 bins per hour @ approximately 100 hrs. per acre (depending on health of crop)		
	Washing: 8-10 bins per hour		
Tools needed	Orthomec Harvester or Knives, regular 1½ bushel boxes		

### Ready to Harvest Indicators and Quality

- ◆ Leaves are 4 -6 inches tall, healthy, free from weeds, yellowing, necrosis or other blemishes.
- ◆ Spinach needs to be dark green and free from any white mold, leaf miner damage, or other defects.

### Harvest Procedures:

- ◆ Wash your hands and sanitize knives before handling produce
- ◆ Harvest in the morning hours to avoid field heat accumulation
- ◆ Use different bins for field as for distribution.
- ◆ When machine harvested:
  - Weed field thoroughly before harvesting as people on machine will not be able to keep up sorting at the speed of harvesting
  - Walk fields before harvesting to inspect animal damage or feces in crop. Mark the spot so the tractor operator can raise the belt approaching this spot.
  - During harvesting remove all yellow leaves off belt before it falls into the crates. When Farmer's Friend harvester is used, sorting will be done after harvesting.
- ◆ When hand harvested with Harvest or Victorinox knife:
  - Walk fields before harvesting to inspect animal damage or feces in crop. Mark the spot so the harvester can avoid it.
  - Hold a small bunch of leaves at the top of the plant with one hand and cut with one motion with the other hand.
  - Shake vigorously to remove any yellow leaves or stems from previous cuttings.
  - Place loosely in box

### Washing and Storage Procedures

- ◆ Wash hands and rinse boots before entering wash and pack shed and cover up field clothes with [men's](#), or [women's bib](#). If long sleeve shirt contains soil remove this as well.
- ◆ Add sanitizer like [SaniDate](#) to wash water. Use [this Guide](#) to establish how much peracetic acid solution to add to water. Wash/rinse greens in at least two tanks.
- ◆ When a passthrough conveyor style washer (whereby water is not circulated) is not used wash spinach at least twice.
- ◆ Do not leave greens in water for longer than 1 minute. Leaves tend to get waterlogged after a few minutes, which causes them to deteriorate faster.
- ◆ Dry spinach in a centrifuge but take care that leaves are not damaged as this can cause bacterial soft rot (Erwinia and Pseudomonas) in storage.
- ◆ For the smaller grower use this [Chef's salad spinner](#). Larger growers can use the [Hobart version](#).
- ◆ Weigh according to customer's needs and pack 3 lbs. in sealed ½ bushel boxes or line the boxes with a plastic liner to avoid product from losing moisture.

Cleaning in the field	Stems or yellow leaves are removed
Packing in the field	12 lbs. per regular 1½ bushel box
Packing for delivery	3-4 lbs. per regular ½ bushel box or in clamshells PLU baby spinach 93332
Storage	At 32°–42°F, 95 –98% humidity. Cover in closed containers or bags if stored for a few days. Highly sensitive to ethylene.

## Strawberries

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$6.00 to \$10.00 per quart	No numbers available	\$6.00 per quart
Yield	¾ pint per row foot at 10,800 pints per acre (in a dry year)		
Standards	Harvesting: 15 Quarts or 25 pints per person per hour @ approximately 400-450 hrs. per acre		
Tools needed	Black boxes with pint baskets & netting. Bowls to pick in are optional		

### Ready to Harvest Indicators and Quality

- ◆ Berries are picked in the morning when they are dry, ripe (¾ of its surface showing a pink or red color), and firm.
- ◆ Overripe berries are discarded as they do not hold up until time of delivery.
- ◆ Berries are at least ¾ inch in diameter and free from blemishes or eating damage. Minor defects (less than 10%) are acceptable but zero tolerance for decay or mold.

### Harvest Procedures

- ◆ Wash hands before harvesting strawberries.
- ◆ Each person takes one row of strawberries, picking into the bowl or directly into pint baskets.
- ◆ When the bowl is filled pour the berries into the pint containers in the small black box.
- ◆ Fill the pint containers until they have a rounded top then place net over the top.
- ◆ Make sure to keep the harvest crew in one section of the field at a time.
- ◆ Mark where you stopped so you can start there the next day.
- ◆ Place the berries in the cooler within an hour of picking performed by a person that has not been harvesting. Otherwise make sure you have clean hands and boots before entering the packing barn.

