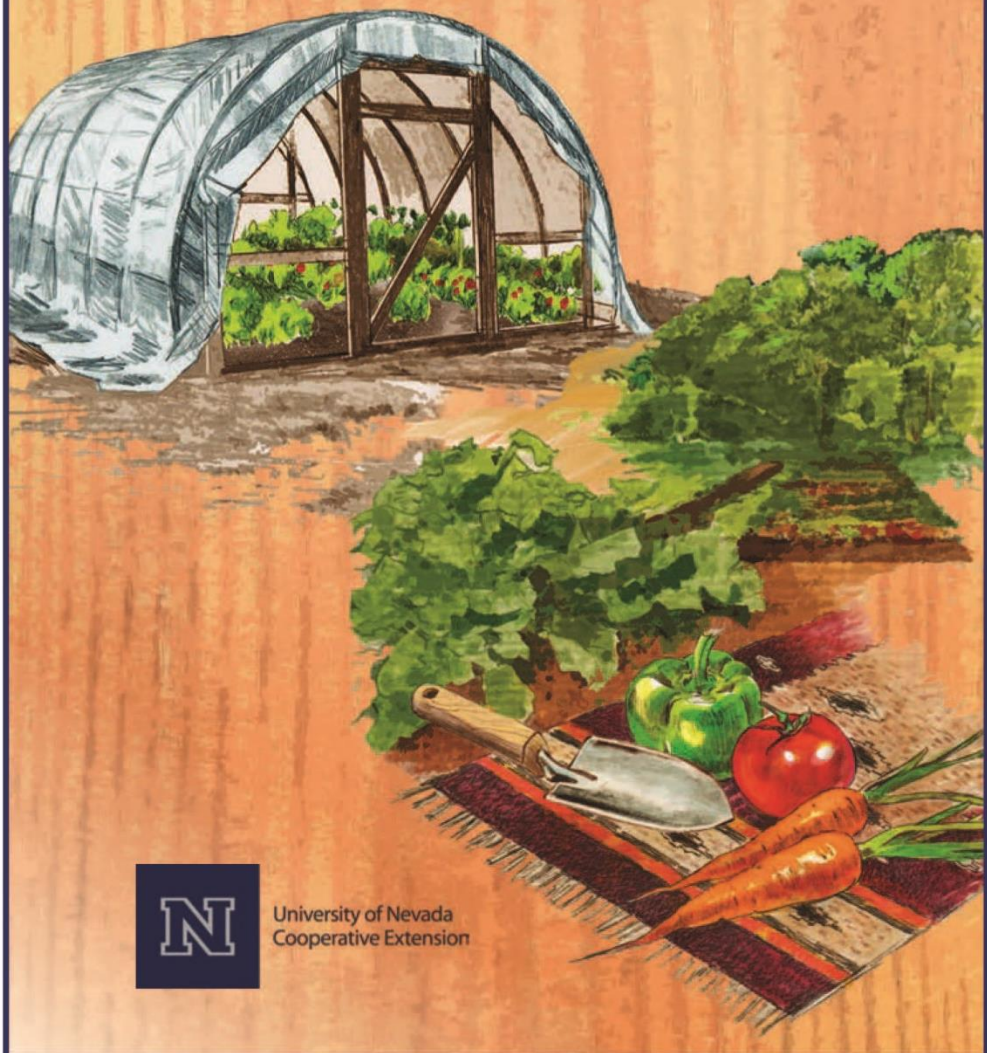


BASIC FARMING PRINCIPLES FOR SUCCESSFUL HOOP HOUSE GROWING



University of Nevada
Cooperative Extension

Reno, Nevada---April 28, 2017

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The Nuts & Bolts of Season Extension Farming

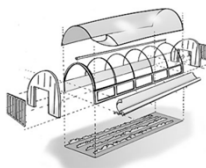


University of Nevada
Cooperative Extension

Presented by:
Rick Lattin,
Managing Partner, Lattin Farms LLC
April 28, 2017
Reno, Nevada

What is Season Extension?

- Season extension is a process of changing the growing environment of plants to enhance and prolong normal growing season.
- Season extension techniques include mulches to warm spring soil, row covers to protect crops from wind and frost and high tunnels to provide more long-term semi-permanent protection for selected crops.
- Season extension is normally growing in existing soil – not on benches or other artificial plant mediums.



What Season Extension is Not

- Season Extension is not greenhouse growing for year around production of a crop by applying supplemental heat to the structure.
- Season extension is not normally associated with hydroponic systems which require heavy capital investment and year long growing.



Why Season Extension in NV?

- Short growing seasons
- Unpredictable weather
- Huge variations in day and night temperatures
- Low humidity
- Dry persistent spring winds



History of Season Extension in NV

- Small farmers in Nevada have been involved in season extension for decades – using hotkaps and other field applied protections from frost due to our short growing seasons.
- Season extension has taken off the last 20 years with the advent of commercial plastic mulches, row covers and high tunnels.
- Specialty Crop Institute & Cooperative Extension encouragement, grant writing and training and building of high tunnels



History of Season Extension in NV

- NRCS funding of high tunnel construction
- Specialty Crop Block grants for high tunnel production experiments
- Improving up-scale local markets i.e., food co-ops, Whole Foods, Farmer's Markets, CSA's, restaurant interest in local production



Key Elements to Hoop House Production

1. Crop Selection
2. Pollination
3. Water management
4. Temperature management
5. Pruning and staking
6. Variety selection



Crop Selection – The Basics

- Any crop for which there exists a market can benefit from high tunnel production.
- There is a higher cost for high tunnel production – must pick crops with high yield potential and high value per unit.
- Value of high tunnel crops is computed by dollar value per square foot and number of days in the structure (multiple crops per year).
- Historically, prices are higher for products early in the season and late in the season that do not compete with field grown products



What do people typically grow in high tunnels?

