ARGYLE, NY ZONE 4

- Land purchased in 1988 - 60 Acres
- Rent Neighbors 120 Acres
2018 PRODUCTION

- 4 Acres Mixed Diverse Vegetables
- ½ Acre Large Fruits
- ¼ Acre Small Fruits
- 3-4 Acres Cover Crops
- Hay fields used by Beefalo farmer
- CNG certified
2018 MARKETING

- Sell at 3 local weekly farmers’ markets in summer & 2 Saturday winter markets - 82%
- Wholesale: Restaurants 12% Other 6%
1. A healthy, challenging, financially successful, family centered lifestyle.
2. Consistent, high quality, organic fruits and vegetables that make us proud.
3. A way of life that is an example to those around us.
4. Time to be an educator of environmentally sound agriculture to our employees, customers, and the community.
5. A rural environment that teaches good moral values and work ethics to our children, while providing time for fun and interesting opportunities.
OUR 10 KEY FACTORS TO REACHING OUR GOAL OF PROFITABLE FARMING

• INEXPENSIVE START-UP WITH SMART EXPENDITURES
• GOOD BUSINESS MANAGEMENT & RECORD KEEPING
• LABOR EFFICIENCIES TO MAXIMIZE PROFITS
• EFFICIENT PRODUCTION SYSTEMS & SOIL MANAGEMENT
• MULCHING AND WEED CONTROL
• PEST AND DISEASE MANAGEMENT
• SEASON EXTENSION-ROWCOVERS & FIELDHOUSES
• YEAR-ROUND HIGH TUNNEL PRODUCTION
• POST-HARVEST HANDLING AND CROP STORAGE
• CREATIVE MARKETING
Crop Production for Winter Storage for Added Sales

Filling Out Our Table—at Pleasant Valley Farm

February 2019 Paul & Sandy Arnold
What we sell in the Winter

- Fresh sprouts from GH
- Fresh greens from tunnels
- Stored greens from root cellar
- Storage garlic & onions
- Storage root crops from root cellar
- Storage winter squash & sweet potatoes
GROW QUALITY CROPS TO HAVE QUALITY PRODUCTS IN STORAGE

....AND QUALITY COMING OUT OF STORAGE
HARVEST AT PROPER TIME
Netting for Insects
- 3 types
- Great investment
- Biothrips netting for thrips, flea beetle

HIGH QUALITY AT HARVEST MEANS FASTER PROCESSING AND HIGHER POST-HARVEST QUALITY
Netting can raise humidity levels.

Protek Netting 65 gram for Cabbage Moth Brussels Sprouts—no spraying & High Storage Quality.
KEEP WEEDS OUT!

CLEAN CROPS MEAN FASTER HARVEST AND HIGHER QUALITY OF PRODUCE...
LELY TINE-WEEDER-CONVERSION TOOL

- Hinged so can use or not
- Williams Tool type system
- Blind cultivation
- Speed determines how aggressive
- Lettuce, beans, potatoes, carrots
- Great for in-row weeding
- Done weekly if possible
One pass to do all:

- Paths with sweeps
- Basket Weeders
- Lely for in-row weeds
- Best at white thread stage
MULTI-PURPOSE FOR SHORT or LONG TERM COOLING & LOW/MEDIUM HUMIDITY STORAGE MARKETS

WALK-IN COOLER 12X14
CROPS FOR STORAGE

- Onions
- Garlic
- Winter Squash
- Sweet Potatoes
- Root Crops
- Brussels Sprouts
- Leeks
- Brassicas
- Greens
HARVEST

- Fork or under cutter bar
- Clip off roots
- Stack gently

GARLIC
RACKING

- Build as garlic comes in
- Ample space
- Fan

GARLIC
GARLIC

RACKING

• Best is in the High Tunnel
• Dries faster
• Shade cloth if needed
GARLIC DRYING

- EASY ACCESS
- READY FOR SELLING!
GARLIC STORAGE

32 DEGREES
60-70% HUMIDITY

CAN VERNALIZE so
STORE SOME AT 50 degrees

WINTER STORAGE
GROUND GARLIC

• GREAT USE OF SECONDS
• PEEL AND PUT THROUGH FOOD PROCESSOR
• DEHYDRATE ABOUT 12 HRS
• GRIND MEDIUM COARSE
• BAG IN MINI-ZIPLOCK
• SELL AT $1.50 FOR .03# (Heaping Tablespoon)
• VALUE ABOUT $30 PER POUND
• STORE IN SEALED GLASS JARS IN COLD ROOM (35 DEGREES)
• Winnowed
• Field Cured
• Necks must be dried down well (at least 1 week in sun)-Overlap
• Beware of sun scald
• Sorted as crated

ONIONS & SHALLLOTS
ONIONS & SHALLOTS

ALTERNATIVE

CURED IN GREENHOUSE ON RACKS or IN BARN

Onion Varieties:
• Red Wing
• Expression
• Walla Walla
• Pontiac

ONIONS & SHALLOTS
STORAGE

- TEMP 32
- HUMIDITY 60-70%
- Store till late winter

CONSERVOR Variety

ONIONS & SHALLOTS
Harvested, washed or not washed...