Packing in the field	pints in small black boxes
Packing for delivery	15 pints per small black box or 8 quarts per box PLU pint 94246, PLU quart 94247
Storage	Store in cooler overnight. If delivering the same day as harvest do not put in cooler. Long term: at 32°F at 90% humidity for 5-7days

## Squash Summer (includes Zucchini)

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$1.00 to \$4.00 per lbs.	\$1.00 to \$2.00 per lbs.	No numbers available
Yield	4.33 lbs. per row foot at 31,200 lbs. per acre		
Standards	Harvesting: 5-6 buckets per hour or 120 lbs. @ approximately 200-300 hrs. per acre (not including picking up buckets and transport).		
Tools needed	Pocket or paring Knives, green buckets		

### Ready to Harvest Indicators and Quality

- ◆ [Wholesale Grading and packing Instructions Zucchini](#)
- ◆ When yellow squash is 4-6 inches long and a good thickness. (Exception is Patty Pan squash which should be the size of a doorknob). Generally, zucchini is harvested at a length of up to 7-8 inches with a thickness of 1.25 to 1.75 inches. On warm days squash should be picked every day and sometimes twice a day to control size to be harvested.
- ◆ Fruit should be straight (apart from crookneck types) and firm from stem to tip and free from defects. Soft fruit tips should be discarded. Misshapen squash indicate poor pollination.
- ◆ Plants with squash bug infestations need to be abandoned and worked under to avoid spreading in later successions.

### Harvest Procedures

- ◆ Wash hands and sanitize knives before harvesting squash
- ◆ Squash and Zucchini need to be harvested from both side of the plant to avoid misses.
- ◆ Zucchini needs to be cut, and while summer squash can be cut, try to twist it off by hand without damaging the plant. The advantage of this is that viruses will not be transmitted between plants with the harvest knife.
- ◆ Protect the fruit from being damaged by the spines of the plant by wrapping your hand around the fruit and place it carefully in the bucket .
- ◆ When the bucket is full carefully put it next to the harvest lane.
- ◆ If the vines give you a rash, wear a long sleeved shirt.
- ◆ When all of the squash and zucchini are harvested pick up buckets with the harvest truck.
- ◆ Count into boxes in the barn.

### Washing Procedures

- ◆ Using adequate mulch like straw can keep the fruit clean so washing is not necessary. Squash is sorted and distributed in well lit packing shed. Many blemishes are discovered during this process.
- ◆ If washing is necessary, use a [rinse conveyor](#) washer. Make sure you use the appropriate pressure on the nozzles to avoid crop damage. Under no circumstance dunk squash in cold water as this can create cross-contamination of pathogens that are absorbed through the skin of the plant.

Packing in the field	fill bucket
Packing for delivery	40-60 pieces per 1 <sup>1</sup> / <sub>9</sub> box or half that amount when packed in a half bushel PLU zucchini 94067, yellow squash 94782, yellow crookneck 94784
Storage	Chilling injury is caused when summer squash is kept at temperatures below 41F for more than a day or two. For 1-2 weeks storage keep at 41-50°F at 95% humidity. Squash is low to moderately sensitive to ethylene exposure.

## Squash, Winter

All prices farmers reported receiving	Retail (Farmer's Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$2.00 to \$2.50 per lbs.	\$0.80 for Acorn and Butternut. \$0.95 for Delicata and Honey-nut \$0.65 for Spaghetti	\$1.40 to \$1.70 per lbs. depending on variety
Yield	3¼ lbs. per row foot at 23,400 lbs. per acre		
Standards	Harvesting: Including picking off the vine and filling up bulk-bin, 600 lbs. per person per hour @ approximately 40 hrs. per acre (not including transport)		
	Washing: 600 lbs. per person per hour		
Tools needed	¾ bushel green buckets, tractor with forklift, 20 bushel bins		

### Ready to Harvest Indicators and Quality

- ◆ Squash have full color. Green Acorn develops an orange ground spot. Kabocha should be harvested slightly on the green side as they continue to mature after harvest.
- ◆ Squash are mature, free of blemishes and black rot infestations (concentric circles on butternut).