- Nationwide, tomatoes are the top crop grown in high tunnels
- Other popular crops include peppers, cucumbers, salad greens and cut flowers

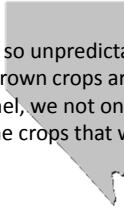


How much does a high tunnel accelerate harvest?

- Most crops grown within a high tunnel are harvested at least a month earlier (and/or later) than field-grown crops.

*****SPECIAL NEVADA NOTE*****

In Northern Nevada, our weather is so unpredictable and our season so short that field-grown crops are not profitable at all. With the high tunnel, we not only get season extension, we can grow some crops that would not make it outside.



How many crops can be produced in a high tunnel per year?

- In the Nevada climate you can expect 2-3 crops per year. A cool season crop, followed by a warm season crop and then back to a cool season crop.
- Quick growing crops such as greens may get an additional crop. If you use cover crops as a soil-building process you may substitute one wintered over crop for that purpose.



Temperature Management

- High tunnels must be managed for both heat and cold. Typically, they are managed passively thru venting systems (vents, fans, roll up or down sides, shade cloth, doors, etc.).
- A must in most vegetable operations is the use of thermal blankets and row covers to trap daytime heat to prevent damage due to night time cooling.



Water Management

- The high tunnel environment means less water usage
- Most high tunnels use drip systems with some use of low volume sprinklers for sprouting.



Pollination



- High temperatures can be as damaging to crops as low temperatures.
- Excessively high temperatures can cause flowers to fall off tomatoes and peppers and reduce pollination.
- Shade cloth and roof vents are effective products used to manage high temperatures.
- Melons, squash and some cucumbers require pollination. Need to open high tunnels to pollinators, use parthenocarpic (self-fruitle) varieties, place bees close by and plant cover crops such as hairy vetch, dill and alyssum around a high tunnel to attract pollinators.

Pruning & Staking

- Space is at a premium in tunnels – staking and pruning improves yield and earliness in cucumbers and tomatoes.



Variety Selection

- Trial and error
- Interdeterminate vs. determinate
- Parthenocarpic
- Varieties proven in high tunnels (tomatoes, cukes – very expensive seed)
- Elliot Coleman's books
- Seed catalogs



Nevada/Utah High Tunnel Info.

Learn From Others Who Have Gone Before

From University of Nevada Cooperative Extension

- Small Farm Hoophouse Production of Vegetables in Desert Climate Costs & Returns 2010 – Holly Gatzke
- Selecting Vegetable Crops for Small-scale Desert Production – Holly Gatzke
- Hoophouse Production in the Desert: Colanaceae and Cucurbitaceae Crops – Holly Gatzke
- Plant Season Extension in the Desert – Holly Gatzke

<http://www.unce.unr.edu/publications/>

From Utah State University Cooperative Extension

- High Tunnel Tomato Production – Dan Drost
- High Tunnel Lettuce in Utah – Dan Drost
- High Tunnel Spinach, High Tunnel Peppers, Fall Bearing Raspberries – Dan Drost & Brent Black

<http://extension.usu.edu/htm/publications>

DVD

Jumping Through Hoops – New Cash Crops of Lincoln County Nevada – Holly Gatzke

10 Reasons **Not** to Grow in High Tunnels

#1 Return on investment

Simply put, input costs are substantially higher in a tunnel versus the field. After amortizing the costs of the structure, the plastic film and other specialized equipment that are required to effectively produce in a tunnel, the field planting has much lower input costs. Yes, increased yield, quality or market window can justify the increased costs of tunnels. However, we have observed in some situations poorly managed tunnels yield equal or less than field plantings. Consider carefully what every square foot of production space is worth and manage with the goal of justifying the increased input costs.

#2 Increased risk

Greenhouses and High Tunnels are typically engineered carefully to balance the environment versus the need to keep material costs low. Metal tube structures do fail as do crops. Between your investment in the tunnel itself, the costs incurred in producing a crop and your anticipated return on investment, growing in protected culture requires a greater attention to details and pest management in order to realize economic goals.

#3 Increased pressure from insects and arthropods

While tunnel culture brings with it the opportunity for higher crop quality, Aphids, Whiteflies, Western Flower Thrips, Spider mites and Broad mites all thrive under tunnel conditions. The dry foliage, stems and fruit grown under intense irrigation and fertilization are ideal environments for these pests to flourish. Scout regularly for pests and consider a proactive pest management that includes banker plants such as Black Pearl and Purple Flash peppers hosting Minute pirate bugs (Orius). Every crop reacts differently under tunnel conditions versus field grown. With no rainfall, Spider mites can increase populations incredibly rapidly unless carefully managed.

Cooperative Extension

10 Reasons **Not** to Grow in High Tunnels

#4 Irrigation management requires greater care vs. field grown

This is especially so on the margins of the season when there are often days with little sunshine. Learning to grow dry(er) during the early and late season will reduce root-borne diseases. Growers must adapt to rapidly changing conditions and know when to increase irrigation flow in order to maximize plant growth, reduce cracks, and Blossom end rot. Consider investing in tensiometers or irrometers in order to monitor root zone moisture levels. Tunnels will require more irrigation than field plantings. Farms with less than adequate water supply should look at tunnels with caution.

#5 Increased disease pressure

While tunnels do reduce diseases such as Early Blight and Septoria Leaf Spot, other diseases are accentuated. Brown leaf mold, Powdery mildew, and Botrytis are occasionally seen in field-grown vegetables, but are standard fare under high tunnel conditions. Increasing air flow, reducing humidity, and using disease resistant varieties will all help to manage these diseases. Brown Leaf Mold in tomatoes is almost exclusive to tunnel-grown tomatoes. We are finally seeing the release of the first tomato varieties with strong resistance to leaf molds. Check with your Extension Specialist / Horticulture Educator for the latest on recommended tunnel varieties.

