Sustainable Production in Year-round High Tunnels

Michael Kilpatrick
Kilpatrick Family Farm

This talk will be on my blog..
www.michael-kilpatrick.com

We are in Middle Granville, NY - an hour north of Albany, NY Zone 4b

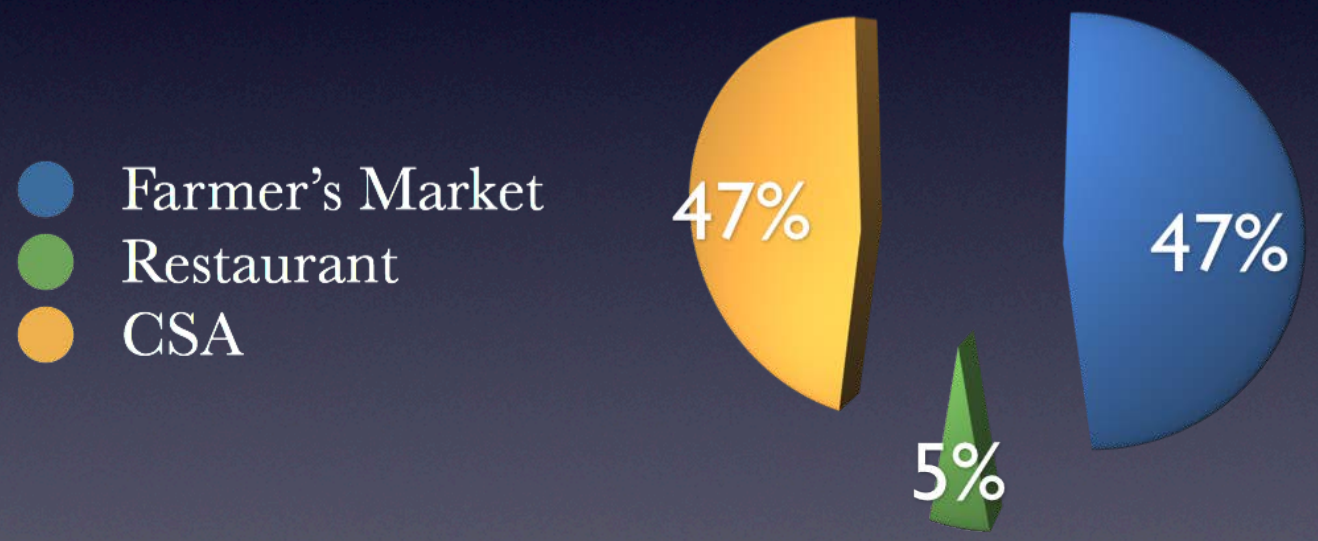
Brief History

- started in 2004, rototiller and strong backs
- 2005, first tractor, Super C and first high tunnel
- 2006, first year of CSA, 10 members
- 2009, 130 members at 4 markets
- 2011, twelve acres of field production, 1/3rd acre covered production

12' profile

- 12 acres in crops, 25 in cover crop
- 8 full time employees during the summer
- 2 full time employees during the winter
- 3 weekly summer markets/ 2 winter
- 285 CSA summer shares / 140 winter shares
- over 1/3 acre under tunnels

Income $450,000+



Soil

With the price of covered stuctures we want the best soil possible

Soil tested twice a year

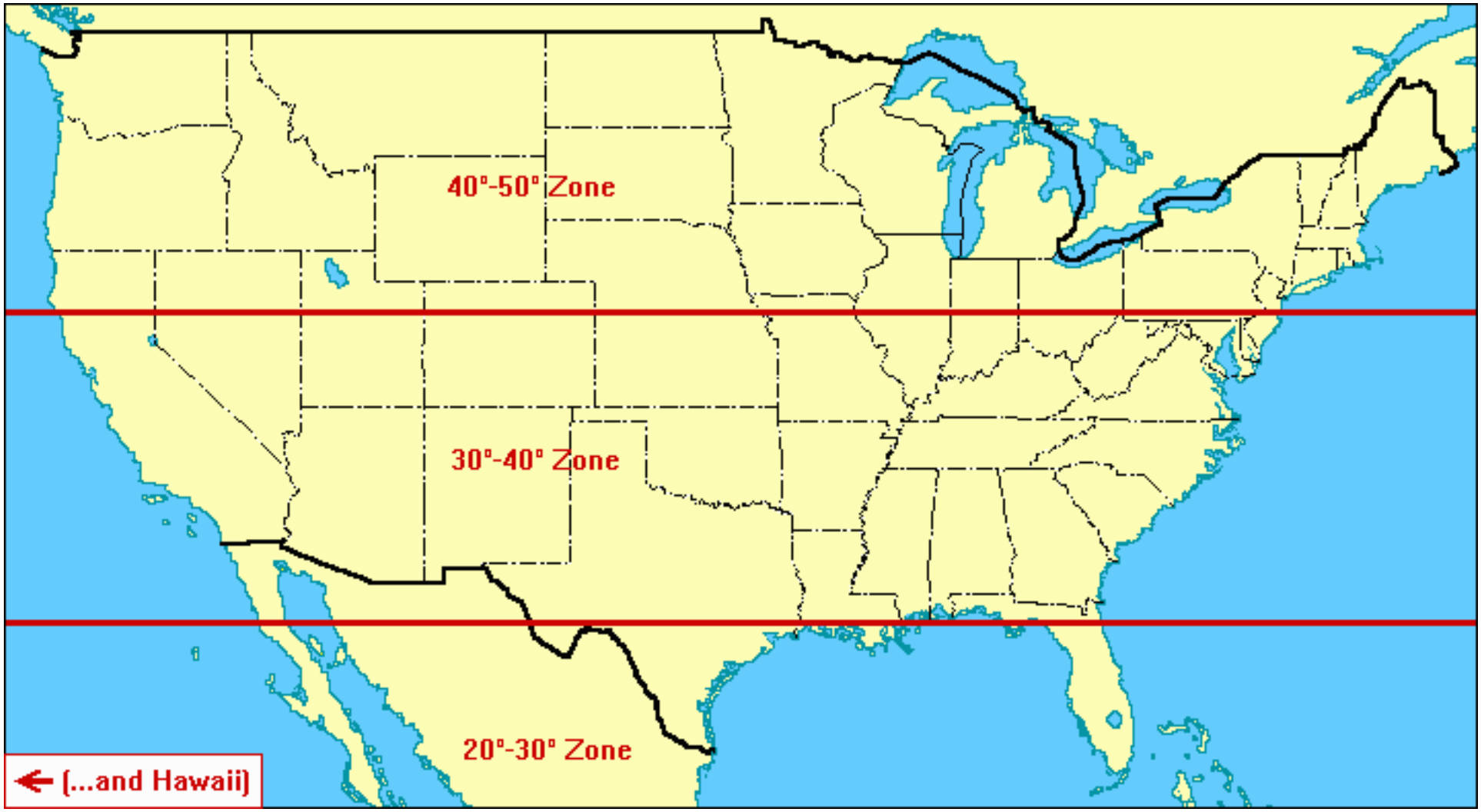
Saturated medium tests- best picture of what is going on

Our organic matter is in the 6-8% range

'Ken Block SnoDrift' by dez&john3313 on Flickr (via Sprixi). CC BY licence.

E-W or N-S?

- whatever the grade will allow
- above 40 degrees east-west
- below 40 degrees doesn't matter


40°-50° Zone
30°-40° Zone
20°-30° Zone
(...and Hawaii)

Tunnel location

- not under trees, shaded, power poles
- protected from high winds
- watch north sides of mountains
- high and dry is always good- not on a flood plain
- difference is summer and winter shade

drainage

- a 30 X 100 tunnel will shed 1800 gallons from a 1” of rain.
- where is that going to go?
- drain tile buried around edge back filled with crushed stone
- can drain to a cistern for reuse.

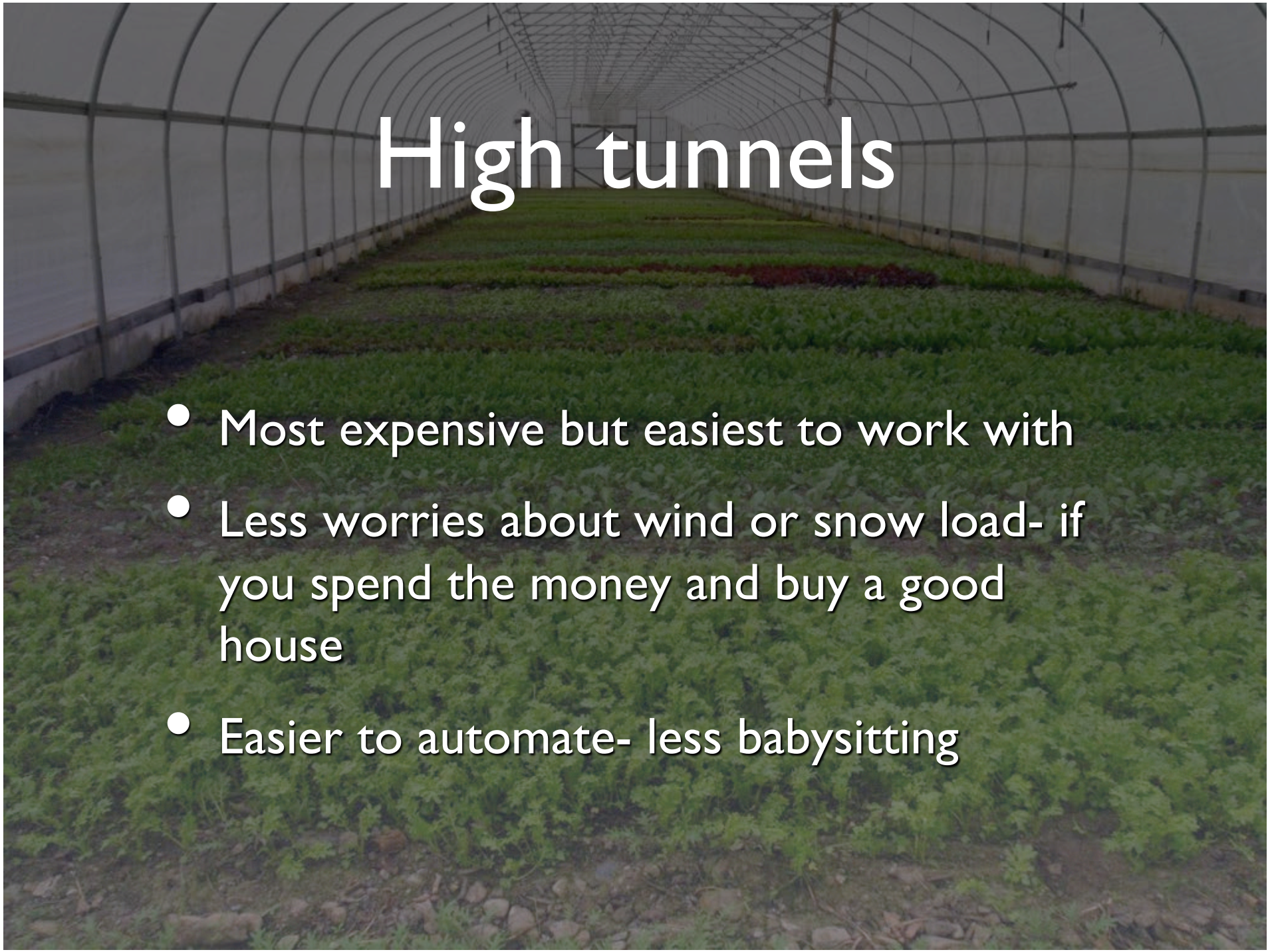
Our Different Tunnels

Hoophouses

…and, while low-cost, they involve a fair amount of "management"

Ted Blomgren
Windflower Farm

Haygrove



High tunnels

- Most expensive but easiest to work with
- Less worries about wind or snow load- if you spend the money and buy a good house
- Easier to automate- less babysitting

Bring purlins down

Jon Satz
Woods Market Garden

Jon Satz
Woods Market Garden

Venting

Peak vents for winter ventilation

advancingalternatives.com/

© Four Season Tools 2012

POSI CLASP
36
VENT CONTROL UNIT
Model VCU1
LR 61791
Open
Close
Manual Operation
Normal Op
Normal Operation
Func
Press to Select Functions Below
Increase or Decrease Displayed Value
OPEN
CLOSE
IDLE
ALERT
SYSTEM FAULT
Press to Store Functions After Selection
ADVANCING ALTERNATIVES
Temperature Set Point
Open/Close "on" Time (Sec)
Open/Close "idle" Time (Sec)
Differential Temperature
High Temperature Alert Point
Low Temperature Alert Point

