

# Use Every Opportunity: Season Extension and Succession Planting

© Pam Dawling 2022. Twin Oaks Community, Central Virginia (zone 7a)  
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[SustainableMarketFarming.com](http://SustainableMarketFarming.com)

## Season Extension in Hot Weather

- Use heat-tolerant crops and varieties, younger and smaller transplants. Sow and transplant in the evening.
- Use netting against bugs, shade cloth
- Use a soil thermometer and tables of days to germination at various temperatures.
- Soak seeds. Sow indoors in a cool place, or outdoors with shade cloth, after cooling soil. Put ice on newly seeded rows.
- Water much more in hot weather.

## Year-round lettuce

The short version is that we sow twice in January, twice in February, every 10 days in March, every 9 days in April, every 8 days in May, every 6-7 days in June and July, every 5 days in early August, moving to every 3 days in late August,

September sowings are for growing under protection only. If you do have coldframes, hoophouses, greenhouses, sow cold-hardy varieties every 2 days until Sept 21, then every 3 days until the end of September.

Or overwinter lettuce outdoors with hoops and rowcover. Aim to have plants half-grown by the time the very cold weather hits. Try a few different sowing dates, as the weather isn't very predictable. For us, Sept 10-18 are the best dates

## Hot weather lettuce sowing

- Lettuce likes 40°F–80°F (4°C–27°C).
- Optimum 75°F (24°C) (germinates in only 2 days).
- Max germination temperature is 85°F (29°C).
- Sow late afternoon or at nightfall - better emergence than morning sowings. After sowing, cover the seeds with soil, ice and shade cloth.

## Winter Kill Temperatures of Cold-Hardy Vegetables 2021 revision

- Unless otherwise stated, these are killing temperatures of crops *outdoors without any rowcover*. All greens do a lot better with protection against cold drying winds. Note that repeated cold temperatures can kill crops that can survive a single dip to a low temperature, and that cold winds, or cold wet weather can destroy plants quicker than simple cold. Crops get more damage when the weather switches suddenly from warm to cold. If the temperature drops 5 or more Fahrenheit degrees (about 3 C degrees) from recent temperatures, there can be cold damage. The forecaster in Raleigh, NC says it needs 3 hours at the critical temperature to do damage. Your experience with your soils, microclimates, and rain levels may lead you to use different temperatures in your planning.
- **35°F (2°C):** Basil.
- **32°F (0°C):** Bush beans, cauliflower curds, corn, cowpeas, cucumbers, eggplant, limas, melons, okra, some pak choy, peanuts, peppers, vines of potatoes, squash and sweet potato, tomatoes.
- **27°F (-3°C):** Many cabbage varieties, *Sugarloaf* chicory (takes only light frosts).
- **25°F (-4°C):** Some cabbage, chervil, Belgian Witloof chicory roots for chicons, and hearts, Chinese Napa cabbage (*Blues*), dill (*Fernleaf*), some fava beans (*Windsor*), annual fennel, some mustards (*Red Giant*, *Southern*

*Curled*) and Asian greens (*Maruba Santoh*, *mizuna*, most *pak choy*, *Tokyo Bekana*), onion scallions (some are much more hardy), radicchio, rhubarb stems and leaves.