#6 Tunnels perpetuate viruses

Tunnel tomatoes are a very 'hands-on' crop as many growers have come to appreciate the benefits of greenhouse methods of pruning to improve yields. However, viruses such as Tobacco Mosaic (TMV) are spread mechanically. Workers move the virus down the row with weekly suckering or pruning. Field tomatoes see . . .

10 Reasons **Not** to Grow in High Tunnels

#6 Tunnels perpetuate viruses (cont.)

much less handling and thus are generally at lower risk. High technology greenhouses on the other hand have disinfection protocols in place to reduce the spread. The soil-based system is also more difficult to disinfect than a concrete floor. The in-between greenhouse field nature of a high tunnel perpetuates TMV. So what can we do to prevent TMV in tunnels? Buy only from reputable seed sources and consider seed treatment. The use of disposable gloves, regular hand washing and tool disinfection will reduce the spread of viruses and other systemic diseases. There are now commercial pruning tools with reservoirs to disinfect the blade continually during usage. Remove suspect plants immediately.

#7 Soil health and nutrition

Tomatoes are the single most popular high tunnel crop due to their high return on investment and high market demand. There is considerable pressure not to rotate tunnel crops as you would fields. This can result in steadily increasing soil-borne diseases such as Fusariums and Verticilliums. Using only the best quality plants from known and trusted sources along with inoculating plant roots with Actinovate AG, RootShield Plus, Companion, Cease... (there are an increasing number of biological root inoculants available). These practices reduce the potential need to fumigate.

In addition, tomatoes are heavy feeders making strict attention to soil tests and tissue analysis especially important in the usually higher (than field) densities used in high tunnels. Maintaining recommended levels of Ca, Mg and K are often challenging in tunnels. Since it never rains in a tunnel, all nutrients that the roots utilize are within the drip irrigation zone. This root area can quickly be exhausted of nutrients. Both injected and foliarly-applied nutrients are necessary to maintain nutrient levels are their optimum levels during ideal growing periods.

10 Reasons **Not** to Grow in High Tunnels

#8 Negative R values

Under early and late season short and cloudy days and clear, cold nights, it is possible to have the low temperature in a high tunnel be lower longer than outdoors. Cold nights, particularly in spring, can see temperatures lower inside the tunnel than out (hard to believe but true). Using a set of heavy floating row covers under these conditions can help to keep a crop alive. Many growers will opt to use a low output heater during these conditions to keep temperatures above 45-50F. In general, an unheated high tunnel can be reliably planted with tomatoes about 4 weeks prior to the normal outdoor planting season. Adding heat can speed up successful planting by 8 weeks or more.

#9 Increased management and labor

It is more challenging to manage tomatoes, peppers, cucumbers, strawberries and raspberries indoors. Pest populations and infestations tend to come on quickly requiring a very proactive management program. The narrow aisles require careful attention to crop canopy management, so pruning and trellising are constant chores. Is there room within your schedule as manager to accommodate the increased demands of a tunnel? We have seen many cases where the answer is No.

#10 Playing field irregularities due to subsidized tunnel purchases

Recent grant programs have created two levels of tunnel purchases, those that are subsidized and those were not. Growers that purchase their tunnels without the grant subsidy may have paid 40-60% more for their first high tunnel. If you are not a grant recipient, your input costs will be higher, and your margin lower, than others.

Summarized from an article written by:
Steve Bogash - Commercial Horticulture Educator, Penn State University Cooperative Extension
Judson Reid - Extension Vegetable Specialist, Penn State University Cooperative Extension

DIRECT MARKETING FOR SMALL
FARMS

Where is Success Found:
Market or Production?



Presented by:
Rick Lattin, Managing Partner
Lattin Farms, LLC
Reno, Nevada
April 28, 2017

The Role of Production



Ante up!

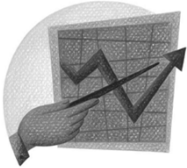
Without successful production, there is no marketing.

Finding Success Through
Production & Marketing



Sell Before You Sow

- Don't plant one seed until you know who your customers will be.
- Match your planning to your market – anticipate the market.
- There's nothing worse than producing a crop, only to find out that you can't sell it.



- Market analysis not only helps determine if your prospective enterprise can be profitable, but also determines how you will promote and market your product.

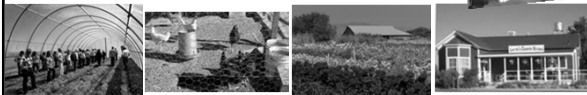
Start Small

- Test your ability to grow and market new products before you scale up.
- Starting small also helps assure you'll produce a quality product.
- Concentrate initially on producing a few specialties, and establish a reputation for quality.



Diversify

- Check with current or potential buyers such as specialty distributors, restaurant chefs, customers at your own farm market.
- Play around in the kitchen experimenting with different ways to use your products.
- Don't get swept away by every new possibility that comes along.
- Evaluate how each crop matches your skills, preferences and resources.
- Don't put all your eggs in one basket. If weather, pests, or a collapsed market wipe out one crop, you've got others to rely on.
- Diversifying markets can be simpler and more lucrative than diversifying production.



Think Specialty Crops

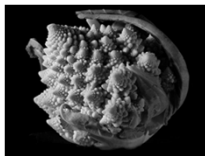
- Raise high-value crops.
- It just has to taste special!
- You are not Wal-Mart.
- Specialty can be variety, quality, freshness, taste, appearance, variety.