### Harvest Procedures

- ◆ Harvest squash before nighttime temperatures drop into the 40's if possible, as these temperatures can cause chilling injury which accumulates over time.
- ◆ The harvest crew goes down the rows and pulls the squash off the vines. Cut stems on acorn and butternut very short so they do not puncture other squash in the bin.
- ◆ Each variety of squash is put in a windrow down the length of the bed (out of the vines so they are easy to see) OR can be placed directly in buckets.
- ◆ When there is a good amount of one variety harvested it is time to pick up the squash.
- ◆ One person rides in a bulk bin and another person hands them the squash until the bin is full enough for both people to bend and fill. Or carefully empty the buckets into the bulk bin.
- ◆ Each variety of squash should have its own bin.
- ◆ Butternut and buttercup squash needs to be cured in the greenhouse at 85 degrees for 7-10 days to be sweet tasting. Cover the greenhouse with 80% shade cloth. Other varieties do not need to be cured.

### Washing Procedures

- ◆ Wash squash in the conveyor washer just before delivery.
- ◆ Squash is sorted for quality and size .
- ◆ Put two fans blowing at high speed towards the pallets with washed squash for drying.
- ◆ Sweet dumpling, Delicata squash, Buttercup and Kabocha should be distributed first as they don't keep very long. Keep butternut for the last deliveries.

Packing in the field	fill buckets and place in 20-bushel bin
Packing for delivery	In 1 <sup>1</sup> / <sub>9</sub> bushel box 35 to 40 lbs. weight PLU's: Acorn 94750, Acorn Yellow 94751, Acorn white 94752, Acorn small 93143, Buttercup 94758, Butternut 94759, Carnival 93142, Sweet Dumpling 94764, Kabocha 94769, Red Kuri 94774, Spaghetti 94776
Storage	Do not store or expose winter squash below 50°F to avoid chilling injury. The best temperature for long term storage of Butternut squash is 59°F. <a href="#">Postharvest Factsheet Winter squash</a>

## Sweet Potatoes

All prices farmers reported receiving	Retail (Farmer's Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$2.00 to \$4.00 per lbs.	\$1.20 to \$1.50 per lbs.	\$1.75 to \$2.75 per lbs.
Yield	1.2 lbs. per row foot at 17,300 lbs. per acre		
Standards	Harvesting: 200 - 250 lbs. per hour per person @ approximately 100 hrs. per acre (not including transport)		
Tools needed	Buckets, bulk-bins, tractor with potato digger, tractor with forklift		

### Ready to Harvest Indicators and Quality

- ◆ Sweet potatoes need to be harvested before the soil temperature goes below 55°F. The vines may have to be mowed before or cut by hand and set aside before dug with a bedlifter or root digger. Sweet potatoes US grade 1 for wholesale are sized between 3 and 9 inches long whereby the tubers should have a minimum diameter of 1 ¼ inch and a maximum diameter of 3 inches. whereby the individual tuber cannot weigh more than 18 Oz. In North Carolina the correct harvest date is when most of the tubers have reached their optimum dimension for a high pack-out. In the northeast it greatly depends on the season and location when tubers reach their optimum size.
- ◆ All tubers harvested are free from defects.

### Harvest Procedures

- ◆ First mow the vines.
- ◆ For bulk harvest: Place about 30 buckets on the harvester. One person drives the tractor, 3-4 people sort out the good potatoes on the machine and place them on the outside chains. One or two people change the buckets on the back of the harvester. Bring the full buckets to the harvest lane. One person drives the tractor with a bulk bin down the harvest lane and carefully dumps the potatoes into the bin.
- ◆ Sweet potatoes are easily bruised so they need to be handled gently.
- ◆ Sweet potatoes need to be cured in the greenhouse or a curing chamber for ten days at 85° F. Cover the greenhouse with 80% shade cloth. Cover up the bins with tarps that can breathe (absolutely no plastic) to protect against sunscald.