WINTER SQUASH
Directly to 20 Bushel bins now

WINTER SQUASH
BETTER QUALITY MEANS A HIGHER PRICE

Pay attention to details for maximum profits

CURING SITES IMPORTANT
Optimum Curing for Winter Squash:

• INDOOR: 80-90 degrees for 7 days with ventilation
• OUTDOOR: Field cure in sun for 5-7 days-CAUTION
• Longer if cooler
• Taste better with age

Varieties vary for curing times
Roeters in Michigan

http://www.roetersfarmequipment.com

Sweet Potatoes

SOIL TYPE
UNDER-CUTTER BAR
TYPAR ROWCOVER
- HEAT
- DEER
- PLANT SKYDD

SWEET POTATOES

BINS 20 BUSHEL
SWEET POTATO VARIETIES - Trials

COVINGTON
BURGUNDY
MURASKI
ORLEANS
BELLVIEW
BAYOU BELLE
BONITA
AVERRE
Optimum Curing for Sweet Potatoes:

- 85-90 degrees for 4-7 days at 80-90% humidity
- Longer if cooler
- Taste better with age

STORAGE AREA #3:
When supply down, move to heated cooler
• Vent-less Propane Heater—Or Electric
• Dehumidifier
• Plastic Bins-Decade $130
• TEW Vegetable Washer
CURRING/WASHING SITE

- TEW Vegetable Washer
- Heated water
- Wash weekly
- $2.50 pound at market
Invest in the equipment that makes harvesting fast, fun and efficient.
• BREAK OFF TOPS
• SORT INTO GRAIN BAGS
• WINNOW BAGS
• LOAD BY VARIETY
• STORE 32 DEGREES
• 95-100% HUMIDITY

CARROT HARVEST
• 1 ROW POTATO DIGGER
• CHECCI MAGGLI
• 1 BUCKET PER GRAIN BAG
• LOAD BY VARIETY
• GENTLE!
OTHER ROOT CROPS

- CELERIAC
- KOHLRABI
- RUTABAGA

- TRIM TOPS & ROOTS
- PACK IN GRAIN BAGS

LONG TERM STORAGE
6-8 MONTHS+

OTHER ROOT CROPS
OTHER ROOT CROPS

- TURNIPS
- BEETS
- RADISHES—Regular round, long & Watermelon types

- TRIM TOPS
- PUT IN 5 GAL BUCKETS
- POUR IN GRAIN BAGS

MEDIUM TO LONG TERM STORAGE

OTHER ROOT CROPS
BRUSSELS SPROUTS

- STRIP LEAVES
- CUT WITH LOPPERS
- DISEASE FREE?
- Store in open bins
• Dig with Fork or Under Cutter Bar
• Sickle or cut off some of roots & very top

LEEKS
• PACK IN 1 BU BINS
• 32 DEGREES
• 95-100% HUMIDITY
• WINTER LEEKS SOMETIMES LEFT IN FIELD
• TRIAL STORAGE AREAS
CABBAGE HARVEST

- CABBAGE—RED & GREEN
- Storage #4
- Reaction
- Super Red 80
- CUT AT BASE
- PEEL EXCESS LEAVES
- PUT IN 20 Bu Bins