Discover New & Exciting Flavors

Prepare for Change

- The secret of high-value, specialty marketing is to know ahead of time what your market is, and where it's going.
- Be prepared to change with the seasons.
- Too many growers just go by what sold well last year - but most specialty buyers, such as chefs, are constantly looking for something new.
- In case your high-end markets don't take all your premium produce, develop secondary outlets for your specialty crops such as canning, processing or selling at lower-end markets.



Seek Profitable Trends & Charge for Them

- Look for niche markets through such trends as:
 - health and nutrition
 - smaller packages
 - more diverse & higher quality foods
 - quality and convenience
 - ethnic foods
 - foods for weight-conscious
 - foods for food safety-conscious
- Some other trends
 - demand for fresh, in-season, local produce
 - organic produce
 - cut flowers



Locavore: Someone who eats within a certain distance of his home (Oxford 2007 word of the year)

Grow and Market for Quality

- Some customers will pay the price you name for **quality** they can't get elsewhere.
- **Freshness:** keep your products on the vine or tree as long as possible, then get them to the consumer as soon as possible after harvest.
- **Variety:** comb through specialty.
- Seed catalogs: search for varieties that boast of excellence in flavor, and fit your season and growing conditions .
- Plant 10% more than you plan to market.



Extend Your Season

- Extend your harvest by successively planting different varieties with different harvest dates.
- Steady production stretched over a long growing season provides numerous benefits
- Farming in Nevada requires season extension
 - varieties
 - high tunnels
 - row covers
 - mulches, etc.



Know Your Customers

- Find out first what will sell!
- Get to know your customers or buyers, why they purchase what they do, and what else they might like to purchase.
- Make it a habit to informally survey your customers.



Test Market Your Product

- Offer your product or service on a limited basis in order to evaluate potential sales.
- Ask your family and friends to give you both positive and negative feedback on any new product or idea you try.
- Send retail or wholesale buyers new product samples and ask for their feedback.
- Use small focus groups to gain insights on your new product.
- Use advertisements as a type of low-cost test promotion.



Don't Compete with Everyone Else



- The name of the game is niche marketing.
- Differentiate your product -- what you grow and how you grow it (i.e., organic)
- Some other ways to differentiate your product might include:
 - service such as washing your lettuce
 - home delivery of products
 - giving information such as recipes or workshops

Look for High-return Marketing Outlets

- High-end restaurants
- Specialty produce businesses
- Farmer's markets
- On-farm market
- Gourmet stores, etc.





Educate the Customer

- The more people know about your product and what went into growing it and how to use it, the more they are willing to pay premium price.
- Ways to inform customers about your products or services include:
 - point-of-purchase educational brochures and flyers
 - on-farm demonstrations and workshops
 - free recipe sheets
 - product information on labels
 - educational articles or columns in the media
 - regularly published newsletter

Price for Quality

- Offer a unique, high-quality product that customers can't get elsewhere.
- Stress quality, freshness and uniqueness rather than "cheap food".
- Package expensive specialty items in smaller units.



Sell Yourself & Your Farm



- Farmers are an endangered species – there aren't many of us around.
- Capitalize on your uniqueness.
- Personal sales is the oldest and most effective form of marketing - USE IT!!
- You grew and intimately knows the product you're selling, you can sell twice as much on any given day as a hired salesman!
- Repeat it!

The Lattin Farms Experience



DIRECT MARKET VENUES





- FRESH CERTIFIED ORGANIC PRODUCE
- ON-FARM PROCESSED JAMS, PICKLES
- ON-FARM BAKERY
- CATERED ON-FARM EVENTS/ACTIVITIES
- CO-PACK PROCESSED ITEMS
- LOCAL FARMER ITEMS

Farm Fun

- CORN MAZE
- PUMPKIN PATCH
- COW TRAIN, BOUNCE HOUSE, COW TRAIN
- FALL FESTIVAL, CRAFT FAIR, GOAT DAYS
- FARM OPEN HOUSES, SPECIAL EVENTS
- PICK YOUR OWN
- WEDDINGS, WAKES, REUNIONS, PICNICS, ETC

Education

- SCHOOL EDUCATIONAL TOURS
- HEALTHY EATING CLASSES
- SPECIALIZED GROUP TOURS
- OPEN HOUSES
- FOOD PRESERVATION CLASSES
- CSA EVENTS

WHERE IS THE MONEY?

- FOOD ----- 89%
- FUN ----- 9%
- EDUCATION -- 2%
 - FOOD BREAKDOWN
 - 65% PRODUCE
 - 20% KITCHEN
 - 15% FIELD CROPS(ALFALFA, SMALL GRAINS)

**PRODUCE INCOME BREAKDOWN
CUSTOMERS**

- GROWERS MARKET ----- 54%
- CSA ----- 25%
- WHOLESALE ACCOUNTS -- 11%
- FARMER'S MARKETS ----- 9%

**PRODUCE INCOME BREAKDOWN
CROPS**

- CANTALOUPE ----- 21%
 - TOMATOES ----- 15%
 - SQUASH ----- 10%(SUMMER, WINTER)
 - PUMPKINS ----- 7%*
 - CUCUMBERS -----5%
 - GREENS ----- 4%**
 - PEPPERS ----- 4%
 - GARLIC/ONIONS -----4%
 - WATERMELON ----- 4%
 - RASPBERRIES ----- 3%
 - CORN ----- 3%
- *MANY PUMPKINS GET RECORDED IN FUN(HAYRIDES)
 **IN 2011 MOSTS OF GREENS SOLD WERE PURCHASED FROM LOCAL FARM
 FOR BASKET SALES – 2012 ANTICIPATE 6-8% OF SALES

GROWERS MARKET AT LATTIN FARMS



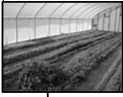
Questions?