- **22°F (-6°C):** Some arugula (some varieties are hardier), *Bright Lights* chard, endive (Escarole may be a little more frost-hardy than Frisée), large leaves of lettuce (protected hearts and small plants will survive colder temperatures).
- **20°F (-7°C):** Some beets (*Bulls Blood*, *Chioggia*), broccoli heads (maybe OK to 15°F (-9.5°C)), some Brussels sprouts, some cabbages (the insides may still be good even if the outer leaves are damaged), some cauliflower varieties, celeriac, celtuce (stem lettuce), some collards (*Georgia Cabbage Collards*, variegated collards), some head lettuce, some mustards/Asian greens (*Tendergreen*, *Tyfon Holland* greens), flat leaf parsley, radicchio (both Treviso and Chioggia), radishes (*Cherry Belle*), most turnips (*Noir d'Hiver* is the most cold-tolerant variety).
- Large oat plants will get serious cold damage. Oats seedlings die at 17°F (-8°C)
- Canadian (spring) field peas are hardy to 10-20°F (-12 to -7°C).
- **15°F (-9.5°C):** Some beets (*Albina Verduna*, *Lutz Winterkeeper*), beet leaves, some broccoli and cauliflower leaves, some cabbage (*Kaitlin*, *Tribute*), covered celery (*Ventura*), red chard, cilantro, fava beans (*Aquadulce Claudia*), *Red Russian* and *White Russian* kales, kohlrabi, some lettuce, especially medium-sized plants with 4-10 leaves (*Marvel of Four Seasons*, *Olga*, *Rouge d'hiver*, *Tango*, *Winter Density*), curly leaf parsley, rutabagas (*American Purple Top Yellow*, *Laurentian*), broad leaf sorrel, most covered turnips, winter cress.
- **12°F (-11°C):** Some beets (*Cylindra*), some broccoli perhaps, some Brussels sprouts, some cabbage (*January King*, Savoy types), carrots (*Danvers*, *Oxheart*), most collards, some fava beans (mostly cover crop varieties), garlic tops if fairly large, *Koji* greens, most fall or summer varieties of leeks (*Lincoln*, *King Richard*), large tops of potato onions, covered rutabagas, some turnips (*Purple Top*).
- **10°F (-12°C):** Covered beets, *Purple Sprouting* broccoli for spring harvest, a few cabbages (*Deadon*), chard (green chard is hardier than multi-colored types), some collards (*Morris Heading* can survive at least one night at 10°F), *Belle Isle* upland cress, some endive (*Perfect*, *President*), young *Bronze fennel*, *Blue Ridge* kale, probably *Komatsuna*, some leeks (*American Flag* (*Broad London*), *Jaune du Poiteau*), some covered lettuce (*Pirat*, *Red Salad Bowl*, *Salad Bowl*, *Sylvesta*, *Winter Marvel*), *Chinese Thick-Stem Mustard* may survive down to 6°F (-14°C), covered winter radish (*Daikon*, *China Rose*, *Shunkyo Semi-Long* survive 10°F/-12°C), *Senposai* leaves (the core of the plant may survive 8°F/-13°C), large leaves of savoyed spinach (more hardy than smooth-leafed varieties), *Tatsoi*, *Yukina Savoy*.
- Oats cover crop of a medium size die around 10°F (-12°C). Large oat plants will die completely at 6°F (-17°C) or even milder.
- **5°F (-15°C):** Garlic tops even if small, some kale (*Winterbor*, *Westland Winter*), some leeks (*Bulgarian Giant*, *Laura*), some bulb onions, potato onions and other multiplier onions, smaller leaves of savoy spinach and broad leaf sorrel. Many of the Even' Star Ice Bred greens varieties and the *Ice-Bred White Egg turnip* are hardy down to 6°F (-14°C), a few unprotected lettuces if small (*Winter Marvel*, *Tango*, *North Pole*, *Green Forest*).
- **0°F (-18°C):** Chives, some collards (*Blue Max*, *Winner*, *McCormack's Green Glaze*), corn salad (*mâche*), garlic, horseradish, Jerusalem artichokes, Even' Star *Ice-Bred Smooth Leaf* kale, a few leeks (*Alaska*, *Durabel*, *Tadorna*); some bulb onions, yellow potato onions, some onion scallions, (*Evergreen Winter Hardy White*, *White Lisbon*), parsnips (probably even colder), salad burnet, salsify (?), some spinach (*Bloomsdale Savoy*, *Long Standing Bloomsdale*, *Olympia*). *Walla Walla* onions sown in late summer are said to be hardy down to -10°F (-23°C), but I don't trust below 0°F (-18°C)
- Crimson clover is hardy down to 0°F (-18°C) or perhaps as cold as **-10°F (-23°C)**
- **-5°F (-19°C):** Leaves of overwintering varieties of cauliflower, *Vates* kale survives although some leaves may be too damaged to use. *Lacinato Rainbow Mix* kale may survive this temperature.
- **-10°F (-23°C)** Austrian Winter Field Peas and Crimson clover (used as cover crops).
- **-15°F (-26°C)** Hairy vetch cover crop – some say down to -30°F (-34°C)
- **-20°F (-29°C)** Dutch White clover cover crops – or even -30°F (-34°C)
- **-30°F to -40°F (-34°C to -40°C):** Narrow leaf sorrel, Claytonia and some cabbage are said to be hardy in zone 3. I have no personal experience of this.
- **-40°F (-40°C)** Winter wheat and winter rye (cover crops).

### Hoophouse Notes

- **In a double-layer hoophouse** (8F/5C warmer than outside on winter nights) **plants can survive 14F/8C colder** than they can outside, without extra rowcover; **with thick rowcover** (1.25oz Typar/Xavan) at least **21F/12C colder** than outside without.
- For example, salad greens in our hoophouse in zone 7a survive nights with outdoor lows of 14°F (-10°C). Russian kales, lettuce, mizuna, senposai, spinach, tatsoi, turnips, Yukina Savoy survived a *hoophouse* temperature of 10.4°F (-12°C) without rowcover, -2.2°F (-19°C) with. *Bright Lights* chard got frozen leaf stems. Outdoor temperatures fell to -12°F (-24°C)!
- **Lettuce varieties for a solar-heated winter greenhouse** or hoophouse in zone 7a: (hardest are in bold) **Buckley**, *Ezrilla*, **Green Forest**, *Green Star*, *Hampton*, *Marvel of Four Seasons*, *Merlot*, *New Red Fire*, *Oscarde*, *Red Salad Bowl*, **Red Tinged Winter**, **Revolution**, **Rouge d'Hiver**, *Salad Bowl*, **Tango**, **Winter Marvel**.
- **Cold-tolerant early spring lettuces** include *Buckley*, *Crawford*, *Green Forest*, *Hampton*, *Merlot*, *New Red Fire*, *Revolution*, *Simpson Elite*, *Susan's Red Bibb* and *Swordleaf*.