LONG TERM STORAGE
4-5 MONTHS

CABBAGE HARVEST
OTHER CROPS

- CELERY
- SWISS CHARD
- ESCAROLE
- SPINACH
- CUT AT BASE
- PEEL EXCESS LEAVES
- PUT IN STORAGE BINS
- MIST IF NEEDED

SHORT TERM STORAGE

6-8 WEEKS
OTHER CROPS

- LETTUCE
- KALE
- CAULIFLOWER
- BROCCOLI

SHORT TERM STORAGE
6-8 WEEKS

- CUT
- PEEL OFF BAD LEAVES
- PUT IN OLDER STORAGE BINS
- MIST IF NEEDED
<table>
<thead>
<tr>
<th>VEGETABLE</th>
<th>TEMP F.</th>
<th>RELATIVE HUMIDITY</th>
<th>STORAGE LIFE</th>
<th>HIGHEST FREEZING TEMP.</th>
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</thead>
<tbody>
<tr>
<td>Beet, topped</td>
<td>32</td>
<td>98-100</td>
<td>4-6 mon.</td>
<td>30.3</td>
</tr>
<tr>
<td>Brussel sprouts</td>
<td>32</td>
<td>95-100</td>
<td>3-5 weeks</td>
<td>30.5</td>
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<tr>
<td>Cabbage, late</td>
<td>32</td>
<td>98-100</td>
<td>5-6 mon.</td>
<td>30.4</td>
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<tr>
<td>Carrot, mature</td>
<td>32</td>
<td>98-100</td>
<td>7-9 mon.</td>
<td>29.5</td>
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<tr>
<td>Celariac</td>
<td>32</td>
<td>97-99</td>
<td>6-8 mon.</td>
<td>30.3</td>
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<tr>
<td>Celery</td>
<td>32</td>
<td>98-100</td>
<td>2-3 mon.</td>
<td>31.1</td>
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<tr>
<td>Garlic</td>
<td>32</td>
<td>65-70</td>
<td>6-7 mon.</td>
<td>30.5</td>
</tr>
<tr>
<td>Kale</td>
<td>32</td>
<td>95-100</td>
<td>2-3 weeks</td>
<td>31.1</td>
</tr>
<tr>
<td>Kohlrabi</td>
<td>32</td>
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<td>2-3 mon.</td>
<td>30.2</td>
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<tr>
<td>Leek</td>
<td>32</td>
<td>95-100</td>
<td>2-3 mon.</td>
<td>30.7</td>
</tr>
<tr>
<td>Lettuce</td>
<td>32</td>
<td>98-100</td>
<td>2-3 weeks</td>
<td>31.7</td>
</tr>
<tr>
<td>Onion, dry</td>
<td>32</td>
<td>65-70</td>
<td>1-8 mon.</td>
<td>30.6</td>
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<tr>
<td>Potato, late</td>
<td>38-40*</td>
<td>90-95</td>
<td>5-10 mon.</td>
<td>30.9</td>
</tr>
<tr>
<td>Radish, Winter</td>
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<td>2-4 mon.</td>
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<tr>
<td>Rutabaga</td>
<td>32</td>
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<td>4-6 mon.</td>
<td>30.0</td>
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<tr>
<td>Squash, Winter</td>
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<td>50-70</td>
<td>Varies</td>
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<tr>
<td>Sweet Potato</td>
<td>55-60*</td>
<td>85-90</td>
<td>4-7 mon.</td>
<td>29.7</td>
</tr>
<tr>
<td>Turnip</td>
<td>32</td>
<td>95</td>
<td>4-5 mon.</td>
<td>30.1</td>
</tr>
</tbody>
</table>

* Require curing

http://www.ba.ars.usda.gov/hb66/contents.html

Adapted from Knott's Handbook for Vegetable Growers
ROOT CELLAR  20 FEET BY 30 FEET UNDER BARN

- 7 foot Ceilings
- Insulated
- Into bank on 2 ½ sides
ROOT CELLAR

Energy Efficient

Auto light on/off

ROOT CELLAR
Loaded via assembly line into the root cellar

2016 - Revamp Root Cellar
Revamped in 2016
Much more Efficient

- Plastic Pallets
- Pallet Jack
- 20 Bushel Bins
- Reinsulate
- Rolling 4’ 6” Door
- Cement Floor
- Waterproof Walls
- Move pallets with pallet jack
- Store unwashed
- Store as individual varieties on a pallet
Water tank in corner from washing station. Filters dirt out.

- Crates sizes and colors vary for different types of produce, rejects, etc.
- Can be labeled with EXPO pen.
• Capacity is about 24 pallets with 18” walkway
• Approximately 1 ton per pallet when stacked to ceiling
• Total = 24 tons
• Value of produce stored: $85,000++
$10,000 System: Specialized for high humidity storage

Oversized condensor

Heating cycle to defrost

Adjust through the seasons

Compressor-- 3HP outside
Need to keep humidity 95%+
Monitoring temp and humidity is critical
Consider monitoring systems

ROOT CELLAR HUMIDITY CONTROL
Store fruits in different facility. Ethylene gas causes maturity and bitterness.

Keep Root Cellar Clean and Tidy. Rotting produce also causes maturing.

KEEPING QUALITY
ROOT CROPS
Medium Storage Crops

- Cabbage
- Leeks
- Brussels Sprouts
- Celery
- Cauliflower

WHAT WE STORE
WHAT WE STORE

Short Term Storage Crops

Lettuce
Kale
Swiss Chard
Spinach
Escarole
Broccoli
SOMETHING NEW

- PEA SPROUTS
- $20 PER POUND
- $18 PER TRAY
- RETURN HIGH
- + $100 PER WEEK
- LEARNING!
- NOW SUNFLOWER & MICROGREENS
Critical to monitor temperature & humidity

MANY OPTIONS
• WEATHER STATION
• MONNIT WITH ALARMS
• SMART FARM INNOVATIONS LLC

MONITORING
• ROOT CELLARING & STORAGE OF PRODUCE IS AN INEXPENSIVE WAY TO INCREASE SALES
• BENEFITS YEAR-ROUND MARKETING/INCOME
• SEPARATE STORAGE FACILITIES IMPORTANT
• MONITOR STORING CONDITIONS
• CURE PROPERLY FOR QUALITY
• KEEP CUSTOMERS HAPPY
• NEW THINGS TO TRY EVERY YEAR

SUMMARY
QUESTIONS/DISCUSSION ON STORAGE+