This presentation is based on ideas presented in:
Tips to Successful Farm Produce Marketing
Duncan M. Chembezi, Ph.D
Professor and Director
Small Farms Research Center
Alabama A&M University



Basic Farming Principals for Successful Hoop House Growing



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4/8/2017

1

- Soil Temperature Germination Ranges for Select Vegetables

TEMP (° F) Direct seed:

- 45-85 cabbage, kale, broccoli, collards seedlings / prefer 45 - 65
- 35-80 lettuce, Asians, and most salad greens (* at more than 80 degrees germination rate drops 50%)
- 35-75 spinach (optimum 68)
- 50-85 onions (optimum 75)
- 45-95 radishes (optimum 85)
- 50-85 beets, Swiss chard (optimum 85)
- 40-75 peas (optimum 75)

Below (* using transplants) -- late spring or early in hoop-house.

- 60-85 * beans, snap (optimum 80)
- 65-82 * tomatoes (optimum 80)
- 60-95 * peppers (optimum 85)
- 65-100 * cucumbers.

* Note: for hoop houses: melons, squash (optimum 80-90). Pumpkin, Corn and are best planted outdoors, as they require more space.

See pass-outs or check Johnny's Seed Growers Library <http://www.johnnyseeds.com/growers-library/vegetables/growers-library-vegetables.html> for additional information on many subjects + soil temperatures and germination.




4/8/2017

2

LAY-OUT GRO-BEDS & WARM THEM IF NEEDED




Soil too cool – and you are anxious to start planting? Use porous covers, like Agribon (Remay) fabric or alternately, black plastic to cover beds (with or without hoops). Create additional warmth as needed. Some folks even hang “curtains” around edges of hoop, to lessen cold infiltration / heat loss. Raised beds are nice for drainage. Easy to work in. Keep after early sprouting weeds.

4/8/2017

3

DON'T GUESS

Determine fertility needs with a good soil test, from an agricultural lab that will give you organic results TO SHOW POTENTIAL PROBLEMS and explain any needs. Such a lab may be A&L Western Labs in Modesto. Or you can go through a company a like Peaceful Valley Farm Supply

Remember, crop residue is good organic matter and may be tilled in, allowing for time and moisture to break down the materials.

We do not recommend tilling in solanum crop (tomato, potato, eggplant, peppers, ETC) residue.



Compost beds, between food crops and green manure cycle.

4/8/2017

4

Our "cool" crops in Hoop-Houses



Arugula and Asian Greens
Beets
Bok-Choy
Broccoli (sprouting variety)
Cabbage
Carrots
Garlic and other Alliums
Herbs: cilantro, parsley, oregano, thyme

Kale
Lettuces and other cold hardy greens.
Leeks, scallions
Mache, claytonia,
Mustards (including Broccoli Raab
Radishes & Hong-Vit
Spinach
Turnips (white oriental and scarlet)



4/8/2017

5

Hoop House Vegetable Planting Guide

Vegetable	Amount per 10'	Days to Germinate	Space Plants	Space rows	Weeks to Start Or Direct Seed	Yields per 10'	
beans, snap	1 to 1.5 oz	6 to 10	2 to 3"	2 ft	N/A	yes	6 LB
beets	1/2 packet	7 to 15	2 to 4"	12-16"	N/A	yes	3 to 4 LB
broccoli	5-7 plants	7 to 10	18 to 24"	24" or more	4 to 6	no	10 LB + sprouts
cabbage T	7 - 10 plants	7 to 10	18 to 24"	24 "	4 to 6	no	7 - 10 heads
carrots	1/2 packet	14 to 21	2"	12 to 18 "	N/A	yes	10-14 lb.
chard	up to 1/2 pkt.	7 to 10	2 to 4 "	12-16"	N/A	yes	12 LB
cucumbers	1/2 packet	7 to 10	12-18"	row	N/A	yes	10 LB
greens	like lettuce						
lettuce	1 pkt.	7 to 10	1 - 5 "	12-18 "	N/A	yes	4-8 lb cut again
radish	1 pkt.	5 to 7	1 - 2"	12 "	N/A	yes	8-12 bunches
spinach	1 pkt.	8 to 10	3 - 6"	12-16"	N/A	yes	5-10 LB
Peppers T	5-7 plants	14 to 20 days	18 to 24"	3-4'	8 to 10 weeks	no	up to 30-40 fruit
Tomatoes T	2-5 plants	8 to 10 days	24"	3-4'	6 to 8 weeks	no	up to 60 LB "

Go on-line to look up seed planting guides and more in depth information for planting both in a hoop house, or in the field. Another fun site is at the Old Farmers Almanac, where you type in your zip-code, and sign up for personalized information. <http://www.almanac.com/> (Also remember Johnny's Seeds and extension sites.)

4/8/2017

6

Get Help and Information

Clyde's Garden Planner: A very informative and **handy slide chart**. Small enough to go with you to the garden and large enough to glean a lot of helpful information, including frost free dates to planting (seed or transplants) to harvest yields in 10 ft. increments. Handy, general guidelines for outdoor gardens or hoop houses. clydesvegetableplantingchart.com/ Be sure to check out their **video**.