Jon Satz
Woods Market Garden

Jon Satz
Woods Market Garden

Roll-Up Secured with Wiggle Wire

Jack Manix
Walker Farm

© Four Season Tools 2012

Four Season Tools

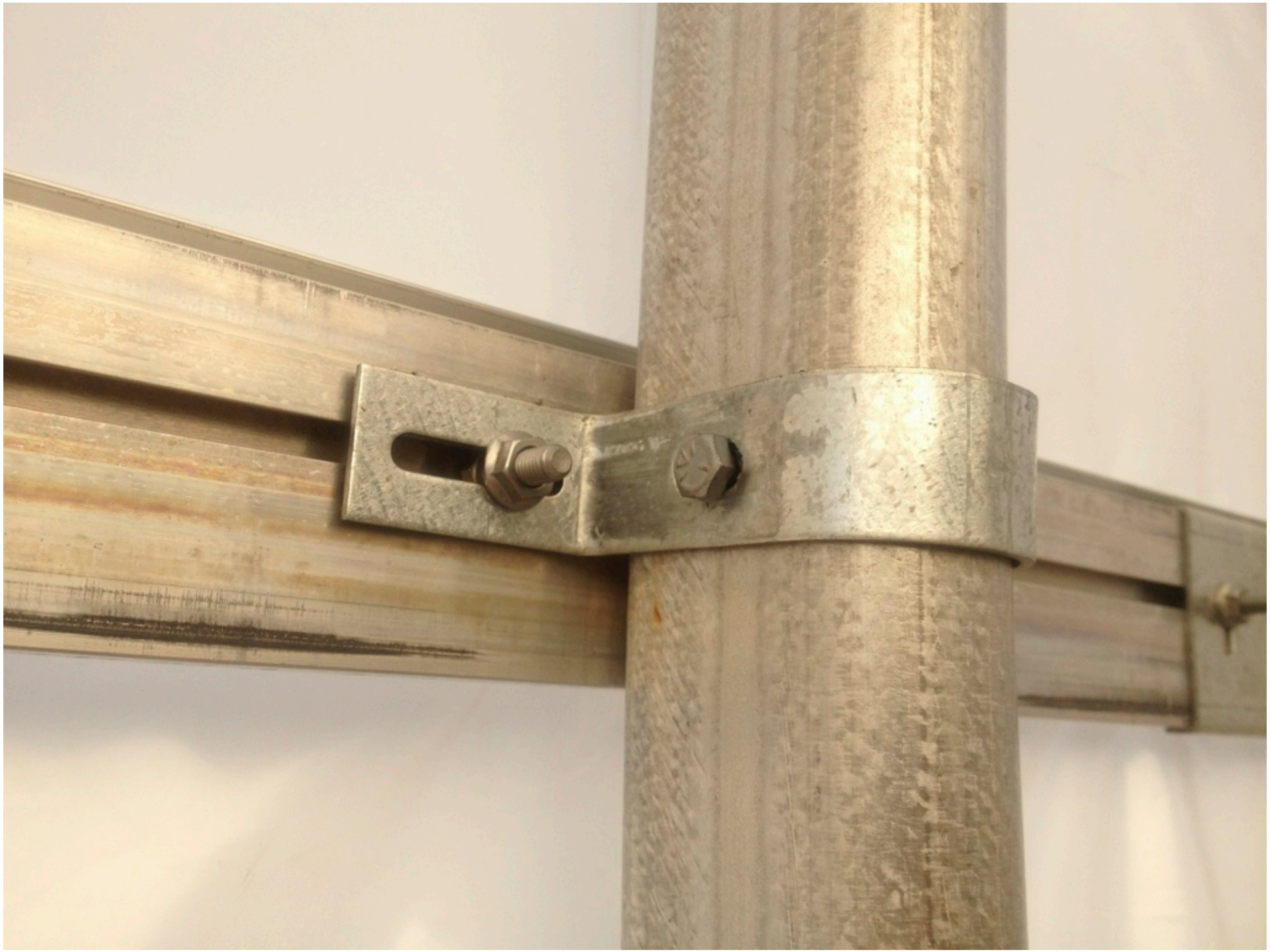
Screens for broccoli, removed leaves on regular basis for large side shoots

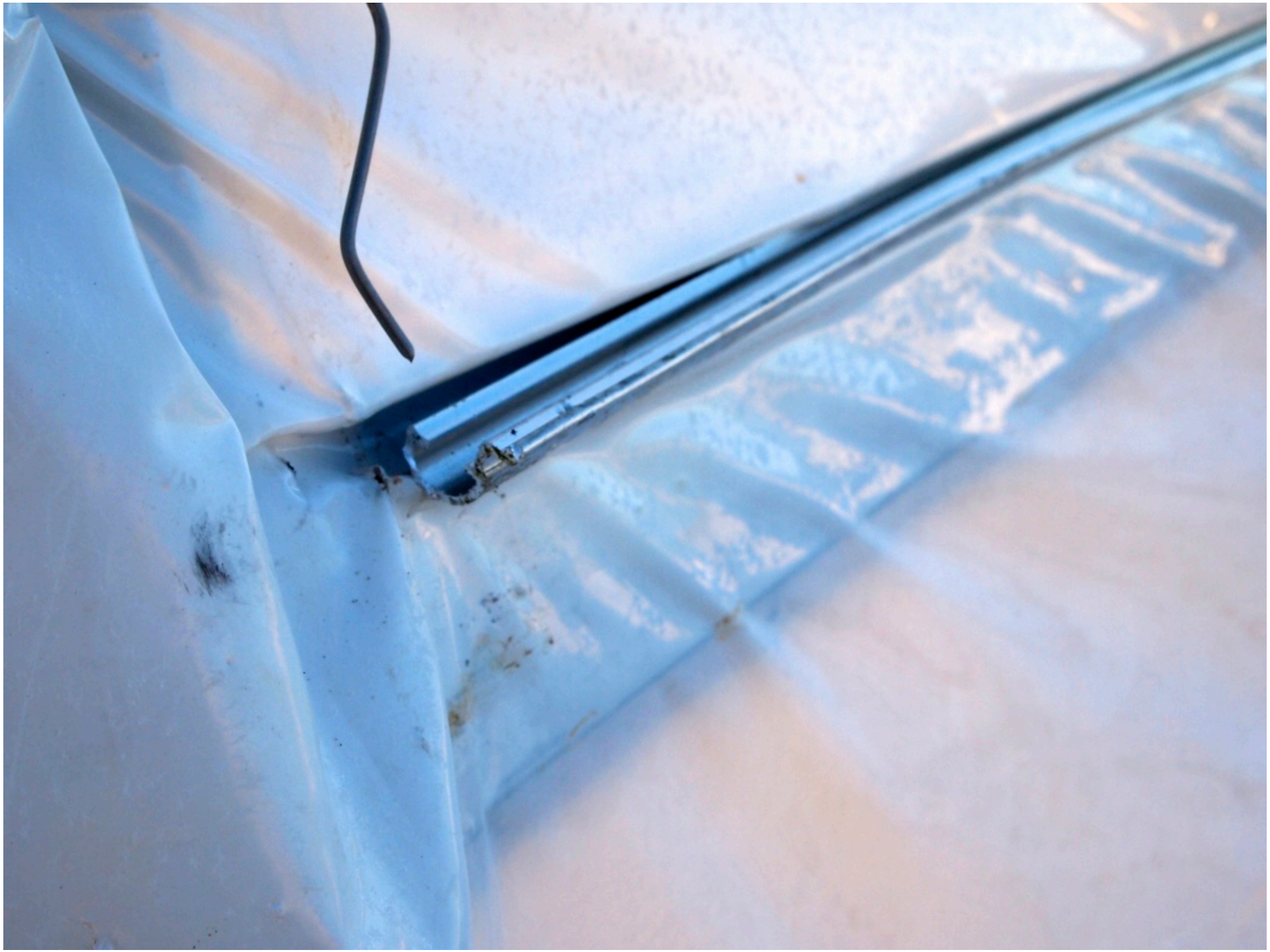
Screen on sides, same cuke crop all summer

polycarbonate-
Nolts Produce Supply
1-717-656-9764

www.northerngreenhousesupply.com

shedding





overhead watering takes the headache out of tripping over pipes on the soil surface.

Rondo Mini Sprinkler

inside covers

Notice high sidewalls and walkway on side

Rolling up the cover in the morning

covered with rowcover hoops-
best to have two people to help
cover- one for each end.

Our hoop houses are usually
only uncovered for harvesting

Snow!

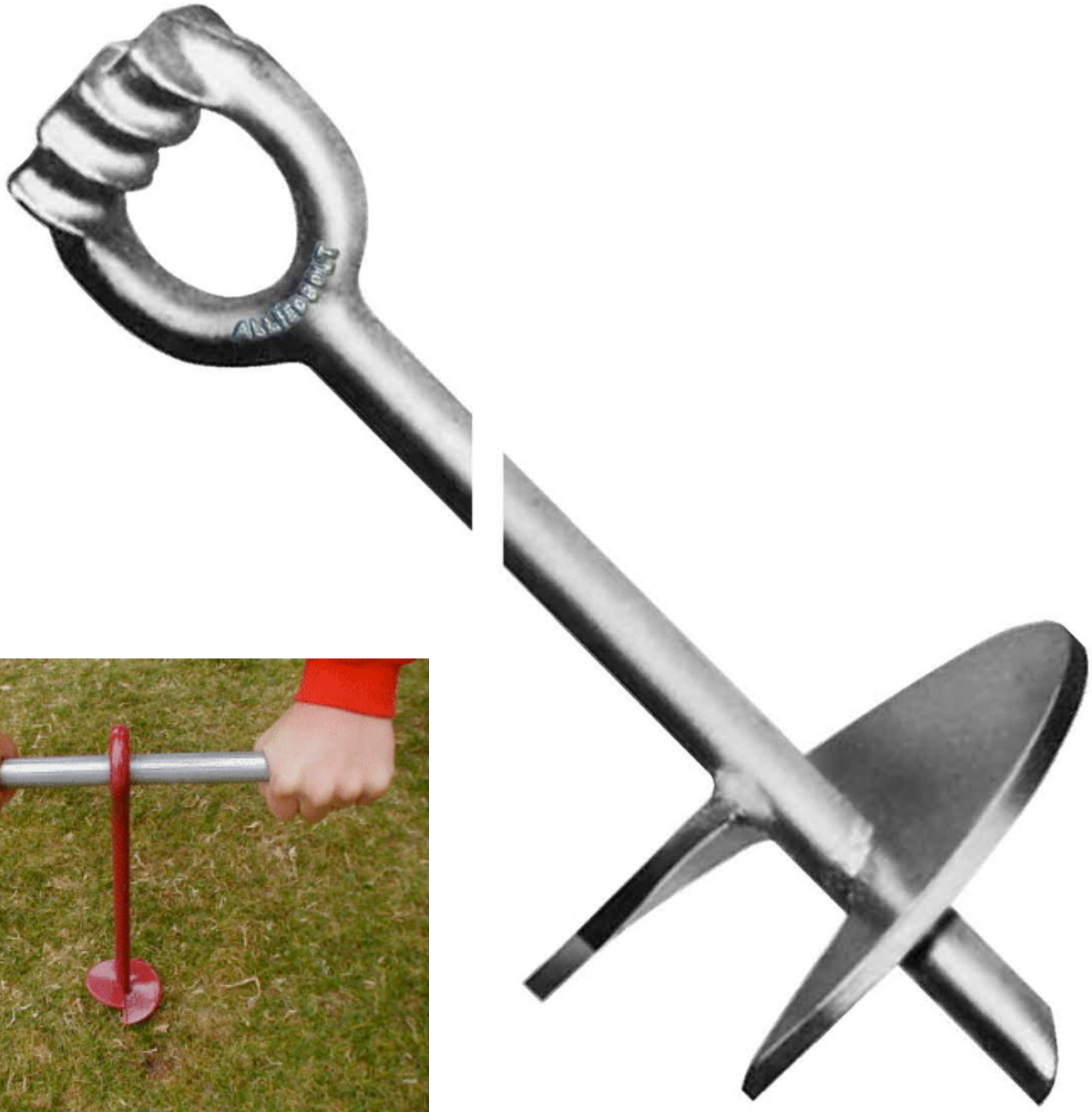
Snow Load

- Snow with 1” rain equivalent will load structure with 5.2 psf
- 1” rain may equal 12” fluffy snow or 2-4” heavy wet snow
- High tunnel built from ribs of 20’ pipe bent to create 14’ wide x 6’ high structure will withstand only about 10 psf
- High winds can add to load pressure

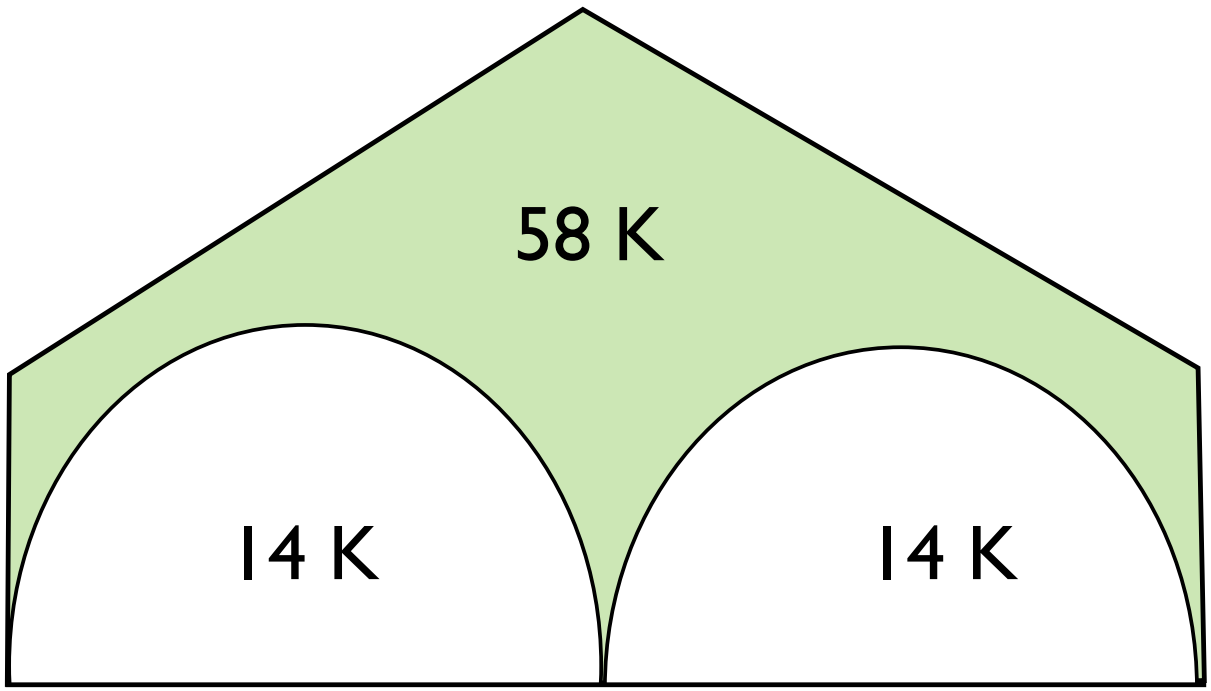
Be Vigilant

- Strong endwalls radiate strength towards middle of greenhouse
- 2 inflated layers help snow slide off
- Clear from middles first
- Keep sides clear to make room for snow to slide from structure

