Welcome to Cabbage Hill Farm
Nutrient-rich fish water is fed from tanks to rotating drum filter.

The filter removes solids greater than 60 microns.

Greater than 60 micron solids are vacuumed off drum filter.

Filtered water is piped to NFT growing beds.
Drip tubes feed plants

Plants absorb nutrients they need

After plants filter nutrients the water passes through gravel beds under the NFT trays
Gravel beds host Nitrifying Bacteria which convert toxic Ammonia into Nitrogen

Cleaned water returns to tanks
Vacuumed solids are sent to settling tank. Baffles trap solids. Remaining water flows to sand bed filter. Sand bed filter contains wetland plants which absorb phosphorous and nitrogen.
Composting

- Trapped solids are pumped to compost piles
- Compost provides high-quality fertilizer for outdoor gardens
Successful Vegetables and Fish

Vegetables:
- Lettuce and Micro-greens
- Watercress and Wheatgrass
- Basil and Chives
- Wetland plants

Fish:
- Tilapia and Yellow Perch
- Bass and Trout
- Walleye
Nile Tilapia (Oreochromis niloticus) are the fish of choice for most aquaponic operations. These fish are easy to raise and make a lot of fertilizer. When these fish reach 1 1/2 pounds they are sold to a local market.
Tilapia are Caught and Sorted
Prepared for Market

- Fish are weighed
- Put into transport tank
- Delivered to market
Greens are Harvested
Deliver to Local Restaurants...
Local Retail Markets...
GOLDEN VILLAGE SUPER MARKET
Getting Started

- Licensing
- Aquaponics system and cost
- Greenhouse structure and cost
- Annual production cost
- Project revenue
- System management
New York State fish and wildlife special conditions for stocking and selling live fish:

- Any Trout, Bass or Salmon stocked or sold in NYS must have a permit
- Any Trout, Bass or Salmon delivered in NYS must have a health certificate
- Bass cannot be resold to the commercial food market in NYS

* EPA regulates effluent discharge into streams, rivers and ponds

* For permits and information contact NYS Department of Environmental Conservation
Four Tank (10,000 gallon) Aquaponics System:

- 4 fiberglass round tanks, 10’ dia x 4’ deep = $6900
- 4 fiberglass gravel beds for filtration, 15’ l x 3’ w x 1’ d = $4200
- 1 sump tank for return water, 4’ l x 2’ w x 2’ d fiberglass = $280
- 2 Pumps (second as backup), 1/2 hp = $400
- 1 Drum vacuum drum filter = $2500
- 2 Aerators (second as backup) = $1600
- Plumbing = $1200
- Estimated total cost = $17,080
Greenhouse Structure and Cost

- Greenhouse, 72’l x 30’w = $5000
- Total estimated cost off the shelf parts = $17,000
- Heat (dependent on location) = $2500
- Estimated total cost = $24,500
Annual Production Cost

- Fish and fish supplies = $5,000
- Seeds and plant supplies = $4,000
- Electricity = $8,000
- Heating (dependent on location) = $5,000
- Office and phone = $1,000
- Vehicle maintenance = $1,000
Project Revenue

- Produce = $47,000
- Fish = $10,000
## System Management

### Tilapia Water Quality Requirements

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temp.</td>
<td>76-82 °F</td>
</tr>
<tr>
<td>DO</td>
<td>&gt; 3.5 ppm</td>
</tr>
<tr>
<td>NH3 N</td>
<td>&lt; 3.0 ppm</td>
</tr>
<tr>
<td>NO2</td>
<td>&lt; 2.0 ppm</td>
</tr>
<tr>
<td>pH</td>
<td>7.0</td>
</tr>
<tr>
<td>pH</td>
<td>7.5 ppm</td>
</tr>
<tr>
<td>Cl:NO2 (Ratio)</td>
<td>7:1 ppm</td>
</tr>
<tr>
<td>Alkalinity</td>
<td>150 ppm</td>
</tr>
<tr>
<td>Hardness</td>
<td>&gt; 100 ppm</td>
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<tr>
<td>C02</td>
<td>&lt; 40 ppm</td>
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</tbody>
</table>

### Tilapia Feeding Rates

<table>
<thead>
<tr>
<th>Fish size</th>
<th>% Feed</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-20 gr</td>
<td>8-10%</td>
</tr>
<tr>
<td>20-60 gr</td>
<td>6%</td>
</tr>
<tr>
<td>60-150 gr</td>
<td>5%</td>
</tr>
<tr>
<td>150-250 gr</td>
<td>4%</td>
</tr>
<tr>
<td>250-400 gr</td>
<td>3%</td>
</tr>
<tr>
<td>&gt; 500 gr</td>
<td>1%</td>
</tr>
</tbody>
</table>

* % of feed x total grams of fish = feed per day
NUTRIENT REQUIREMENTS FOR LETTUCE

N03 200 ppm
P    30 ppm
K    200 ppm
Ca   200 ppm
Mg   24 ppm
Fe   3 ppm
Na   < 50 ppm
Cl   < 70 ppm