Nevada Extension:

<https://www.unce.unr.edu/resources/horticulture/growyourown/>

More on seeds, supplies and vegetable growing information - so al many additional catalogs (watch for free shipping offers). Also available on-line: Peaceful Valley Farm Supply www.groworganic.com
High Mowing Seeds <https://www.highmowingseeds.com/>
Irrigation supplies: Dripworks <https://www.dripworks.com>

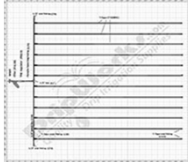
Check out your local area suppliers: Here is one for Northern NV, for example; Silverado Farm Supply in Yerington, NV. Bill Chounet is our contact. www.srsupply.us

4/8/2017

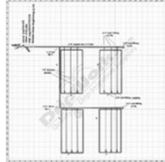
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Part 2; Hoop house Watering

- You have prepared the soil beds or rows.
- You have decided what to plant and when
- Time for the all-important need – watering, to produce the foods.



Showing just a couple ideas for layout of beds and watering systems with driplines. You have many choices.



4/8/2017

8

What's your water source?



NOT VERY EFFICIENT
if you are having to wait on ice & frozen hoses
OR
Will be dragging a hose all over your plants.

9

For my 40 ft bed-rows, I filled up 5 x



**Watering by hand
Not very efficient.**

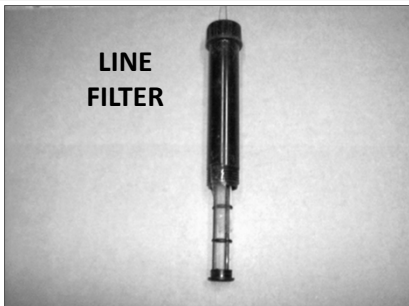
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**Preferred method – a freezeless faucet
inside your hoop house.**

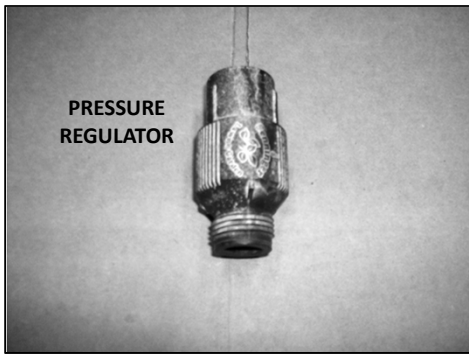


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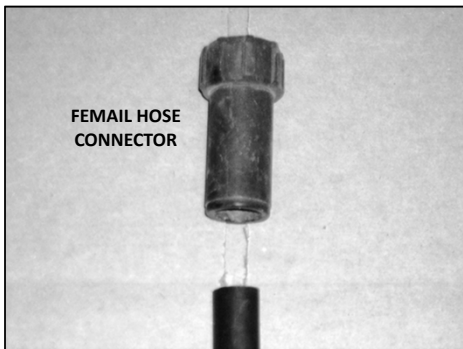
Putting it all together



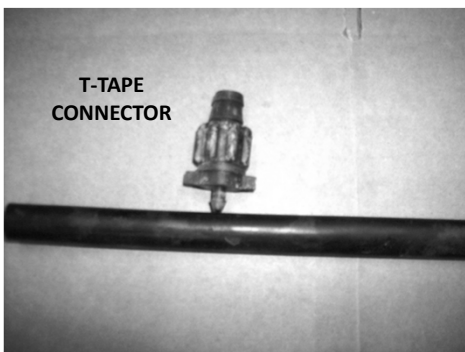
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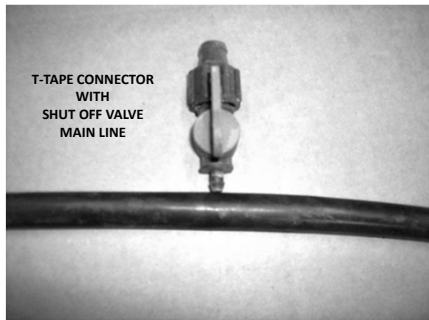
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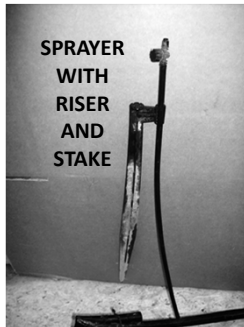
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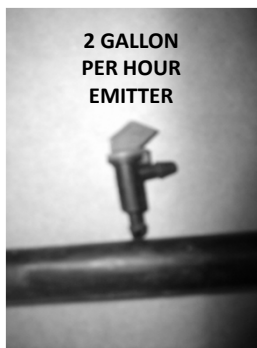
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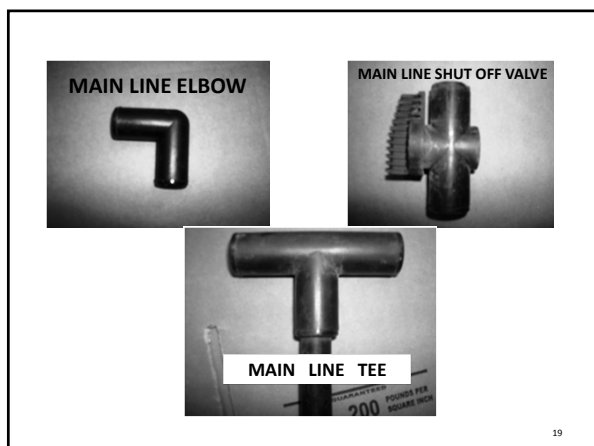
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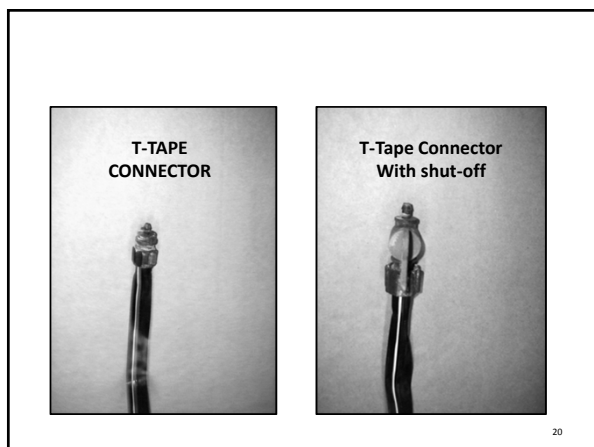