### Washing Procedures

Cleaning in the field	Remove large chunks of dirt
Packing for delivery	Sort by size and pack in 40 lbs. boxes potatoes that well shaped, free from blemishes and internal breakdown. US Grade 1: minimum length 3½ by width 1¾ inches US grade 2: minimum length 3 by width 1½ inches PLU Orange Large 94817, PLU Orange small 94074, PLU large Red with white flesh 93334, PLU white 04091 <a href="#">Sweet Potatoes Visual</a>  For CSA pack in a 2-3 lbs. paper bag. 7- 8 bags per black box. 15 bags to small green box
Storage	55°F at 80% humidity. <a href="#">Postharvest Factsheet Sweet Potatoes</a>

## Tatsoi

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$8.00 to 10.00 per lbs.	\$3.50-\$4.50 per lbs.	\$5.00-\$7.00/lbs. (3lbs. box) \$10.00/lbs. in 8Oz. Clamshells
Yield	0.2 lbs. per row foot at 7500 lbs. per acre		
Standards	Harvesting: 40 lbs. per hour @ approximately 185 hrs. per acre (depending on health of crop)		
	Washing: 8-10 bins per hour		
Tools needed	Knives, regular 1½ bushel boxes		

### Ready to Harvest Indicators and Quality

- ◆ When Tatsoi is approx. 4 - 6 inches tall.
- ◆ Tatsoi should be dark green, free from holes and absent of yellow leaves.

### Harvest Procedures

- ◆ Harvest in the morning to avoid field heat accumulation
- ◆ One hand holds a small bunch of Tatsoi by the top of the leaves. The other hand cuts with knife in a smooth motion
- ◆ The excess yellow leaves and stems from previous cutting can be easily discarded by shaking bunch vigorously.
- ◆ Then the Tatsoi is placed in the box.
- ◆ Tatsoi can also be harvested as a head just as we harvest bok choy.

### Washing Procedures

- ◆ Dunk box into both washing tubs unless greens are very dirty, then dump into the first washing tub, repack and dunk bin into second tub with ice water.
- ◆ By going through the two tubs of cold water the greens stay fresher longer and are very clean.
- ◆ Do not leave greens for longer than 15 seconds in water.
- ◆ Leaves tend to get waterlogged after a few minutes, which makes them deteriorate faster.

Cleaning in the field	Stems or yellow leaves are removed
Packing in the field	N/A
Packing for delivery	3 lbs. per ½ bushel box
Storage	At 32°–42°F, 95 –98% humidity. Cover in closed containers or bags if stored for a few days.

## Tomatoes

All prices farmers reported receiving	Retail (Farmer's Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	Heirlooms: \$3.50 to \$7.00 per lbs. Beefsteak: \$2.00 to \$5.00 per lbs. Cherry: \$3.50 to \$7.00 per pint. Paste/Plum: \$1.00 to \$3.00 per lbs.	No good numbers available	No good numbers available
Yield	Early beefsteak (all sizes): 6 lbs. per row foot at 1800 lbs. per 100 foot caterpillar tunnel Cherry: 4 pints per row foot at 1200 pints per 100 foot caterpillar tunnel Heirlooms: 2.8 lbs. per row foot at 840 lbs. per 100 foot caterpillar tunnel Marketable Midseason Beefsteak: 6 lbs. per row foot at 1800 lbs. per 100 foot caterpillar tunnel Plum Tomatoes: 5 lbs. per row foot at 1500 lbs. per 100 foot caterpillar tunnel		
Value	<u>Farmers Market Prices:</u> Early Beefsteak: (@\$3.50 TO \$7.00 lbs.) \$6300.00 to \$9000 per 100 foot Caterpillar Tunnel (if harvested by July) Cherry: \$3600 to \$6,000 per 100 foot Caterpillar Tunnel Heirlooms: \$2940 to \$5880 per 100 foot Caterpillar Tunnel Midseason Beefsteak (@\$2.00-\$3.00 lbs.): \$3600 to \$5400 per 100 foot caterpillar Plum tomatoes: \$1500 to \$4500 per 100 foot caterpillar		
Standards	Harvesting: Early small Beefsteak in Quart baskets: 30 -40 quarts (60-80lbs) per person per hour, including sorting, and netting Large (5 by 6) Beefsteak: 200 lbs. per hour, including sorting and packing Cherry in pint baskets: 20 – 30 pints per hour, including sorting, and netting Heirloom: 80 -100 lbs. per hour, including sorting Plum: 100-200 lbs. per person per hour depending on size		
Tools needed	Buckets (Beefsteak, Smalls, and Plums) Tomato Trays (Heirloom varieties) Pick directly in pints for cherries in flat trays		