### Three Ranges of Cold Hardy Crops

- **Crops to keep alive in the ground into winter to 22°-15°F (-6°C to -9°C), then harvest.**
- Store: Beets, cabbage, carrots, celeriac, kohlrabi, winter radish (including daikon), rutabagas, turnips,
- Use: Asian greens, broccoli, cabbage, chard, lettuce, radishes
- **Hardy crops to store in the ground and harvest during the winter.** In zone 7, they need to be hardy to 0°-10°F (-17.8°C to -12.3°C): Collards, horseradish, Jerusalem artichokes, kale, leeks, parsnips, scallions, spinach
- **Overwinter crops for spring harvests before the main season:** Cabbage, carrots, chard, collards, garlic and garlic scallions, kale, multiplier onions (potato onions), scallions, spinach

### Cool Weather Spring/Fall Crops

Use fall as well as spring to grow beets, carrots, chard, spinach, Asian greens, cauliflower, turnips, rutabagas, cabbage, broccoli, kale, collards, kohlrabi, lettuce, salad mix, radishes (large and small), scallions.

### Lettuce Varieties for every time of year

We have 5 lettuce seasons, and we always sow 4 diverse varieties:

- Early Spring (Jan – Feb), 3 sowings. Priorities: cold tolerance, fast growth
- Spring (March – April 22), 5 sowings. Priorities: some cold tolerances, some warmth tolerance
- Summer (April 23 – Aug 14), 20 sowings (lots of seed!). Priority: Extreme heat tolerance/bolt-resistance
- Fall (Aug 15 – Sept 7), 9 sowings. Priorities: Some warmth-tolerance, some cold tolerance
- Winter (Sept 8 – 27), 9 sowings. Priority: Cold-tolerance

**The formula for frost tender crops** - how many days to count back from the expected first frost date:

- add together the number of days from seeding to harvest, (that is, the days to maturity)
- the average length of the harvest period, (the length you'll be satisfied with)
- 14 days to allow for the slowing rate of growth in the fall, (for warm weather crops)
- and 14 days to allow for an early frost.
- But using rowcover to throw over the last planting during cold spells, the growing season is effectively 2 weeks longer and there is no need to allow 14 days for an early frost, so the growing season is 28 days longer.

### Four Sets of Storage Conditions

By providing storage spaces with these 4 types of conditions, 25 crops can be stored

In my chart below, the Summary column indicates the general conditions needed for each crop, and allocates each crop to one of 4 groups. See the key below the chart, for the summary column.

Storage Crop	°F	°C	% Humidity	Need for Ventilation	Summary		Storage Life in months	Notes
Apples	30 – 40	–1–4	90–95	Low	Cool, Fairly Moist	B	2–7	
Beets	33 – 40	1–4	95–100	Low	Cold and Moist	A	4–6	Perforated plastic bag in cellar. Short-term inground. Clamp. Temperatures above 45°F (7°C) cause sprouting.
Cabbage	32 – 34	0–1	90–95	Low	Cool and Fairly Moist	B	5–6	Net bag in cellar. Or dig up and hang upside down. Short-term inground. Clamp. Light reduces yellowing and weight loss.
Carrots	32 – 41	0–5	90–95	Medium	Cold and Moist	A	7–9	Perforated plastic bag in cellar. Inground. Clamp. Temperatures above 45°F (7°C) cause sprouting.
Celeriac	32 – 40	0–4	97–98	Medium	Cold and Moist	A	4–8	Well-perforated plastic bag in cellar. Short-term inground. Temperatures above 45°F (7°C) cause sprouting.
Celery	32	0	95–100	Medium	Cold and Moist	A	1–3	Can dig up and replant in buckets in cellar.
Chinese cabbage	32 – 41	0–5	99–100	Medium	Cold and Moist	A	1–3	Perforated plastic bag, or dig up and replant in buckets in cellar
Daikon radish	32 – 34	0–1	95–100	Low	Cold and Moist	A	4	Perforated plastic bag in cellar. Clamp. Temperatures above 45°F (7°C) cause sprouting.
Garlic	32 – 38 or 65 – 86	0–3 or 18–30	60–70	Low above 50°F (10°C)	Cool and Dry. Or Warm and Dry	C D	6–7. 1–3 months at warm temps	Net bag. Keep warm or keep cold.. Never 40°F–56°F (4°C–13°C), or they will sprout. Never warm after cold either.
Ginger root	54 – 57	12–14	85–90	Low	Warm and Fairly Moist	D	4–6	If stored with other warm-storage crops, will need extra humidifying.
Horseradish	30 – 32	–1–0	90–100	Low	Cold and Moist	A	10–12	Perforated plastic bag or plastic bucket, no lid, in cellar. Inground. Clamp. Temperatures above 45°F (7°C) cause sprouting.
Jerusalem artichoke	32 – 34	0–2	90–95	Low	Cold and (Fairly) Moist	A	4–10	Paper or plastic bag in cellar. Inground. Clamp.