Wind Damage



Tunnel size considerations

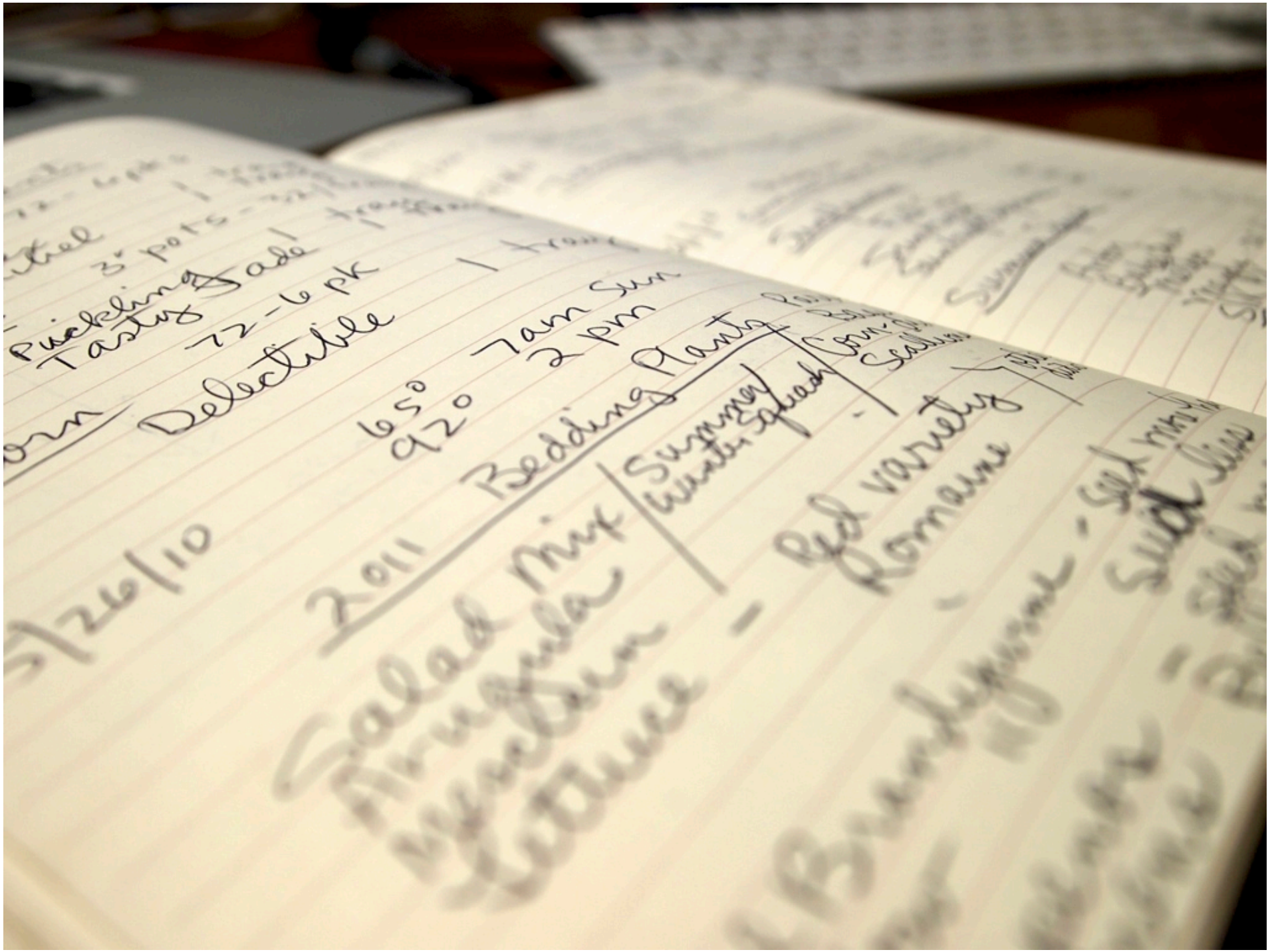


Area of hoophouses 28,000 cubic ft

Area of high tunnel 58,000 cubic ft

The perfect greenhouse

- BIG 40 X 200
- high sidewalls/with rollups or dropdown sides
- groundheat
- peak vents
- metal framed polycarbonate/poly end walls
- backup air heat


Pickling
Tasty Sade
72-6 pk
Delectible
650
920
7am Sun
2 pm
5/26/10
2011 Bedding Plants
Salad Mix
Arugula
Mesclun
Lettuce
Summer
Winter Squash
Red variety
Romaine

| | | |

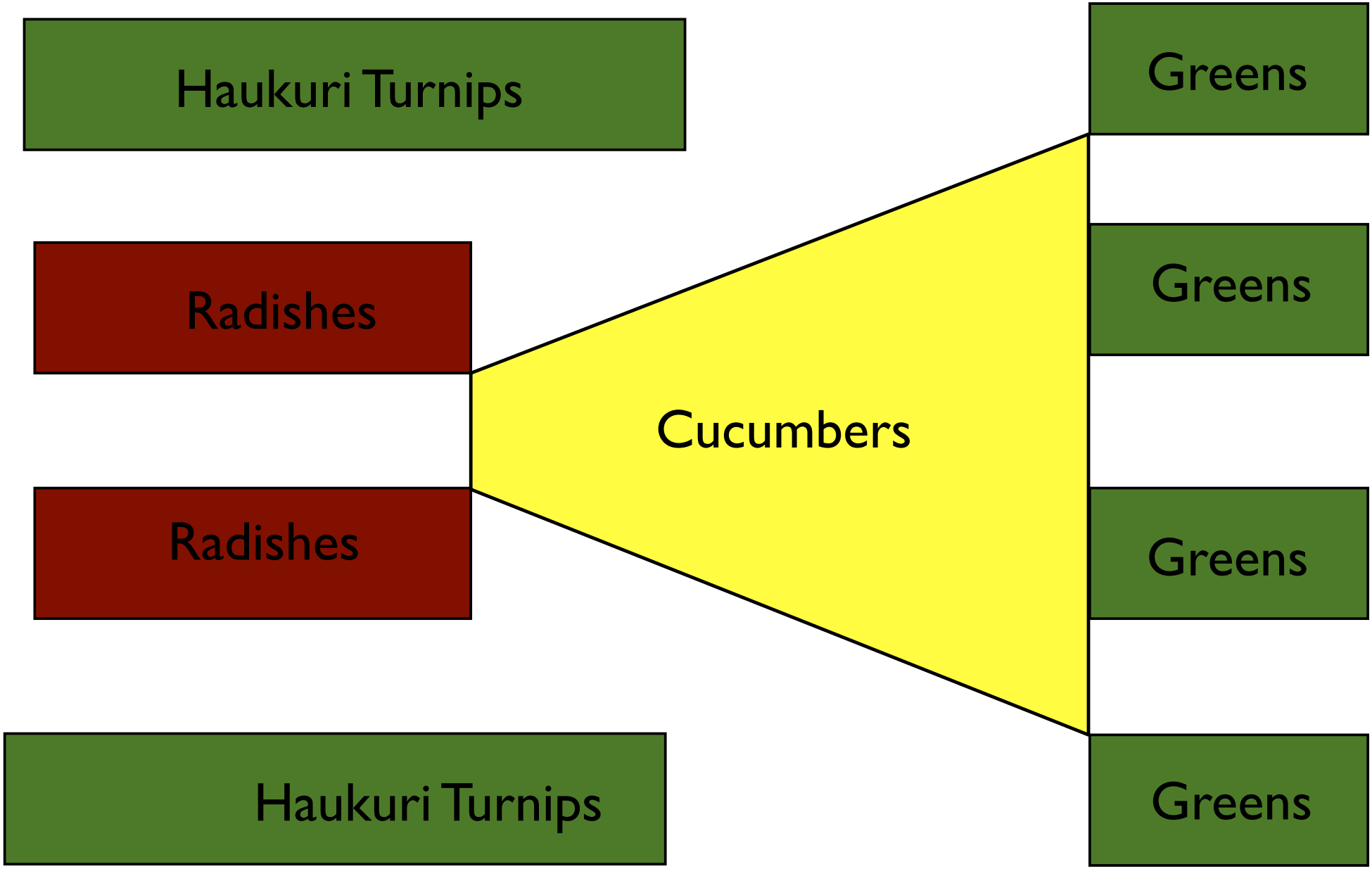
	A	AZ	BA	BB	BC	BD	BE
1		9/25/13 sent	9/25/13 lo	10/2/13 sent	10/2/13 lo	10/9/13 sent	10/9/13 lo
2	Weather						
3	Arugula		19		14	3	
10	Beets, Red	25	19	29	23	28	
11	Beets, Bunched	24	3	24	0	25	
14	Bokchoi	13	6	20	9	12	
15	Braising			2	0	3	
16	Broc						
17	Broccoli	11		83	25	120	
19	Bulk onions						
20	Cauliflower			171	90	42	
22	Cabbage	17	4	15	6	13	
25	Carrot, Orange	57		60	28	54	
27	Carrot, rainbow	21	9.5	25	7	20	
29	Carrots, Seconds	10	6				
31	China cabbage	9		12	5	8	
32	CSA item						
34	French Fillet beans			5	0		
37	Garlic, Powder						
39	Hakuri 2nds						
40	Head lettuce	26	11	24	12	12	
43	Kale, Bag						
44	Kale, Bunch	39	10	35	12	26	
45	Kirby cukes						
46	Kolrabi	8B./9bunch	5	26	18	38	
50	Micro cilantro	3					
51	Micro radish	5	4	0			
52	Micro, Arugula	10	7	0			
53	Micro, Mild	7	3	0		3	
54	Micro, Spicy	8	5	0		3	
55	Mini broc			50	31	44	
59	Onions						

Sar Wed | Sar Sat | Glens Falls Sat | Harvest | csa | wholesale orders | backstock

ITem Number	crop	variety	Days	**Seed date**	plant date	container	Company	Have seed?	Seeds ordered	seeds per cell	Plants/ Seeds needed	Field	bed feet	rows per bed
2120	Artichoke	Imperial Star		3/1	5/16	20 row> 3"	JSS			1	250		450	1
2015g	Arugula	Astro			2/8		JSS	Y				Tomato house 3	50	5
2015g	Arugula	Astro			3/1		JSS	y				Haygrove 3	100	4
2015g	Arugula	Astro			4/4		JSS	Y	lb			TW	25	4
2015g	Arugula	Astro			4/11		JSS	Y				TW	25	4
2015g	Arugula	Astro			4/18		JSS	Y				TW	25	4
2015g	Arugula	Astro			4/25		JSS	Y				TW	25	4
2015g	Arugula	Astro			5/2		JSS	Y				TW	25	4
2015g	Arugula	Astro			5/9		JSS	Y				TW	25	4
2015g	Arugula	Astro			5/16		JSS	Y				TW	25	4
2015g	Arugula	Astro			5/23		JSS	Y				TW	25	4
2015g	Arugula	Astro			5/30		JSS	Y				TW	25	4
2015g	Arugula	Astro			6/6		JSS	Y				TW	25	4
2015g	Arugula	Astro			6/13		JSS	Y				TW	25	4
2015g	Arugula	Astro			6/20		JSS	Y				TW	25	4
2015g	Arugula	Astro			6/27		JSS	Y				TW	25	4
2015g	Arugula	Astro			7/4		JSS	Y				GR 4	25	4
2015g	Arugula	Astro			7/11		JSS	Y				GR 4	25	4
2015g	Arugula	Astro			7/18		JSS	Y				GR 4	25	4
2015g	Arugula	Astro			7/25		JSS	Y				GR 4	25	4
2015g	Arugula	Astro			8/1		JSS	Y				TW	25	4
2015g	Arugula	Astro			8/8		JSS	Y				TW	25	4
2015g	Arugula	Astro			8/15		JSS	Y				TW	25	4
2015g	Arugula	Astro			8/22		JSS	Y				TW	25	4
2015g	Arugula	Astro			8/29		JSS	Y				Bottom	100	12
2015g	Arugula	Astro			9/5		JSS	Y				Bottom	100	12
2015g	Arugula	Astro			9/12		JSS	Y				Bottom	150	12
3021BO	Arugula	Ice-Bred			9/17		FS		oz			Bottom	200	12
3021BO	Arugula	Ice-Bred			9/22		FS					Bottom	200	12
3021BO	Arugula	Ice-Bred			9/26		FS					Bottom	200	12
3021BO	Arugula	Ice-Bred			10/1		FS					Haygrove 4	50	12
3021BO	Arugula	Ice-Bred			10/10		FS					Haygrove 4	100	12