### Ready to Harvest Indicators and Quality

- ◆ Tomatoes are well-formed for type. “Marketable” size is dependent on market. Maturity is also dependent on how far removed you are from the end-buyer, and they will communicate how they want to receive them either Stage 1 mature-green, Stage 2 pink, or Stage 3 vine-ripe.
- ◆ Tomatoes have a uniform color throughout the fruit with absence of green shoulders or grey wall. Fruit is smooth with small blossom-end scar, and stem-end scar.
- ◆ Fruit shows absence of any growth cracks, cat-facing, zippering, sunscald, insect injury, insect frass or honeydew, and physical injury or bruises.
- ◆ Beefsteak tomato should yield to firm hand pressure. Soft and easily deformed tomatoes are overripe.
- ◆ Heirlooms are soft and tend to crack. Great care should be taken in handling the fruit.

**Harvest Procedures**

- ◆ Avoid harvesting when crop is wet either from rain or dew.
- ◆ Each person takes one side of a tomato row.
- ◆ Pick tomatoes into buckets or tomato trays (only use one-layer trays for heirloom tomatoes).
- ◆ For beefsteaks remove the green stems so that the tomatoes are not punctured and place them face down. Do not remove the stems from the heirloom tomatoes or cherries. Pick cherry tomatoes directly in pints or quarts.
- ◆ Heirloom and some beefsteak varieties are very soft and easy to damage. They must be harvested into one layer tomato trays placing each tomato carefully in a one layer tray.
- ◆ Mark where you stopped harvesting with a flag or other marker.

**Cleaning Procedures**

- ◆ When using adequate mulch like straw fruit stays clean making washing unnecessary. Washing decreases storage life and can introduce pathogens.
- ◆ Clean tomatoes by wiping them with a clean cloth.
- ◆ Tomatoes are sorted and distributed for size and quality in well-lit packing shed.
- ◆ If washing is necessary, use a conveyor brusher washer. Make sure tomatoes are dried after washing.

**Packing Procedures**

- ◆ For CSA and farmers market small beefsteak tomatoes are packed into quart baskets. Quarts should have rounded top and a possibly a net. Each Qt weighs approx. 0.8 lbs. per box.
- ◆ Cherry tomatoes are distributed in pint baskets. Fill to rounded top and possibly place a net on top to avoid spill.
- ◆ Large Beefsteak tomatoes are packed in tomato boxes. A five by 6 box implies that each layer in the box can accommodate five tomatoes on the short side and six tomatoes on the long side.
- ◆ Sort heirlooms by size into the one-layer tomato trays.
- ◆ Plum tomatoes are distributed by 20-25 lbs. boxes.

Cleaning in the field	Remove green tops off all the beefsteak tomatoes
Packing for delivery	Communicate with the buyer (or listen to your customers) on the maturity desired (stage 1 mature green, Stage 2 pink, and Stage 3 ripe) and how to pack. PLU beefsteak 93061, small beefsteak (6 by 6 -referring to how many fit in one layer of the box- and smaller) 94063, large beefsteak (5 by 6 and larger) 94064, cherry red 94796, plum red 94087, many other PLUs for tomatoes as there are many different varieties available.
Storage	Tomatoes are sensitive for chilling injury when held for longer than 2 weeks below 50°F or longer than a week at 41°F. Ideal storage temperature for ripe tomatoes is 50°F at 90-95% humidity. Light red tomatoes are best kept at 55°F and mature green at 60°F. A faster ripening can be accomplished by keeping the tomatoes at temperatures as high as 75°F. Tomatoes are sensitive to ethylene which also allows them to ripen <a href="#">Postharvest Factsheet Tomatoes.</a>

## Turnips

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$2.00 to \$3.50 per bunch. Or \$2.00 a lbs.	Hakurei \$1.60 to \$2.00 per bunch. Scarlet turnips \$0.75-\$1.00 per lbs.	\$2.66 per bunch \$1.36-\$1.75 per lbs.
Yield	1/2 bunch per foot at 10,800 bunches to the acre		
Value	\$17,280 to \$37,800 per acre		
Standards	Harvesting: 30-50 bunches per hour per person depending on quality of the leaves @ approximately 270 hrs. per acre		
	Washing: 100 bunches per hour.		
Tools needed	twisties, regular 1½ bushel boxes		

### Ready to Harvest Indicators and Quality

- ◆ Turnips 2- 3 inches in width with healthy tops
- ◆ Turnips are white without cracks or eating damage by root maggot. Leaves are light to dark green with no yellowing or necrosis or aphids.