Kohlrabi	32	0	95–100	Medium	Cold and Moist	A	2–3	Perforated plastic bag in cellar. Clamp.
Leeks	32	0	95–100	Medium	Cold and Moist	A	3	Perforated plastic bag, or plastic bucket with small amount of water, or dig up and replant in buckets in cellar. Inground.
Onions (bulbs)	32 – 40 or 60 – 90	0–4 or 16–32	60–70	Low	Cool and Dry. Or Warm and Dry	C D	1–8	Net bag. Keep warm or keep cold.. Never 45°F–55°F (7°C –13°C), or they will sprout. Never warm after cold
Parsnips	32 – 34	0–1	95–100	Medium	Cold and Moist	A	6	Perforated plastic bag in cellar. Inground. Clamp. Temperatures above 45°F (7°C) cause sprouting.
Pears	29 – 31	– 1.5 to – 0.5	90–95	Low	Cool and Fairly Moist	B	2–8	Open trays. Temperature requirements vary with variety, and are critical.
Potatoes	40 – 45	4–7	90–95	Low	Cool and Fairly Moist	B	5–10	Plastic or wood crates, paper bags in cellar. Protect from light. Below 40°F (4°C) the flavor deteriorates.
Radish, winter	32	0	95–100	Low	Cold and Moist	A	4	Perforated plastic bag in cellar. Clamp. Temperatures above 45°F (7°C) cause sprouting.
Rutabagas	32	0	95–100	Low	Cold and Moist	A	4–6	Perforated plastic bag in cellar. Inground. Clamp. Wax unnecessary. Temperatures above 45°F (7°C) cause sprouting.
Salsify	32	0	95–98	Low	Cold and Moist	A	2–4	Can dig up and replant in buckets in cellar. Clamp. Temperatures above 45°F (7°C) cause sprouting.
Squash, winter	50 – 60	10–15	50–75	Med	Warm and Dry	D	2–12	Storage life varies widely with variety.
Sweet potatoes	55 – 65	13–18	70–80	Low after curing	Warm but not too Dry	D	4–10	Never below 50°F (10°C). Ideal temperature 55°F–59°F (13°C–15°C). Temps above 65°F (18°C) hasten sprouting.
Tomatoes, ripening green	55 – 70	13–21	75–85	Low	Warm but not too Dry	D	1–3	Egg trays, apple trays
Turnips	32	0	90–95	Low	Cold and Moist	A	4–5	Perforated plastic bag in cellar. Inground. Clamp. Temperatures above 45°F (7°C) cause sprouting.

**A= Cold and Moist:** 32°F–40°F (0°C–5°C), 80–95% humidity: refrigerator or winter root cellar conditions. Most roots, greens, leeks

**B= Cool and Fairly Moist:** 40°F–50°F (5°C–10°C), 85–90% humidity: root cellar. Potatoes

**C= Cool and Dry:** 32°F–50°F (0°C–10°C), 60–70% humidity: cooler basements and barns. Garlic and onions

**D= Warm and Fairly Moist:** 50°F–60°F (10°C–15°C), 60–70% humidity: basements. Sweet potatoes, winter squash.

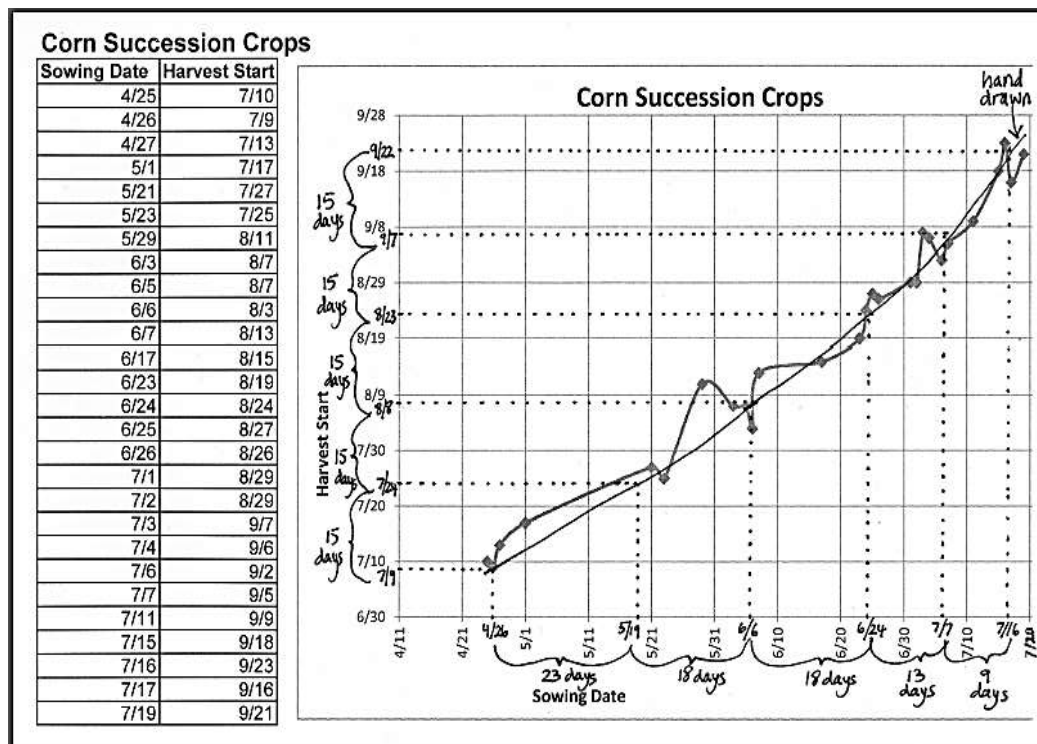
**Succession planting for continuous vegetable harvests Avoid gluts and shortages.**