Haygrove 2011

Time	3/1	3/15	4/1	4/15	5/1	5/15	6/1	6/15
BED 1	strawberries 1st half/	strawberries 1st half	strawberries 1st half/ lettuce mix/ mesclun xx	strawberries 1st half/ lettuce mix/ mesclun	strawberries 1st half/ lettuce mix/ mesclun	strawberries 1st half/ lettuce mix/ mesclun	strawberries 1st half/ lettuce mix/ mesclun	basil
BED 2	transplanted turnips and radishes- radishes in center of bedxx	transplanted turnips and radishes- radishes in center of bed	transplanted turnips and radishes- radishes in center of bed	transplanted turnips and radishes- radishes in center of bed	Cukes in center of bed turnips finishing up on edges	Cukes in center of bed turnips finishing up on edges	cukes	cukes
BED 3	Arugula/ mesclunxx	Arugula/ mesclun	Arugula/ mesclun	beans	beans	beans/ tomatoes in center of bed	beans/ tomatoes in center of bed	beans/ tomatoes in center of bed
BED 4	Swiss chard, mustards, pac choi, hon tsai tai xx	Swiss chard, mustards, pac choi, hon tsai tai	Swiss chard, mustards, pac choi, hon tsai tai	Swiss chard, mustards, pac choi, hon tsai tai	peppers	peppers	peppers	peppers


Haukuri Turnips
Radishes
Radishes
Haukuri Turnips
Cucumbers
Greens
Greens
Greens
Greens

Haygrove 2011

Time	3/1	3/15	4/1	4/15	5/1	5/15	6/1	6/15
BED 1	strawberries 1st half/	strawberries 1st half	strawberries 1st half/ lettuce mix/ mesclun xx	strawberries 1st half/ lettuce mix/ mesclun	strawberries 1st half/ lettuce mix/ mesclun	strawberries 1st half/ lettuce mix/ mesclun	strawberries 1st half/ lettuce mix/ mesclun	basil
BED 2	transplanted turnips and radishes- radishes in center of bedxx	transplanted turnips and radishes- radishes in center of bed	transplanted turnips and radishes- radishes in center of bed	transplanted turnips and radishes- radishes in center of bed	Cukes in center of bed turnips finishing up on edges	Cukes in center of bed turnips finishing up on edges	cukes	cukes
BED 3	Arugula/ mesclunxx	Arugula/ mesclun	Arugula/ mesclun	beans	beans	beans/ tomatoes in center of bed	beans/ tomatoes in center of bed	beans/ tomatoes in center of bed
BED 4	Swiss chard, mustards, pac choi, hon tsai tai xx	Swiss chard, mustards, pac choi, hon tsai tai	Swiss chard, mustards, pac choi, hon tsai tai	Swiss chard, mustards, pac choi, hon tsai tai	peppers	peppers	peppers	peppers

Haygrove 2011 fall

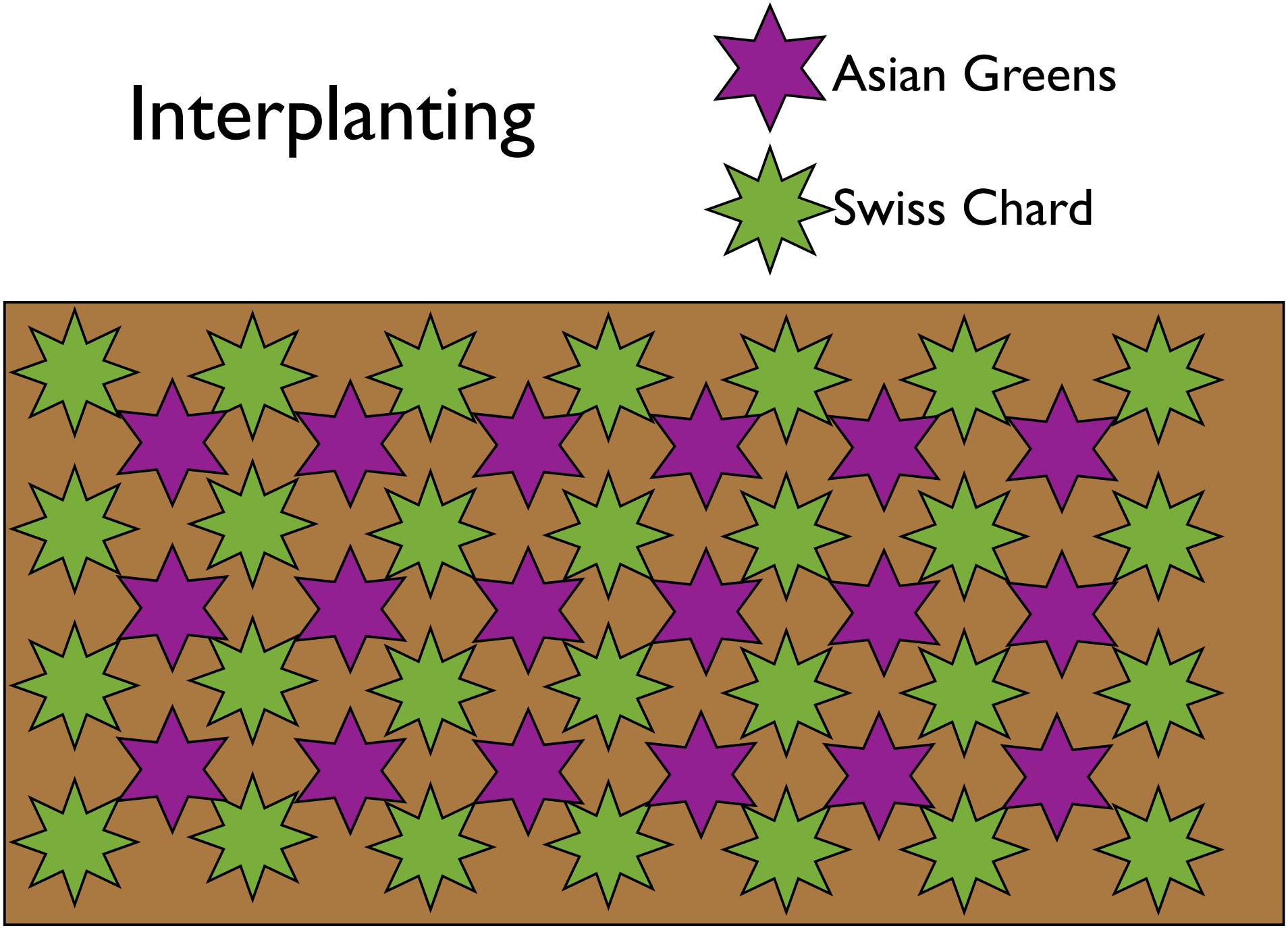
8/1	8/15	9/1	9/15	10/1	10/15	11/1	11/15	12/1
basil	basil	basil	basil	spinach	spinach	spinach	spinach	spinachxx
cukes	cukes		broccolini/ broccoli raab/ boc choi	broccolini/ broccoli raab/ boc choi	broccolini/ broccoli raab/ boc choi	broccolini/ broccoli raab/ boc choi	broccolini/ broccoli raab/ boc choi	broccolini/ broccoli raab/ boc choixx
tomatoes	tomatoes	tomatoes	tomatoes	lettuce	lettuce	lettuce	lettuce	lettucexx
peppers	peppers	peppers	peppers	Arugula/ lettuce	Arugula/ lettuce	Arugula/ lettuce	Arugula/ lettuce	Arugula/ lettucexx

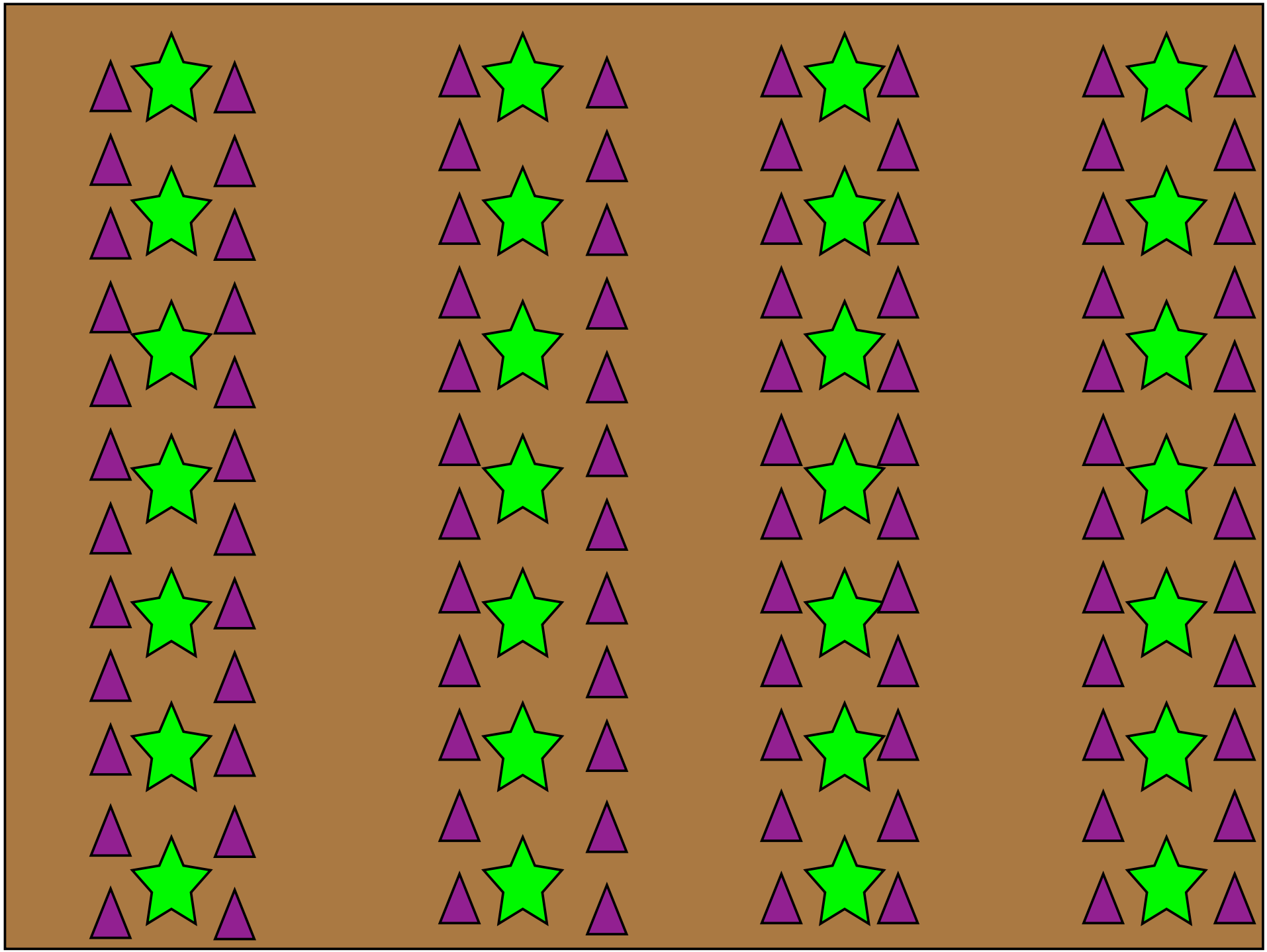
664	Radish	Rover		2/7	2/28		JSS			3	3600	1200	200	3	Haygrove 2		2
2015g	Arugula	Astro			3/1		JSS	y					100	4	Haygrove 3	brassica	30.0
1C	Mesclun, Greenhouse	Mixed	28		3/1						0	16000	100	8	Haygrove 3	brassica	20.0
702	Swiss Chard, Greenhouse	ruby red			3/1		JSS				0	3600	50	6	Haygrove 2	beet	12
706	Turnip	Hakuri		1/24	3/1	200 sp	JSS			4	3200	800	200	2	Haygrove 2		2
	Greens, Greenhouse	Mixed	45	1/24	3/7	200 speedling									Haygrove 4		
138	Greens, Greenhouse	Hon Tsai Tai	37	2/8	3/7	200 speedling				2	532	266	50	4	Haygrove 4		1.3
2460	Greens, Greenhouse	Black summer	45	2/8	3/7	200 speedling				1	266	266	50	4	Haygrove 4		1.3
1C	Mesclun, Greenhouse	Mustards	28	1/25	3/7					3	780	260	50	4	Haygrove 4		1.3
703D	Swiss Chard	Bright Lights		1/28	3/15	200 speedling	JSS			1	300	300	100	3	Hoophouse		1
ITem Number	crop	variety	Days	**Seed date**	plant date	container	Company	Have seed?	Seeds ordered	seeds per cell	Plants/ Seeds needed	Plants needed	bed feet	rows per bed	Field	Plate	Seeds per FT