### Harvest Procedures

- ◆ Select the larger (at least the size of a quarter) turnips out of rows, clean off the dead leaves, and put 4-6 turnips per bunch. Hold the twistie tightly next to the stems and twist the bunch. Make sure to bunch tight enough to keep the turnips together during washing.
- ◆ All bunches should be uniform in size. Bunches are left in the wheel-track, to be picked up and boxed periodically to avoid over-harvesting. Pack the turnips, root to root to keep the leaves clean.
- ◆ Don’t bunch and count at the same time as this can cause mistakes in counting.

### Washing Procedures

- ◆ Use the [bunch washer](#) or [mesh table](#) to wash the turnips. Be careful to keep nozzle away from leaves as they are very tender. Alternatively, use a [rinse conveyor](#) washer. Make sure you use the appropriate pressure on the nozzles to avoid leaf damage.

Cleaning in the field	Remove dead and yellow leaves from the bunch
Packing in the field	15 bunches per regular (1½ bushel) green box. Pack roots at just one side of the box so greens do not get muddy.
Packing for delivery	15 bunches per regular 1½ bushel box, pack in rows of five. Pack tightly, root to leaf PLU turnips is 94619
Storage	At 32° – 41° F, 95 -100% humidity. Pack with ice in closed containers for storage longer than a few days.

## Watermelon

All prices farmers reported receiving	Retail (Farmer’s Market, CSA)	Wholesale (Distributor)	Specialty Wholesale (Restaurant, Co-op, Etc)
Value	\$0.75 to \$1.00 per lbs.	No numbers available	\$0.60 to \$0.80 per lbs.
Yield	0.8 melon per row foot at 5760 melons per acre		
Standards	Harvesting: 50 - 75 melons per hour per person depending on quality of the crop @ approximately 80- 100 hrs. per acre.		
	Washing: not necessary when mulched is used in between plastic.		
Tools needed	20 bushel bins or Large green 1¾ bushel boxes		

### Ready to Harvest Indicators and Quality

- ◆ Watermelons are ready to harvest when at least two out three symptoms occur:
  1. Melons have a yellow coloration on the side not exposed to the sun
  2. Melons sound hollow (the “poink”) sound
  3. Tendril closest to the melon is shriveled up (depending on variety)
- ◆ Watermelons should:
  1. Be symmetrical and uniform in appearance
  2. The surface should be waxy and bright in appearance
  3. Absence of scars, sunburn, transit abrasions or other surface defects or dirt, with no evidence of bruising
  4. Appearing to be heavy for size

### Harvest Procedures

- ◆ 1 or 2 people stand on harvest wagon and the others each take a row of melons.
- ◆ After a picker harvests a melon, they toss the melon to one of the people on the truck. Make sure you have eye contact with the catcher before you toss the melon underhanded.
- ◆ Move the harvest wagon down the harvest lane as you pick.

### Washing Procedures

- ◆ Using adequate mulch like straw can keep the fruit clean so washing is not necessary. Watermelons are sorted and distributed in we lit packing shed. Many blemishes are discovered during this process.
- ◆ If washing is necessary, use a [rinse conveyor](#) washer. Make sure you use the appropriate pressure on the nozzles to avoid crop damage. Under no circumstance dunk melons in cold water as this can create cross-contamination of pathogens that can be absorbed through the skin of the fruit.

Cleaning in the field	Brush off any soil or straw mulch
Packing in the field	If possible sort by size in either large boxes or squash bins. Do a quick field inspection for any defect before placing them in the bin
Packing for delivery	sort by size and quality, PLU regular watermelon 94031, seedless watermelon 94032
Storage	At 45° – 59° F, 85-90% humidity, except for Honeydew melons at 50° –54°F. Chilling injury will occur when stored below 45° for several days. Melons are sensitive to ethylene and good fresh air intake of cooler is necessary <a href="#">Watermelon Postharvest Factsheet</a>