**Summer crops such as beans, squash, cucumbers and sweet corn; year-round lettuce, winter hoophouse greens and radishes.**

- As temperatures and day-length **decrease** in the fall, the time to maturity lengthens – a day late in sowing can lead to a week's delay in harvesting.
- After the Winter Solstice, as day-length and then temperatures **increase**, the time to maturity shortens. Later sowings catch up.
- To get **harvests** starting an equal number of days apart, vary the interval between one **sowing** date and the next accordingly

**Succession Planting: Make a Graph - 6 Steps (see corn graph)**

1. Gather sowing and harvest start and end dates (thus, the number of productive days of the planting), for each planting of each crop you want continuous harvests of.
2. Make a graph for each crop: sowing date along the horizontal (x) axis; harvest start date along the vertical (y) axis. Mark in all your data, even if only one year's worth. Smooth the graph line (more likely typical reality).
3. Mark the first possible sowing date and the harvest start date for that.
4. Decide the last *worthwhile* harvest start date of the season, mark that.
5. Use the harvest end dates to calculate how long a patch lasts for you. Divide the harvest period into a whole number of equal segments, of that length. Mark in your harvest start dates.
6. See the sowing dates needed to match those harvest start dates



## Hoophouse Succession Planting

Crop		Planting Dates	Harvest Dates	Notes
Chard	#1	transplanted Oct 15	Dec 11–April 9	
	#2	sown Oct 26	March 6–April 9	
Lettuce mix	#1	sown Oct 24	Dec 11–Feb 21	
	#2	sown Feb 1	March 20–April 20	3 cuts if we're lucky
Lettuce heads		until October	November to February	Harvest leaves from the mature plants
			Dec 6–March 31	Cut the heads
Mizuna	#1	transplanted Oct 24	Nov 1–Jan 25	
	#2	sown Nov 10	Jan 27–March 6	
Onions (bulbing)	#1	sown Nov 10		Transplanted outdoors as early as possible in March
	#2	sown Nov 22		
	#3 backup	sown Dec 6		
Radish	#1	sown Sept 6	Oct 1–Nov 15	
	#2	sown Oct 22	Nov 25–Jan 29	
	#3	sown Nov 27	Feb 12–March 13	
	#4	sown Dec 27	March 2–April 1	
	#5	sown Jan 27	April 2–April 15	
Scallions	#1	sown Sept 6	Dec 25–March 20	
	#2	sown Nov 13	March 19–May 15	Following radish #1
Spinach	#1	sown Sept 6	Oct 30–April 9	Sprouted seeds sown
	#2	sown Oct 24	Nov 20–May 7	
	#3	sown Nov 10	All these later sowings are harvested until May 7	We keep planting to fill gaps and pulling up finished plants
	#4	sown Dec 27		
	#5	sown Jan 17		
	#6	sown Jan 24	Until mid-May	To transplant outdoors in February
Tatsoi	#1	sown Sept 7	Oct 30–Dec 28	
	#2	sown Nov 15	Feb 15–Feb 28	
Turnips	#1	sown Oct 15	Dec 4–Feb 20	
	#2	sown Nov 10	Feb 25–March 10	Thinnings Jan 11
	#3	sown Dec 10	March 5–March 20	Only worthwhile if thinned promptly and eaten small. Greens are a very sweet and beautiful hoophouse crop
Yukina Savoy	#1	transplanted Oct 10	Dec 30–Jan 22	
	#2	sown Oct 24	until Jan 29	Only one week extra

### Resources – General (Nov 2021)

- ❑ ATTRA [attra.ncat.org/](http://attra.ncat.org/) *Season Extension Techniques for Market Farmers*, etc.
- ❑ SARE [www.sare.org/](http://www.sare.org/) A searchable database of research findings. See *Season Extension Topic Room*
- ❑ [articles.extension.org/organic\\_production](http://articles.extension.org/organic_production) and [eorganic.info](http://eorganic.info) Publications, webinars, videos, trainings and support.
- ❑ *Growing Small Farms*: [growingsmallfarms.ces.ncsu.edu/](http://growingsmallfarms.ces.ncsu.edu/) Farmer Resources.
- ❑ Jean-Paul Courtens, Roxbury Farm <https://www.roxburyfarm.com/roxbury-agriculture-institute-at-philip-farm> *Whole Farm Approach; Biodynamic Practices; Harvest Manual; Crop Manual; Soil Fertility Practices; 100 Member CSA plans; CSA Share List, Greenhouse Plan, Field Plan.*
- ❑ <https://weatherspark.com/> Weather records for your area. Fun!
- ❑ Soil temperatures [www.greencastonline.com/tools/soil-temperature](http://www.greencastonline.com/tools/soil-temperature)