Long House Fall

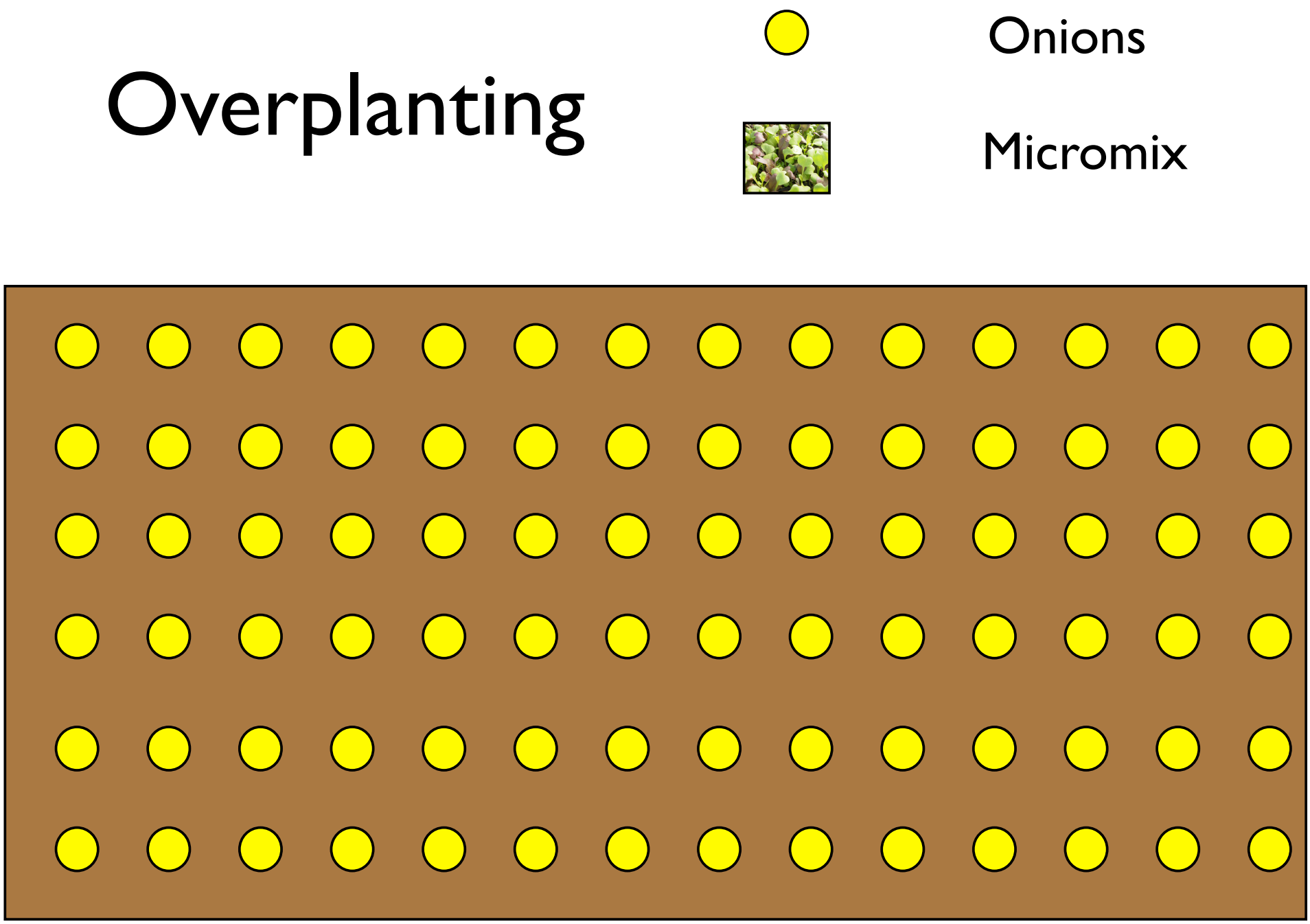
9/1	9/15	10/1	10/15	11/1	11/15	12/1
Tomato	Tomato	Tomato	spinach	spinach	spinach	spinachxx
Tomato	Tomato	Tomato	boc choi, asian greens, swiss chard-interplanted	boc choi, asian greens, swiss chard-interplanted	boc choi, asian greens, swiss chard-interplanted	boc choi, asian greens, swiss chard-interplanted
Tomato	Tomato	Tomato	mesclun	mesclun	mesclun	mesclunxx
Tomato	Tomato	Tomato	lettuce	lettuce	lettuce	lettuce
Ginger	Ginger	Ginger	spinach	spinach	spinach	spinachxx

Interplanting





Overplanting

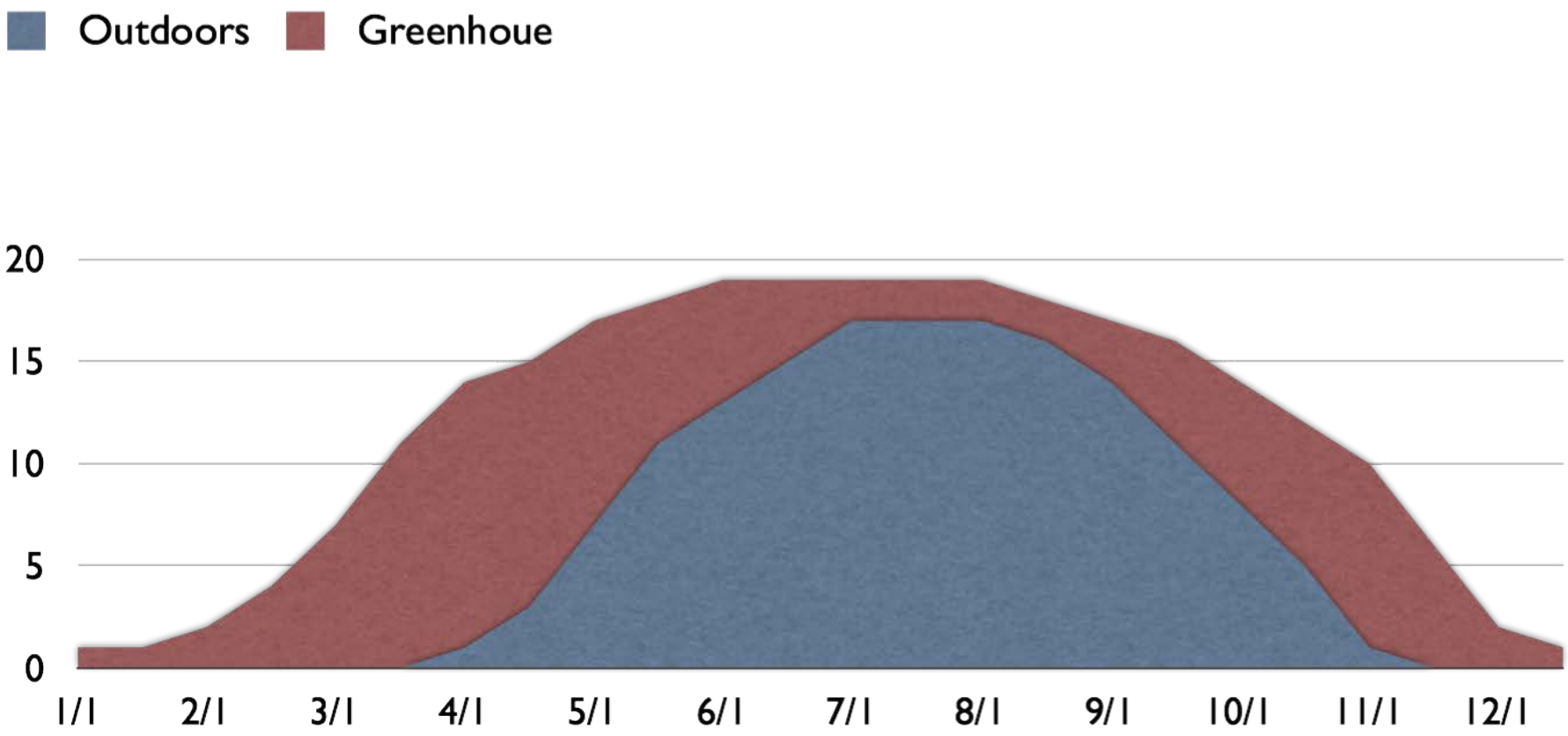


Overplanting

Onions

Micromix

Growth rates



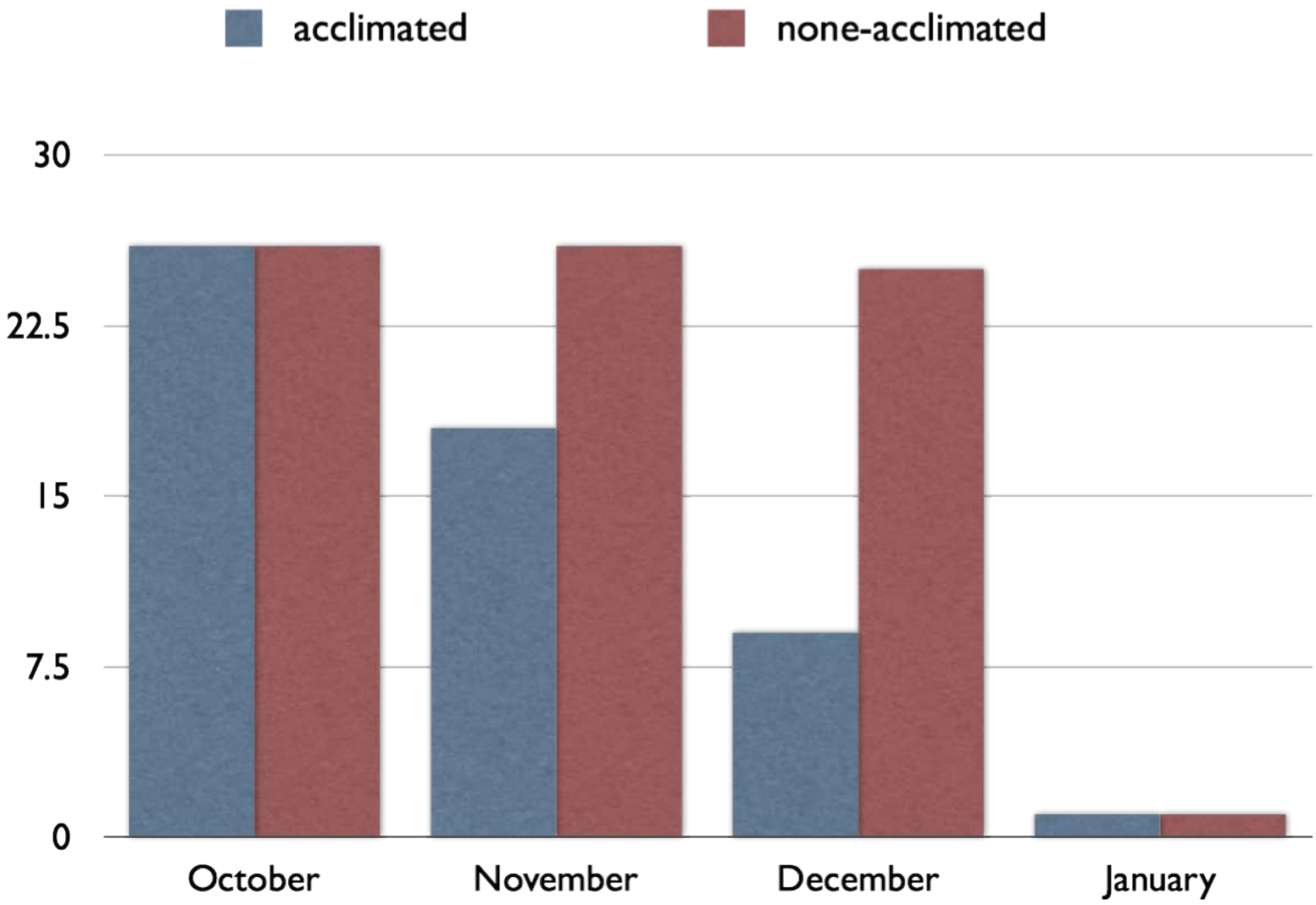
We need to make $40,000 an acre outdoors
Or $60,000 in the greenhouse
Works out to be $4.50 or 7.75 a bed ft
Also need to make at least $40 an
hour picking the crop

Acclimating Greens to Cold

Acclimation factor

When lush, rapidly growing plants
are subjected to sharp dips in temperature they
tipburn or die readily (not acclimated)

The goal is to gradually harden them off


acclimated
none-acclimated
30
22.5
15
7.5
0
October
November
December
January

to acclimate plants properly we try to-

- plant early enough so we're not rushing plantings

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- vent like crazy in the fall- houses are usually left open until the first hard frost- venting also reduces diseases greatly

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- plant early enough so we're not rushing plantings
- vent like crazy in the fall- houses are usually left open until the first hard frost- venting also reduces diseases greatly
- slowly bring the plants down to the low temperatures of winter

Tools of the trade

Six row seeder
landscape rake

4-row seeder

harvest utensils

LUCKO

Crops for winter growing

Chickweed

Spinach

Spinach Successions

seed	trans plant	Location	Type	Sales date
9/1		raised field beds	baby	November
9/1		hoophouse	full size	February
9/25		Haygrove	baby	December
10/10		High-tunnel	baby	December/ January
10/6	11/6	High-tunnel	full size	Emergency

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- Hoophouse spinach is seeded by September 1st
- fertilized and weeded 3 weeks later with soybean meal
- preferred Varieties are Space or Donkey
- Spinach makes around $300,000 an acre when covered

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Seeded Baby Spinach

- Seeded by October 10th
- seeded at 30 seeds per ft with rows 8” apart
- Pigeon, Donkey or Red Cardinal (for Christmas Spinach)

Christmas Spinach

- Red Cardinal is best variety
- Faster regrowth 4-5 cuttings during our growing season
- does bolt faster in the spring
- really good flavor!