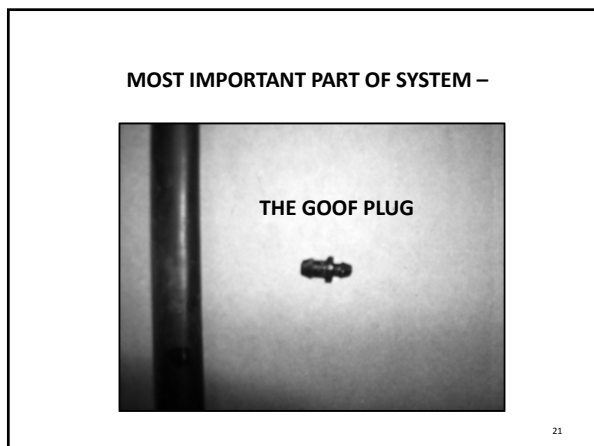
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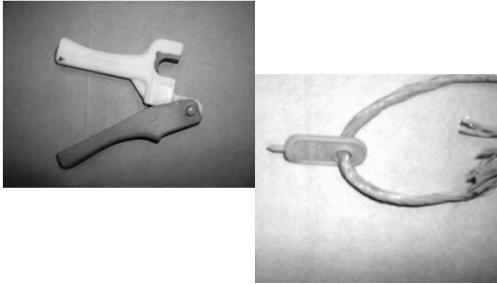
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Punches for drip system installation



22

How it Works – Putting it all Together



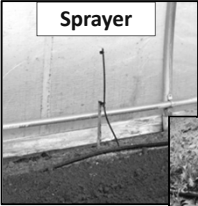
23

Pick a system and stick with it
Commercial -- VS -- Home improvement store

All parts will vary in size

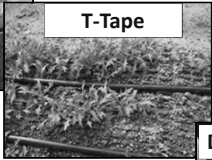
Commercial	- VS -	Home improvement
.700" OD		.620" OD
Dripworks Catalog or		Home Depot, Lowe's
Internet:		or hardware store
www.dripworks.com/pro		

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Sprayer

Choices in watering methods



T-Tape



Drip

25

WHEN TO WATER

Depending on Season:

Early Morning ??

Afternoon ??

Always avoid having wet foliage when the sun brings hot temps.

How much to water?

- Most important -- be consistent.
- You will soon learn what works best. Not enough or over-watering can both harm or cause problems.

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Basic Principles of Hoop-House Growing

NV. Cooperative Extension
April 28, 2017

Part 1; Soil Preparation

Presented by Ray Johnson
Custom Gardens Organic farm
3701 Elm St.
Silver Springs, NV 89429
577-2069 customgardens@att.net

4/18/2017

1

It all starts with the soil....



4/18/2017

2

Green manures enrich the soil where your future produce will grow!



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1: A typical soil builder seed mix 2: Growing a healthy soil.

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3



Cutting a good stand of overwintered soil builder green-manure crop.

Remember allow 2-3 weeks for good breakdown.
before planting vegetable seed.

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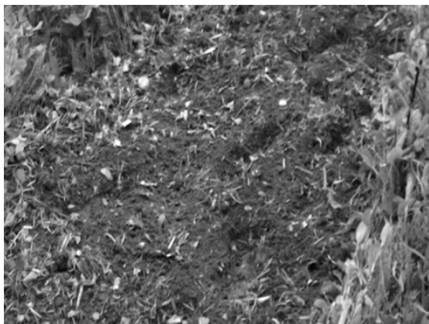
4



Tilling is the fun part!

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5



Check out all of the soil organic matter & nutrition

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6



Almost done tilling in the green manure!

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7

It all starts with the soil!

- **Know the soil in the garden area.**
- This is done by getting a **soil test**. Generally, any reputable lab will do – but consider using a lab that will give you the organic readings, if you are growing organically. The lab test will tell you what is good and what is lacking, without using chemicals. You will also get to know the N-P-K
- **(Nitrogen, Phosphorous, and Potassium)** + other nutrients and minerals that may be lacking (or excessive such as salts/alkali) + and how much organic matter your soil contains. There will be other findings – important to healthy soils which produce healthy fruits and vegetables.

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Doing your soil test.



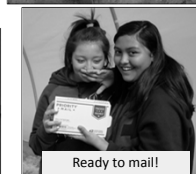
Clean hands & tools



Follow instructions from your testing lab.



Into clean zip bag!



Ready to mail!

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A crash course on N-P-K

There's more details, and resources next up.....

N	Stands for Nitrogen. Nitrogen helps make plants greener, and helps plants grow faster. Nitrogen can be depleted over time by plants, or by being washed away.
P	Stands for Phosphorus. Phosphorus is good for root growth, disease resistance, seed and fruit growth, and for blooming and flowering.
K	Stands for Potash (or Potassium). Potash can help with increasing root growth, with drought resistance, and with disease resistance. (So why is it K? Because it would be confusing if they used P twice in a row, and you'd never know which is which!)

Important!

Don't just grab a bag with high numbers on it and start spreading it on your garden. Your soil might already have plenty of phosphorous or potassium.

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Why N-P-K & Where to find it naturally.