### Resources – Books

(I have reviewed some of these books on my blog at [www.sustainablemarketfarming.com](http://www.sustainablemarketfarming.com))

- ❑ *The Market Gardener*, Jean-Martin Fortier, New Society Publishers
- ❑ *The Complete Know and Grow Vegetables*, JKA Bleasdale, PJ Salter et al. (Buy used)
- ❑ *Knott's Handbook for Vegetable Growers*, Maynard and Hochmuth. The 2006 5<sup>th</sup> edition is online <https://onlinelibrary.wiley.com/doi/book/10.1002/9780470121474>
- ❑ *The New Organic Grower and The Winter Harvest Manual*, Eliot Coleman
- ❑ *Solar Gardening: Growing Vegetables Year-Round the American Intensive Way*, Leandre Poisson, Gretchen Poisson and Robin Wimbiscus, 1994
- ❑ *The Urban Farmer*, Curtis Stone, New Society Publishers
- ❑ *High-Yield Vegetable Gardening*, Colin McCrate and Brad Halm, Storey Pub
- ❑ *How to Grow More Vegetables*, John Jeavons 8th edition 2012
- ❑ *Gardening When it Counts*, Steve Solomon, New Society Publishers
- ❑ *The Lean Farm, How to Minimize Waste, Increase Efficiency, and Maximize Value and Profits with Less Work and The Lean Farm Guide* Ben Hartman,
- ❑ *Wholesale Success*, Atina Diffley, Jim Slama. Online <https://static1.squarespace.com/static/5a6b36f28fd4d259ba4fae16/t/5a7e00cc71c10b2ebf7df534/1518207192816/Wholesale-Success-Manual.pdf>
- ❑ *The Organic Farmer's Business Handbook*, Richard Wiswall, Chelsea Green
- ❑ *Sustainable Vegetable Production from Start-up to Market*, Vern Grubinger,
- ❑ *Market Farming Success: The Business of Growing and Selling Local Food*, Lynn Byczynski
- ❑ *The New Seed Starter's Handbook*, Nancy Bubel, 1988, Rodale Books
- ❑ *Root Cellaring*, Nancy and Mike Bubel (for construction details and advice)
- ❑ *The Vegetable Growers Handbook*, Frank Tozer, 2008, Green Man Publishing
- ❑ *Nature and Properties of Soils, fourteenth edition*. Nyle Brady and Ray Weil
- ❑ *Garden Insects of North America*, Whitney Cranshaw

### Resources – Planning

- ❑ *Crop Planning for Organic Vegetable Growers*, Daniel Brisebois and Frédéric Thériault <https://cog-shop.myshopify.com/products/crop-planning-for-vegetable-growers>
- ❑ AgSquared online planning software: <https://www.agsquared.com/>
- ❑ COG-Pro record-keeping software for Certified Organic Farms: <https://cog-pro.com/>
- ❑ *SARE Crop Rotations on Organic Farms, A Planning Manual*, Charles Mohler, Sue Ellen Johnson, editors
- ❑ *Johnny's Planning Tools and Calculators* <http://www.johnnyseeds.com/growers-library/online-tools-calculators.html>
- ❑ Mark Cain <http://drippingspringsgarden.com/> under the CSA tab, Harvest Schedule.
- ❑ *Crop Yield Verification*, two charts, one of organic crops from *The Owner-Built Homestead* by Ken & Barbara Kern, one from California. <http://gardensofeden.org/04%20Crop%20Yield%20Verification.htm>
- ❑ *Determining Prices for CSA Share Boxes* Iowa State U Ag Decision Maker <https://www.extension.iastate.edu/agdm/wholefarm/pdf/c5-19.pdf>
- ❑ New England Vegetable Management Guide *Crop Budgets* <http://nevegetable.org/cultural-practices/crop-budgets>
- ❑ *Johnny's Planning Tools and Calculators* <https://www.johnnyseeds.com/growers-library/online-tools-calculators.html>

### Resources – Season Extension

- ❑ *Extending the Season: Six Strategies for Improving Cash Flow Year-Round on the Market Farm* a free e-book from *Growing for Market* magazine. <https://www.growingformarket.com/downloads/20141029>
- ❑ *Fall and Winter Gardening Quick Reference*, Southern Exposure Seed Exchange, <https://www.southernexposure.com/growing-guides/fall-winter-quick-guide.pdf>
- ❑ *Johnny's Growers' Library, Vegetable Library, Winter Growing Guide* <https://www.johnnyseeds.com/growers-library/vegetables/winter-growing-guide-high-tunnel-scheduling.html>. A multi-section guide. [Winter-Harvest Crops](#) and [Overwintered Crops](#)
- ❑ Charles Vavrina's research on transplants <https://www.researchgate.net/scientific-contributions/C-S-Vavrina-2021740147>. Example: *Transplant Age in Vegetable Crops*, Charles Vavrina [https://swfrec.ifas.ufl.edu/docs/pdf/veg-hort/transplant/trans\\_age.pdf](https://swfrec.ifas.ufl.edu/docs/pdf/veg-hort/transplant/trans_age.pdf)