Spinach Varieties High Mowing seeds trials

Samish F1	HMS (ALF15-04)	yes	3.75	1.06	1.20	2.16	3.24	5.84	0.00	0.00	0.00	17.25
Bloomsdale Longstanding	HMS (TER 15-20)	yes	0	0.84	0.86	1.52	2.06	6.58	3.48	2.90	0.00	18.24
Regiment F1	BEJ	yes	1.5	0.78	0.88	1.50	2.08	6.44	3.96	3.10	3.46	23.70
Corvair F1	HMS (VIT15-15)	yes	2.75	1.88	1.20	2.34	3.32	5.92	5.98	1.98	0.00	25.37
Donkey F1	RZ	no	2.5	0.92	1.06	1.72	3.24	5.82	4.00	3.36	4.86	27.48
Renegade F1	HMS (BEJ14-32)	yes	2.75	2.2	1.24	2.68	2.72	6.84	5.94	3.32	0.00	27.69
Racoon F1	RZ	no	1.75	2.02	1.22	2.72	3.72	10.10	6.78	0.00	0.00	28.31
Palco F1	HILD	yes in 2012	3.25	1.7	1.44	1.62	3.08	6.02	5.58	4.38	6.14	33.21
Tyee F1	HMS (ALF15-05)	yes	2.5	1.5	1.66	2.56	3.48	7.98	4.96	4.00	5.00	33.64
Giant Winter	HMS (WOD 15-03)	yes	5.5	1.74	0.92	1.78	5.40	8.34	7.24	3.66	0.00	34.58
Space F1 *MS	JSS *09TR	no	4.2	3.04	1.46	2.80	4.68	7.66	7.30	3.48	0.00	34.62
Pigeon F1	RZ	yes in 2012	6	2.5	1.36	2.60	4.66	7.44	7.20	3.28	0.00	35.04
Variety	Source	Available from HMS	9-Nov	9-Feb	18-Mar	23-Mar	4-Apr	13-Apr	27-Apr	6-May	19-May	Total weight

Customer's love these in April

Seeded after January 15th

rows 6 inches apart- can transplant!-3 seeds per cell 6”x4” spacing

Favorite varieties- Rover and Pink Beauty

Mesclun

Mesclun

- We try to have Mesclun from November to May
  - don't want to compete with summer mesclun
  - dealing with row covers all summer is not our idea of fun
  - will seed the end of September for November field harvest under row cover or mini-tunnel
  - grossing around $120,000 an acre

150
112.5
75
37.5
0
1
2
3
4
Growth in March

we're finding that 4-5 inches is
best for row spacing

For mid-winter replantings (usually after lettuce), we will come in with transplants (6” x 6” spacing seeded 5-8 seeds per cell)

Mesclun Varieties

- Black Summer
- Red choi
- Yukina Savoy
- Red Komatsuna
- Tokyo Bekana
- Purple Mizuna
- Kyona Mizuna
- Ruby Streaks Mustard
- Golden Frill Mustard

Tokyo Bekana

Vitamin Green

Komatsuna

Braising greens

braising greens is mesclun in the “teenage” stage or 8”-10” tall. In early spring we usually can’t keep up with the growth of the greens and then just cut and bunch individual varieties. We’ll even bunch it after it has flowered!

Braising greens

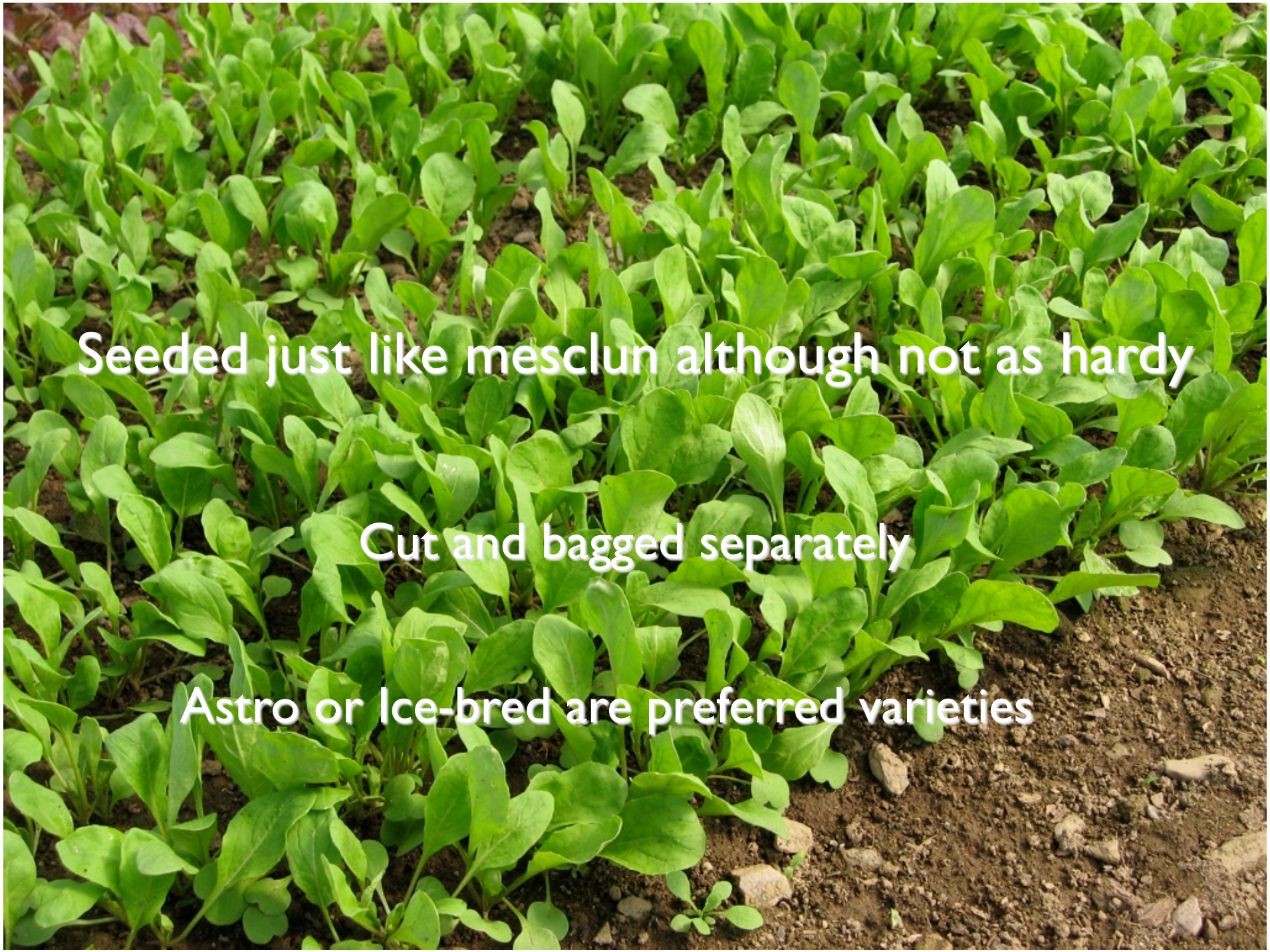
Pictures courtesy of Johnnys Seeds

Cress

Mache

Preventing
Steminess

Arugula


Seeded just like mesclun although not as hardy
Cut and bagged separately
Astro or Ice-bred are preferred varieties

Kale

Variety	seed	transplant	Location
Fall Kale	Jul 5, 2011	8/4	Field
Hoophouse Kale	Jul 20, 2011	8/17	Hoophouse
Greenhouse Kale	Aug 4, 2011	9/1	High tunnel

Variety	seed	transplant	Location
Fall Kale	Jul 5, 2011	8/4	Field
Hoophouse Kale	Jul 20, 2011	8/17	Hoophouse
Greenhouse Kale	Aug 4, 2011	9/1	High tunnel

Variety	seed	transplant	Location
Fall Kale	Jul 5, 2011	8/4	Field
Hoophouse Kale	Jul 20, 2011	8/17	Hoophouse
Greenhouse Kale	Aug 4, 2011	9/1	High tunnel

Swiss Chard

Variety	seed	transplant	Location
Bright Lights	8/1		mini or hoophouses
Bright Lights	8/10	10/13	High tunnel
Bright Lights	8/10	10/28	High tunnel
Fordhook giant	9/10		high tunnel

Swiss Chard

Variety	seed	transplant	Location
Bright Lights	8/1		mini or hoophouses
Bright Lights	8/10	10/13	High tunnel
Bright Lights	8/10	10/28	High tunnel
Fordhook giant	9/10		high tunnel

Swiss Chard

Variety	seed	transplant	Location
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Bright Lights	8/10	10/13	High tunnel
Bright Lights	8/10	10/28	High tunnel
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Swiss Chard

Variety	seed	transplant	Location
Bright Lights	8/1		mini or hoophouses
Bright Lights	8/10	10/13	High tunnel
Bright Lights	8/10	10/28	High tunnel
Fordhook giant	9/10		high tunnel

Salad
mix

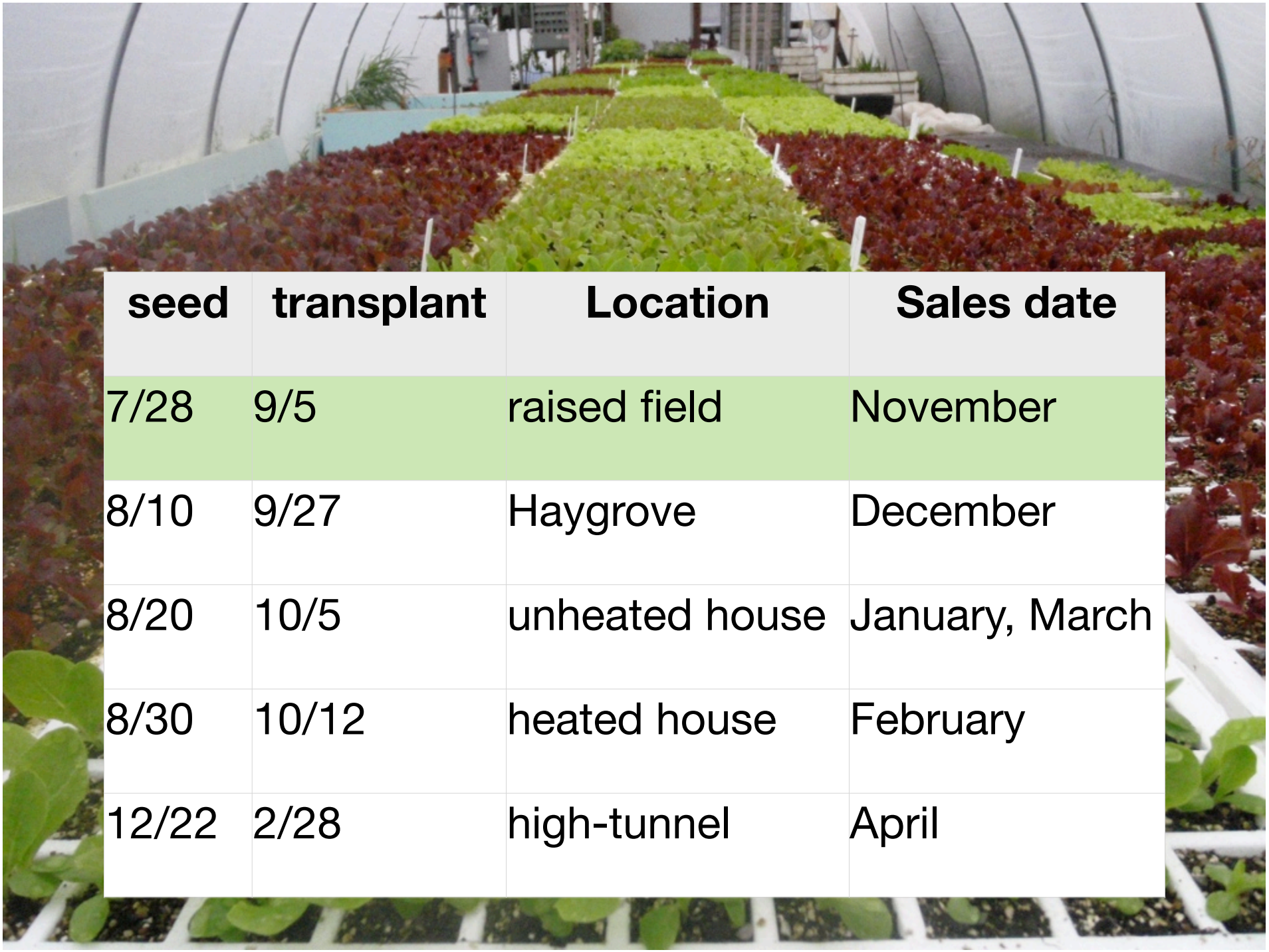
Lettuce Mix

Varieties

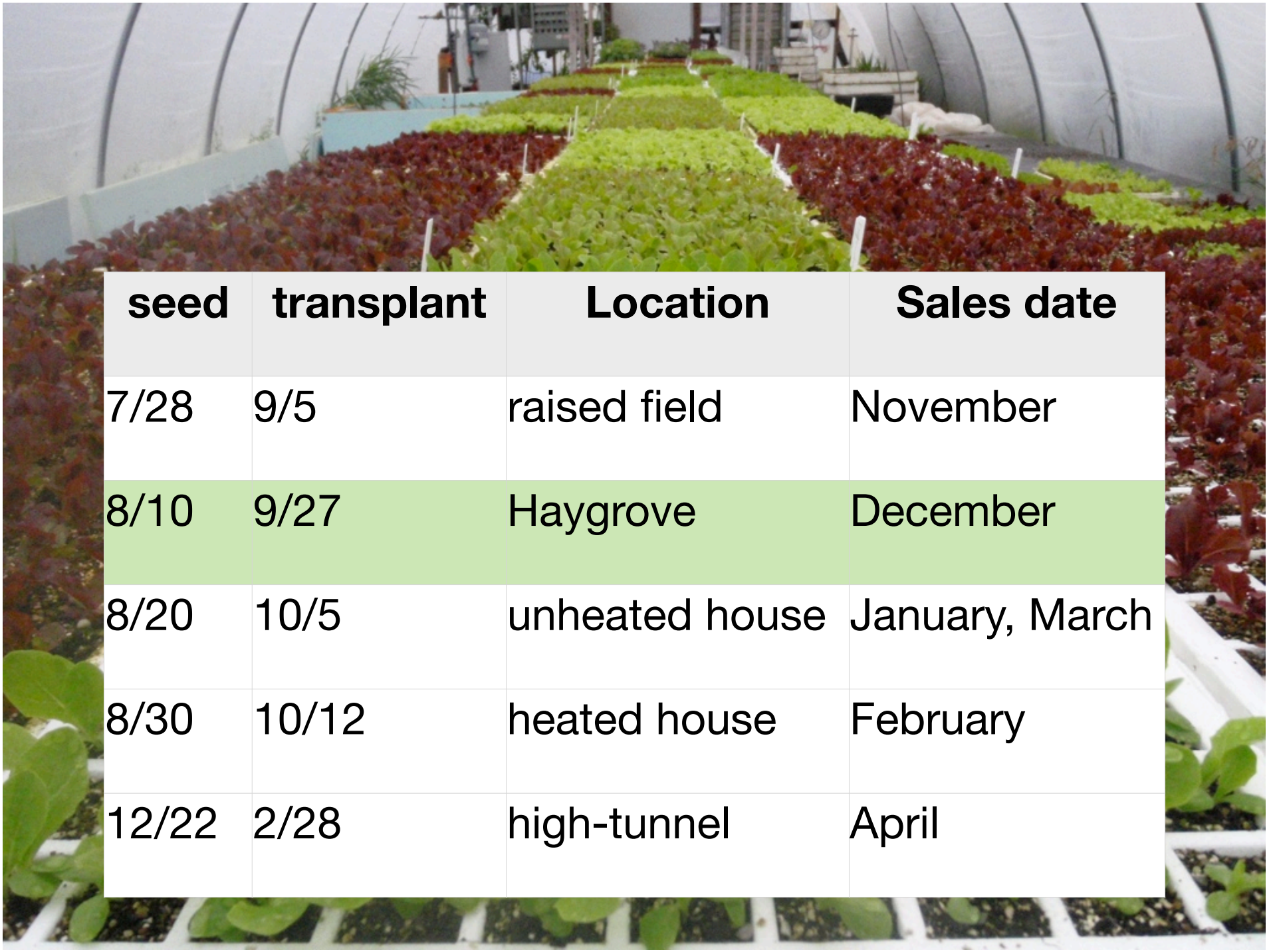
- need Downy Mildew Tolerant (DMT) varieties
- Johnnys 5 star mix (192) good place to start
- like sulu, concept, magenta, winter density