- N Nitrogen** = vegetative growth above ground. Deficiency usually shows up first in leaves: Yellowish or light green and smaller than they should be. Plant a "Green manure" crop to build soil; suppress weeds, add organic matter (in a hoop or in the field)

Peas, vetch, bell beans are some of the nitrogen providers

Other N sources: Fish, Farm Animal Manure (preferably composted). Or if a commercial product, stay away from products such as bagged treatment plant fertilizers – they contain sewage sludge, not allowed in organic production. Allow time 90 to 120 days to crop harvest when using raw manures.

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- P = Phosphorous:** A major element in plant nutrition, healthy growth, strong roots, blossom and fruit development, and disease resistance. Deficiencies may be red or purple discoloration underside of leaves and on stems or leaf veins.

Best sources are: Soft Rock Phosphate, Bone Meal (animal or fish) aged goat or sheep manure. (If using manures, organic growers have a 90-120 day rule)

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- **K = Potassium** ; essential for the development of strong healthy plants.

Helps plants resist diseases, pests, helps protect from cold or hot weather stresses and wind. Deficiencies contribute to poor yield, leaves with yellow streaks leaf edges dry and scorched looking, poorly developed roots.



Some Natural Sources are: Plant residues, manures, compost, "greensand", a marine deposit, found in garden centers), wood ash (use sparingly as it will contribute to excess alkalinity – very prevalent in NV arid soils. In addition: A "tea" of Blackstrap Molasses & water has potassium plus many other nutrients that plants love.

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Part 2; Deciding which Crops to Plant



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What to Grow in a Hoop-House?

- Anything you grow in your field, plus....
- Crops to extend your season, before and after main season.
- Specialty crops to bring higher income.
- Novelty, or Ethnic crops.
- Herbs, edible or cut-flowers, small fruit
- It's up to you and customer demand....

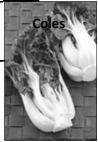


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Planting for the Season

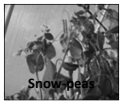

Sprouting Broccoli


Coles

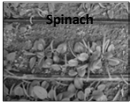

Kohlrabi


Onion, Onions & Leeks

Some Cool Season Hardy Crops


Snow peas


Raidishes


Spinach


Turnips

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Our “cool” crops

off-season (fall- winter-spring)



Arugula
Beets
Bok-Choy
Broccoli (sprouting variety)
Cabbage
Carrots
Cutting Celery
Garlic
Herbs: chives, parsley, oregano, thyme

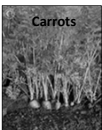
Kale
Lettuces
Leeks
Mache
Mustards (including Broccoli Raab)
Radishes & Hong-Vit
Spinach
Turnips (white oriental and scarlet)




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SEMI-HARDY COOL SEASON


Beets


Carrots


Cauliflower


Cool Herbs


Lettuces


New Potatoes


Chard


Remember to have extra frost protection handy for plunging temps.

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Some produce will thrive in the summer months!



Tomatoes, Peppers and Cucumber



Sweet Potatoes do very well!

VENTILATION AND OR SHADE IS CRUCIAL DURING SOME SPRING DAYS, MOST SUMMER DAYS, and a few weeks in the FALL.

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Target your harvest dates to determine when to plant.



- **Early Spring Crops** are ideal for an unheated greenhouse. The sun will warm the inside of the greenhouse, making it possible to grow carrots, lettuce, onions, spinach, radish, peas and a host of other early spring crops. Watering needs are less.
- **Lower light levels** and the occasional freeze will not harm these types of plants, especially if you have frost fabric ready to cover during the nights, or on really cold or freezing days. Harvest later in the day on frosty mornings – (to lessen nitrate buildup that happens with low light & cold temps.)
- **Once the air temperature warms up** inside the greenhouse, the crops will perk up, and the quality of the produce will be the same as before.
- **Day-length is increasing starting in February**, (10 to 11) so these crops will take off and grow! Remember, it may take a bit longer to reach maturity. Seed packet maturity is just a guide. Use a chart, (provided) and possibly add or subtract some extra days or weeks to your actual harvest.

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April – May: Plant for summer

- **If overwinter plants start to bolt** – till them in, or till in green manure, wait a week or so, and re-plant with vegetables you want in early summer.
- **Summer Crops:** Choose warm-weather crops, such as peppers, tomatoes, eggplant, basil, or fruits or flowers, to replace the early spring crops. Transplants that you started a few weeks ago can go in. (keep covers ready for extra cold weather) Transplants can be popped into an existing lettuce or greens bed that is finishing, just add a bit of compost to planting hole.
- **Shade is required;** for most summer crops grown in a hoop house so they do not burn up. Covering the house with shade cloth is the easiest way to accomplish this task.
- **Keep the soil cool;** by watering daily or as needed. Ventilate the summer house by using fans, or opening the windows, doors and vents, to allow better air circulation and keep temperatures down.

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What are some of the differences between * hoop-house and field?

- * Appearance (cosmetic) & less problems
- * Quality
- * More yield in smaller space
- * Getting to "market" earlier
- * Opportunities (trial and develop new to area crops)



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Grow with less effort

- Fewer Pests (insects & disease)
- Less "inputs" overall
- Better retention of inputs
- Water savings
- Less and easier weeding
- Harvesting in various seasons, warm and cold.
- Fewer inputs for soil, pest, disease control

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Some crops (ginger? Sweet potatoes?) will occupy our Hoop House for several months.
We are able to plant quick vegetables – 30-60 days to maturity,
To grow right along-side the crops that take longer.



We also have a couple Perennials in a hoop house:
True Asian Lemongrass and Wild Strawberries



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Buried Treasure – Our Reward September through mid December



Our volunteer Stephanie – helping
with the Baby Ginger Harvest.
Happy DAZE!



Here, Dave our farm helper for 18 years,
manages the cleaning operation for the
ginger. (filling orders)

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**Happy growing – no matter the season.
Stay tuned for part 3**



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