### Resources – Asian Greens

- ❑ *Grow Your Own Chinese Vegetables*, Geri Harrington, 1984, Garden Way Publishing. Includes the names for these crops in different cultures.
- ❑ *Growing Unusual Vegetables*, Simon Hickmott, 2006, Eco-Logic books, UK.
- ❑ *Oriental Vegetables: The Complete Guide for the Garden and Kitchen*, Joy Larkham, revised edition 2008,
- ❑ *Asian Vegetables*, Sally Cunningham, Chelsea Green
- ❑ *The Chinese Kitchen Garden*, Wendy Kiang-Spray, 2017, Workman Publishing
- ❑ Kitazawa Seeds [kitazawaseed.com/](http://kitazawaseed.com/) & [Evergreen Seeds](http://EvergreenSeeds.com) have the most choices.  
<https://www.evergreenseeds.com/chinese-vegetables/>
- ❑ Fedco Seeds [fedcoseeds.com/](http://fedcoseeds.com/) and Johnny's [johnnyseeds.com/](http://johnnyseeds.com/) have a good range.
- ❑ Wild Garden Seed has many interesting home-bred varieties. Search under Mustard. [wildgardenseed.com](http://wildgardenseed.com)
- ❑ ATTRA Cole Crops and Other Brassicas: Organic Production <https://attra.ncat.org/product/cole-crops-and-other-brassicas-organic-production/>

### Resources – Hoophouses and Greenhouses

- ❑ HighTunnels.org: <https://www.facebook.com/hightunnels/>
- ❑ *High Tunnels: Using Low Cost Technology to Increase Yields, Improve Quality, and Extend the Growing Season* by Ted Blomgren, Tracy Frisch and Steve Moore. University of Vermont Center for Sustainable Agriculture.  
<https://www.sare.org/resources/high-tunnels/>
- ❑ *High Tunnel Winter Cropping Systems*, Lewis Jett, SARE. Slideshow and audio.  
<https://northeast.sare.org/resources/high-tunnel-winter-cropping-systems/>
- ❑ *Greenhouse and Hoophouse Grower's Handbook – Organic Vegetable Production Using Protected Culture*, Andrew Mefferd, Chelsea Green <https://www.growingformarket.com/store/products/182>
- ❑ *The Chinese Greenhouse: Design and Build a Low-Cost, Passive Solar Greenhouse*, Dan Chiras, New Society Publishers. Solar-heated, earth-sheltered, well-insulated, plastic-glazed structures, making it possible to grow warm weather crops in winter.
- ❑ Penn State High Tunnel Production Manual, William Lamont, \$25 <https://extension.psu.edu/high-tunnel-manual>
- ❑ *The Hoophouse Handbook Revised and Expanded*, 2<sup>nd</sup> edition, Lynn Byczynski by Growing for Market:  
<https://www.growingformarket.com/store/products/165>
- ❑ U of MN High Tunnel Production Manual <http://www.extension.umn.edu/garden/fruit-vegetable/#high-tunnel> or  
<https://hdl.handle.net/11299/197952>
- ❑ U of MN Deep Winter Greenhouse <https://extension.umn.edu/growing-systems/deep-winter-greenhouses>
- ❑ U of MN Cold-Climate Greenhouse Resource <http://www.cura.umn.edu/publications/catalog/cap-186> or  
<https://conservancy.umn.edu/handle/11299/195528>
- ❑ *The Northlands Winter Greenhouse Manual*, Carol Ford & Chuck Waibe  
<https://mosesorganic.net/?product=northlands-winter-greenhouse-manual-the> \$20

### Resources – Post-Harvest, Storage Engineering

- ❑ NC State Guide to Postharvest Handling and Cooling of Fresh Fruits, Vegetables, and Flowers for Small Farms. (5 parts, pdfs, 1999) <https://content.ces.ncsu.edu/catalog/series/158/postharvest-handling-and-cooling-of-fresh-fruits-vegetables-and-flowers-for-small-farms>
- ❑ ATTRA *Postharvest Handling of Fruits and Vegetables* (2000) <https://attra.ncat.org/attra-pub/download.php?id=378>
- ❑ University of California *Post-Harvest Handling for Organic Crops* (2000) <http://anrcatalog.ucanr.edu/pdf/7254.pdf>
- ❑ Center for Environmental Farming Systems *Post-Harvest Handling Resources* <https://cefs.ncsu.edu/portfolio/tags/postharvest-handling/>
- ❑ *Small-Scale Postharvest Handling Practices: A Manual* - UC Davis (2003) <http://ucce.ucdavis.edu/files/datastore/234-1450.pdf>
- ❑ Community Involved in Sustaining Agriculture Winter Crop Storage 2010 <https://www.buylocalfood.org/resources-for-farmers/ag-infrastructure/>
  - [Walk-in Cooler: New Construction, Stand-alone Cold Storage with Free Air Case Study](#)
  - [Walk-in Cooler & Squash Storage: Existing Structure Retrofit Case Study](#)