Lettuce Mix

- Lettony
- Bolsachica
- blade
- Sulu
- Galactic



seed	transplant	Location	Sales date
7/28	9/5	raised field	November
8/10	9/27	Haygrove	December
8/20	10/5	unheated house	January, March
8/30	10/12	heated house	February
12/22	2/28	high-tunnel	April



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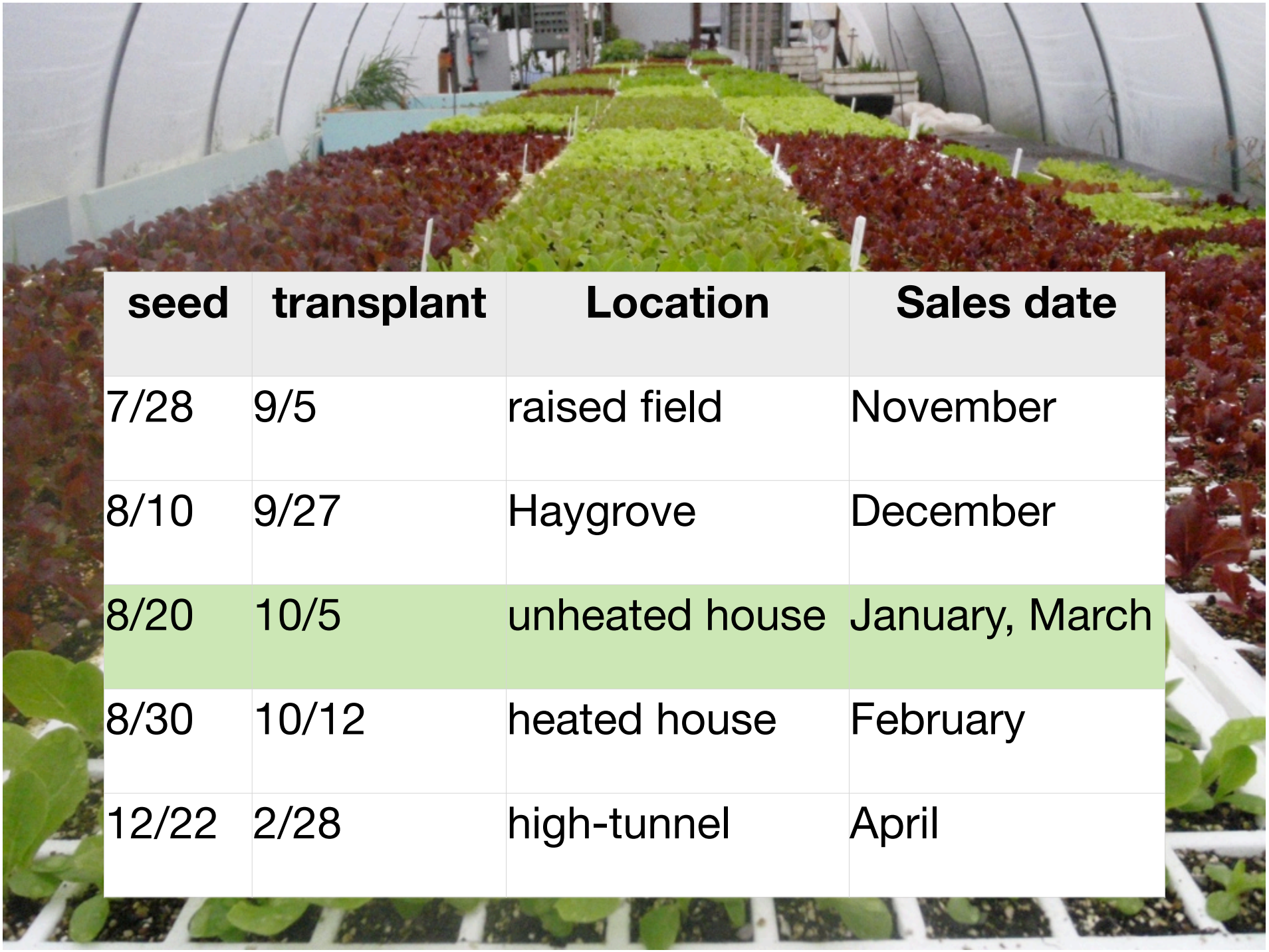

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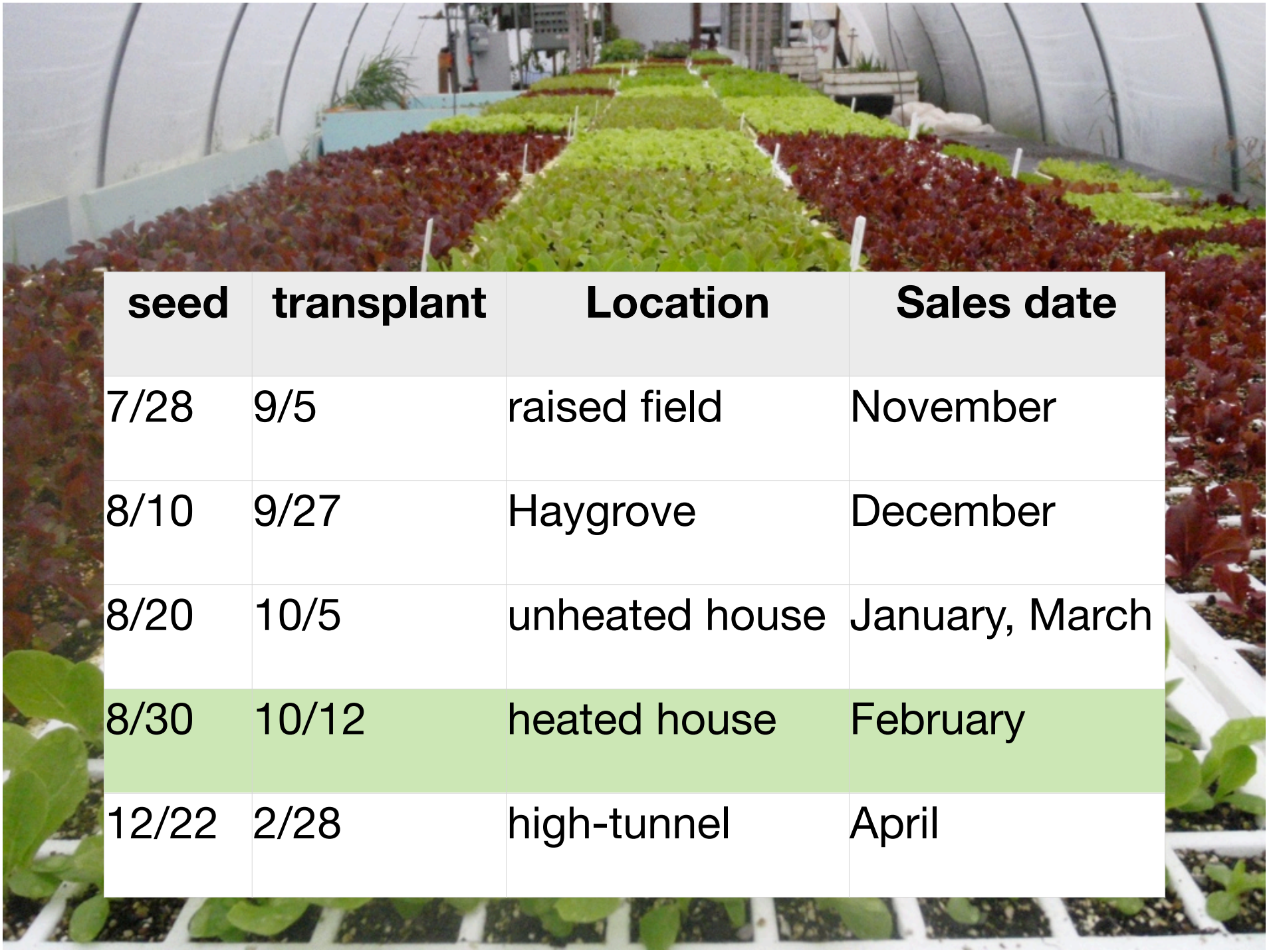
8/30	10/12	heated house	February
12/22	2/28	high-tunnel	April

Transplanted 10/5

Start harvest on12/5



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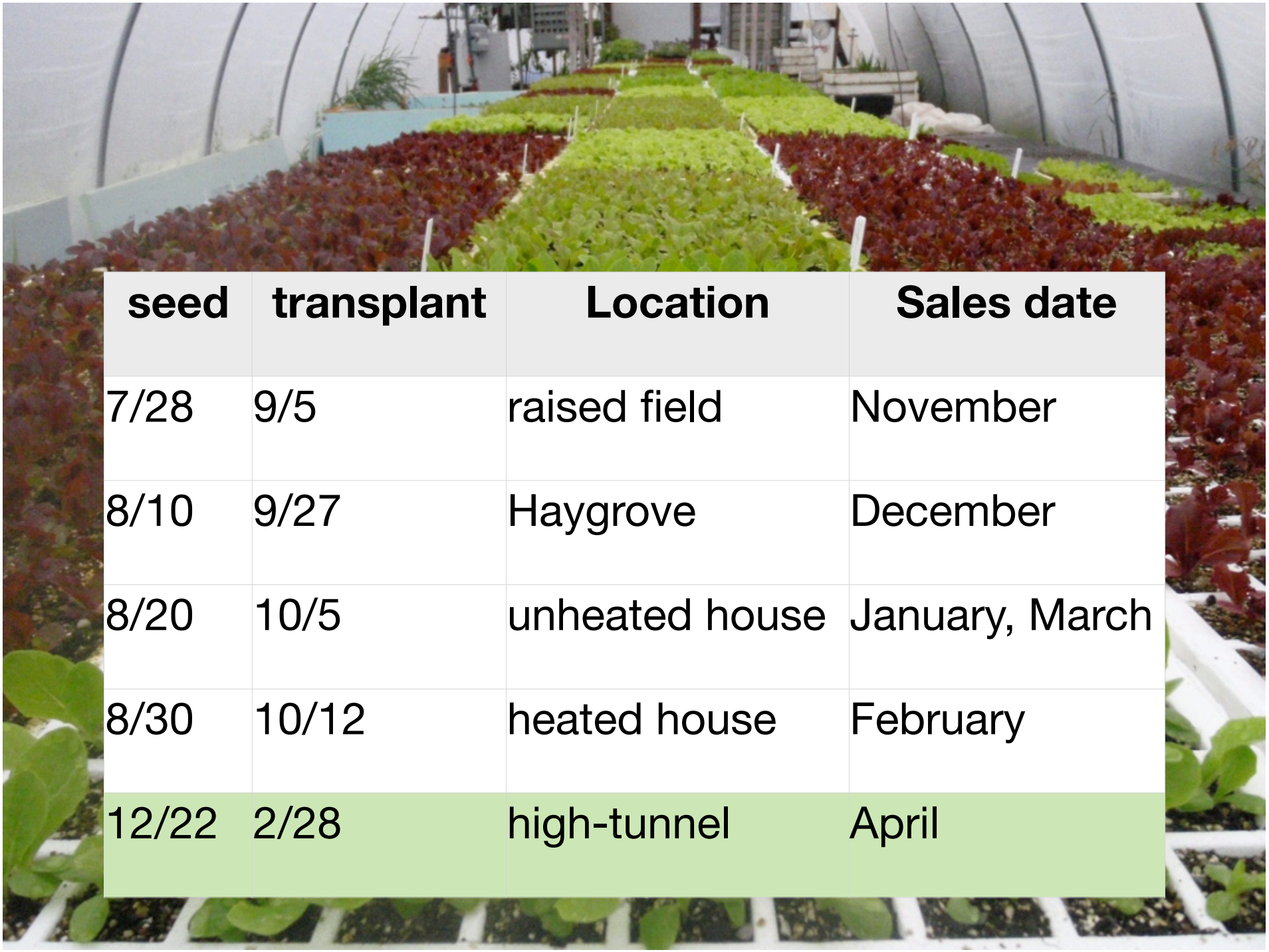

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8/30	10/12	heated house	February
12/22	2/28	high-tunnel	April

Asian Greens

Variety	seed	transplant	Location
Pac choi	8/20	9/16	field
Pac choi	8/25	9/30	haygrove
vitamin green	9/9	10/21	haygrove
Pac choi	9/9	10/15	high tunnel
Vitamin Green	9/9	10/15	High tunnel
Tokyo Bekana	9/9	10/15	High tunnel
Yukina savoy	9/9	10/15	High tunnel
Mix	1/15	2/20	Hoophouse

Variety	seed	transplant	Location
Pac choi	8/20	9/16	field
Pac choi	8/25	9/30	haygrove
Vitamin Green	9/9	10/21	haygrove
Pac choi	9/9	10/15	high tunnel
Vitamin Green	9/9	10/15	High tunnel
Tokyo Bekana	9/9	10/15	High tunnel
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Mix	1/15	2/20	Hoophouse

Variety	seed	transplant	Location
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Pac choi	9/9	10/15	high tunnel
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Tokyo Bekana	9/9	10/15	High tunnel
Yukina savoy	9/9	10/15	High tunnel
Mix	1/15	2/20	Hoophouse

Boc Choi Varieties

- Black Summer
- Mei Qing Choi
- Joi Choi
- Red Choi

Atlantis

Peppers

- Carmen, a red Italian type
- Flavorburst, yellow bell
- Islander, purple bell
- makes $15 per bed ft

Variety	seed	transplant	Field
Flavorburst	3/7	5/2	Haygrove 4
Carmen	3/7	5/2	Haygrove 5
Ace	3/15	5/18	Field
carmen	3/15	5/18	Field

Time	3/1	3/15	4/1	4/15	5/1	5/15
BED 1	strawberries 1st half/	strawberries 1st half	strawberries 1st half/ lettuce mix/ mesclun xx	strawberries 1st half/ lettuce mix/ mesclun	strawberries 1st half/ lettuce mix/ mesclun	strawberries 1st half/ lettuce mix/ mesclun
BED 2	transplanted turnips and radishes- radishes in center of bedxx	transplanted turnips and radishes- radishes in center of bed	transplanted turnips and radishes- radishes in center of bed	transplanted turnips and radishes- radishes in center of bed	Cukes in center of bed turnips finishing up on edges	Cukes in center of bed turnips finishing up on edges
BED 3	Arugula/ mesclunxx	Arugula/ mesclun	Arugula/ mesclun	beans	beans	beans/ tomatoes in center of bed
BED 4	Swiss chard, mustards, pac choi, hon tsai tai xx	Swiss chard, mustards, pac choi, hon tsai tai	Swiss chard, mustards, pac choi, hon tsai tai	Swiss chard, mustards, pac choi, hon tsai tai	peppers	peppers
BED 5	spinach	spinach	spinach	spinach	peppers	peppers

High tunnel planted around 4/1

- 2 rows down a raised bed, plants 18" apart
- double drip tape on surface - 1 next to each row of plants (so we don't hit the tape when we pound the stakes)
- Straw laid down in paths for weed control

Hoophouse planting

- transplanted through black landscape cloth
- 2’ x 2’ spacing
- drip under cloth, 1 run per row
- plastic put on several days after planting to reduce stress on plants

Harvest starting 7/10

French Beans

Can be direct seeded in a hoophouse 3rd week of April
rows 24" apart seeded with Earthway seeder

Variety	seed	transplant	Location
Maxibel	4/23/2011		hoophouse
Maxibel	5/1/2011	5/10	hoophouse

Transplanting

- 2-3 seeds per cell, planted as a multi-plant
- Transplants need to be much smaller (10 days max)
- water in well (reduce stress as much a possible)
- Maxibel best variety
- we transplant 2 rows apart on the bed (plants 12 inches apart) with drip tape down the center

- Need to pick every 2 days to keep small
- Early season beans can command up to $10 lb
- 1.6 lbs per bed ft = $9 per bed ft
- need consistent irrigation
- If we can beat the market by a week we can do $1500 in beans alone on a Saturday

Cherry tomatoes

Cherry tomatoes

- 2 plantings-
  - the January 30th planting is for our greenhouse red cherries
  - the Febuary 30th planting is for hoophouse rainbow cherries
- Our goal has to always stay ahead of the market- we try to be first with the red and when others come in with red move on to rainbow

Cultural techniques

- greenhouse plantings are trellised just like regular tomatoes- 2 leaders clipped up
- hoop house plantings are basket-weave with 7 ft rebar in between 8 ft 2 x 2 stakes
- we pick into 2 gallon mushroom buckets and sort in washing shed

Running cherries though the barrel washer to
mix, shine, and wash off any copper

by the numbers

- @ 3 pints per ft we make $12-15/ft
- varieties from totally tomatoes, tomato growers supply, johnnys
- favorites are chocolate cherry, snow white, green grape, black cherry

Tomato culture

- All are grafted
- Maxifort Rootstock
- Geronimo, Big Beef, Rebelski
- Great White, German Johnson, Black Prince, Cherokee Purple, Indigo rose

Greenhouse Cukes

Greenhouse Cukes

- seeded in 3 inch pots 4 weeks ahead of plant out date
- transplanted 12” apart in a single row down raised bed with 2 drip tubes (cukes love water)
- Hortanova is used for trellising - attached to a pipe suspended in the greenhouse
- Grosses $160,000 per acre

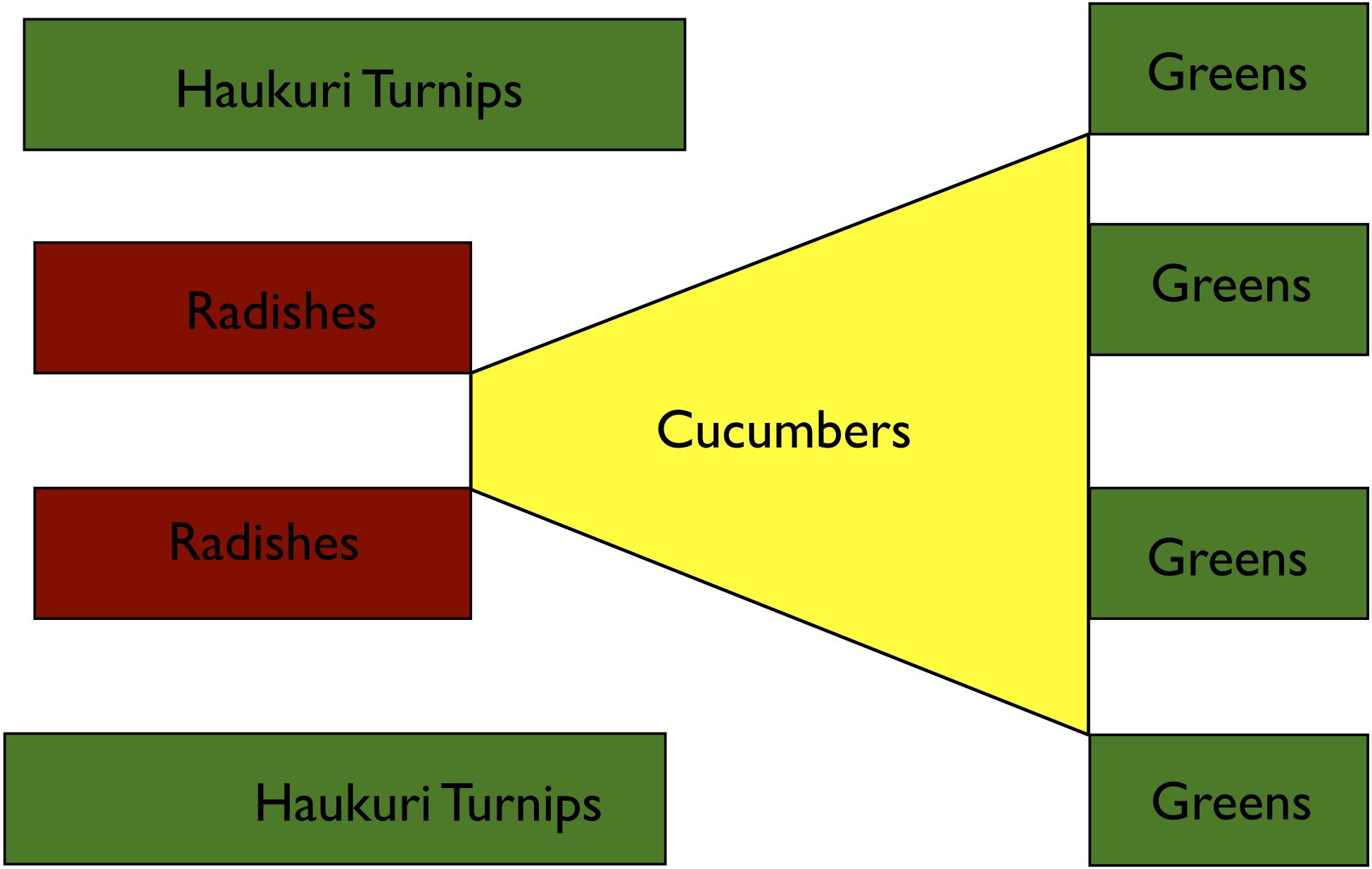
Varieties

- Socrates- smaller euro type- really good flavor
- Tasty Jade- long japanese type, customers love them!
- Diamant- good pickling variety- really productive!
- Need to pick self-pollinating varieties because of pollination

Tasty Jade
Socrates

Variety	seed	transplant	Field
Diamant	3/28	4/18	Haygrove 2
Tasty jade	3/28	4/18	Haygrove 2
Diamant	7/11	7/25	Haygrove 1
Tasty Jade	7/11	7/25	Haygrove 1

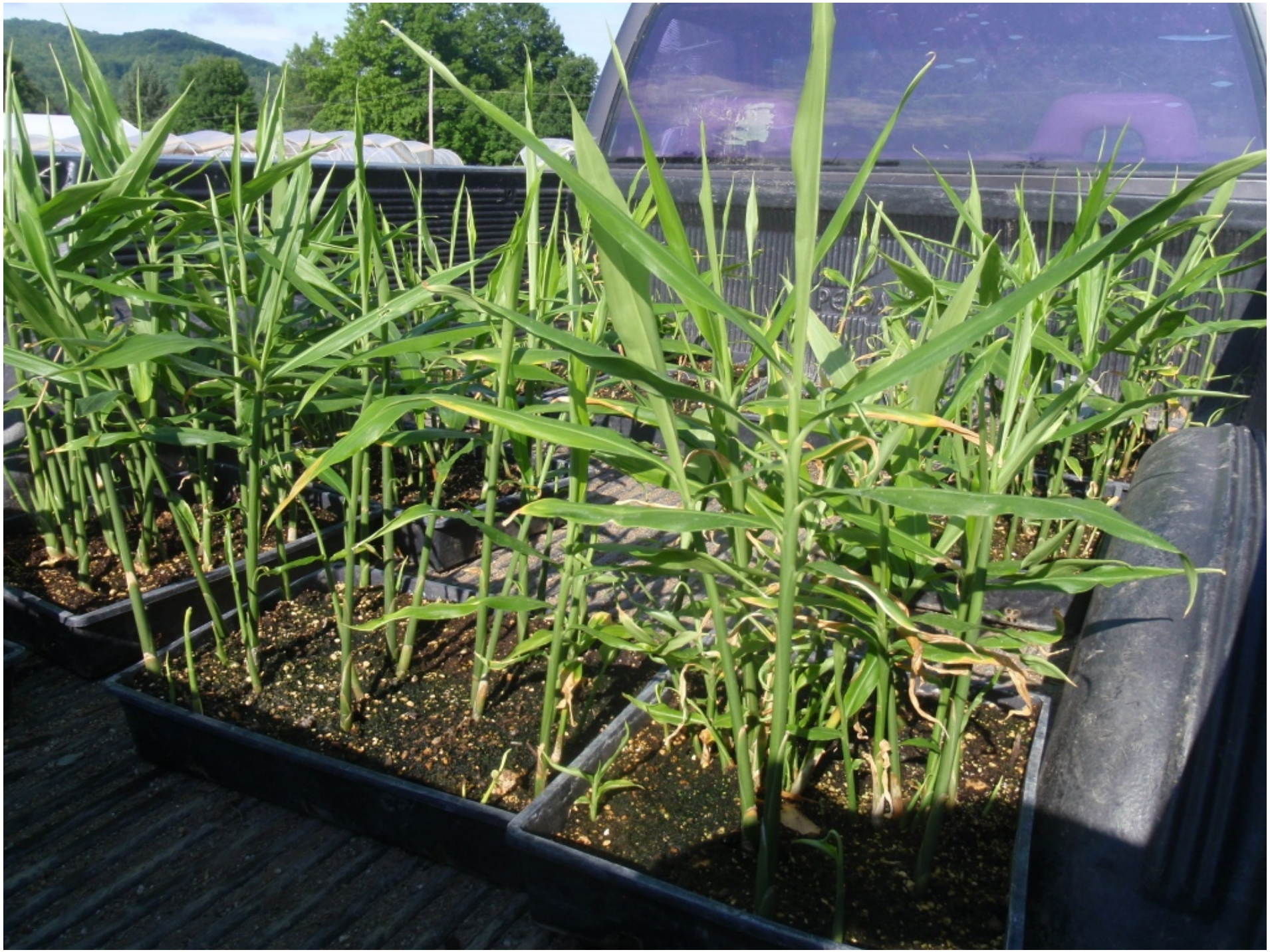
First planting between turnips


Haukuri Turnips
Radishes
Radishes
Haukuri Turnips
Cucumbers
Greens
Greens
Greens
Greens

Variety	seed	transplant	Field
Diamant	3/28	4/18	Haygrove 2
Tasty jade	3/28	4/18	Haygrove 2
Diamant	7/11	7/25	Haygrove 1
Tasty Jade	7/11	7/25	Haygrove 1

Second planting after early greens and lettuce

Seed cut (leaving 3-4 eyes) into
trays and cover with soil mix



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