### Resources – Storage

- ❑ Johnnys Storage Recommendations <https://www.johnnyseeds.com/growers-library/tools-supplies/harvesting-handling-storage/storage-crops.html>
- ❑ Washington State University Extension, *Storing Vegetables and Fruits at Home* [EB1326E](https://s3.wp.wsu.edu/uploads/sites/2063/2014/05/Storing-Vegetables-and-Fruits-at-Home.pdf)  
<https://s3.wp.wsu.edu/uploads/sites/2063/2014/05/Storing-Vegetables-and-Fruits-at-Home.pdf>
- ❑ USDA Agriculture Handbook 66: *The Commercial Storage of Fruits, Vegetables, and Florist and Nursery Stocks*.  
[ba.ars.usda.gov/hb66/contents.html](http://ba.ars.usda.gov/hb66/contents.html)
- ❑ <https://www.ars.usda.gov/ARSUserFiles/oc/np/CommercialStorage/CommercialStorage.pdf> Revised Feb 2016
- ❑ UMass Extension *Post-harvest and Storage Resources* <https://ag.umass.edu/vegetable/resources/winter-production-storage/storage>
- ❑ UMass Extension *Harvest, curing and storage conditions for fall and winter vegetables*. [https://ag.umass.edu/sites/ag.umass.edu/files/pdf-doc-ppt/harvest\\_and\\_storage\\_chart\\_winter\\_sare\\_project.pdf](https://ag.umass.edu/sites/ag.umass.edu/files/pdf-doc-ppt/harvest_and_storage_chart_winter_sare_project.pdf)
- ❑ *Vegetable Harvest and Storage*. <http://extension.missouri.edu/p/g6226>
- ❑ *2012 Production Guide for Storage of Organic Fruits and Vegetables*, Cornell  
<https://ecommons.cornell.edu/bitstream/handle/1813/42885/organic-stored-fruit-veg-NYSIPM.pdf?sequence=1>

### Resources - Growing Degree Days

A measure of heat accumulation. Can be a tool for season extension:

Can indicate when it's warm enough to plant tender crops, or can be used to plan dates for succession sowings.

- Average the maximum and minimum temperatures for the 24 hour period, and subtract the base temperature of 50°F (10°C). Add each day's figure to the total for the year to date. This is the GDD figure.
- [www.en.wikipedia.org/wiki/Growing-degree\\_day](http://www.en.wikipedia.org/wiki/Growing-degree_day)
- <http://farmprogress.com/mobile-apps> mobile phone app
- Using your own max and min thermometer is the best way to do this. Info from the nearest weather station is an OK alternative.
- Using GDDs to schedule sweet corn plantings <https://extension.udel.edu/weeklycropupdate/?p=6618>
- *Using Heat Units to Schedule Vegetable Plantings, Predict Harvest Dates and Manage Crops*  
<http://smallfarms.oregonstate.edu>. Nick Andrews and Leonard Coop. Excellent article gives a table of lower development thresholds for various crops, so that GDDs can be fine-tuned for different crops.

### Resources – My Slideshows

Many of my presentations are available at <https://www.slideshare.net/> Search for Pam Dawling.

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|---|---|
| ❑ <i>Cold-hardy Winter Vegetables</i>                                   | ❑ <i>Producing Asian Greens</i>   |
| ❑ <i>Cover Crops for Vegetable Growers</i>                              | ❑ <i>Production of Late Fall, Winter and Early Spring Vegetable Crops</i> |
| ❑ <i>Crop Planning for Sustainable Vegetable Production</i>             | ❑ <i>Season Extension</i>   |
| ❑ <i>Crop Rotations for Vegetables and Cover Crops</i>                  | ❑ <i>Sequential Planting of Cool Season Crops in a High Tunnel</i>        |
| ❑ <i>Diversify your Vegetable Crops</i>                                 | ❑ <i>Spring and Summer Hoophouses</i>                                     |
| ❑ <i>Fall and Winter Hoophouse</i>                                      | ❑ <i>Storage Vegetables</i>   |
| ❑ <i>Fall Vegetable Production</i>                                      | ❑ <i>Succession Planting for Continuous Vegetable Harvests</i>            |
| ❑ <i>Feeding the Soil</i>   | ❑ <i>Sustainable Farming Practices</i>                                    |
| ❑ <i>Growing Great Garlic</i>   | ❑ <i>The Seed Garden</i>  |
| ❑ <i>Growing Sweet Potatoes from Start to Finish</i>                    | ❑ <i>Year Round Vegetable Production</i>                                  |
| ❑ <i>Hoophouse Production of Cool Season Crops</i>                      | ❑ <i>Year Round Hoophouse Vegetables</i>                                  |
| ❑ <i>Lettuce Year Round</i>   |   |
| ❑ <i>Many Crops, Many Plantings, to Maximize High Tunnel Efficiency</i> |   |