



**Welcome
to Cabbage Hill Farm**

Cabbage Hill's Aquaponics System...



Four Tank System



- 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

NFT (Nutrient Film Technique) 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

Water Return

A large hydroponic greenhouse with a high ceiling and a complex metal frame. The structure is covered with translucent plastic. Inside, there are several long, parallel rows of plants growing in white, perforated trays. The trays are supported by a network of pipes and channels. The plants are in various stages of growth, with some showing green leaves and others showing red or purple hues. The floor is made of grey, interlocking plastic tiles. In the foreground, a large, reddish-brown pot is visible on the right side. The overall atmosphere is bright and industrial.

- Gravel beds host Nitrifying Bacteria which convert toxic Ammonia into Nitrogen
- Cleaned water returns to tanks

Solid Separation



- 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

A photograph of a hydroponic system. In the foreground, a long, narrow, light blue plastic trough is filled with a layer of grey gravel. A wooden plank is laid across the trough. To the left, several trays of young green plants are visible, growing in a dark, nutrient-rich medium. A white PVC pipe is connected to the trough. In the background, a person wearing a green jacket is partially visible, and a white trash can is present.

Vegetables:

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

Fish:

- Tilapia and Yellow Perch
- Bass and Trout
- Walleye

Tilapia are the fish of choice for Aquaponics

- 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...





LEXINGTON
SQUARE

SUNDAY
BRUNCH
OUTDOOR
DINING

LEFT LANE
MUST
TURN LEFT

Local Retail Markets...



金鄉 GOLDEN VILLAGE SUPER MARKET



PLEASE ASK US
ABOUT OUR
SALAD MIX
MIZUNA
MUSTARD
BUCKWHEAT
↓ ↓ ↓ ↓ ↓ ↓

TOAD HAUL FARM
NORTH SALEM, NY
HERBS
&
SALAD GREENS
CERTIFIED ORGANIC
BY
FA-NY
ASSOC.



Getting Started



- **Licensing**
- **Aquaponics system and cost**
- **Greenhouse structure and cost**
- **Annual production cost**
- **Project revenue**
- **System management**

Licensing



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**

Aquaponics System and Cost

The background image shows a large-scale indoor aquaponics facility. It features several large, dark-colored circular tanks arranged in rows. The tanks are connected by a network of white pipes and hoses. In the foreground, a large circular tank is visible with a white aerator pipe extending into the water. The facility is housed in a greenhouse-like structure with a translucent roof. In the background, there are more tanks, some with plants growing on them, and various pieces of equipment like pumps and filters. The overall scene is a complex and organized hydroponic and aquaculture system.

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 Structure:

- 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

Temp.	76 82 F
DO	> 3.5 ppm
NH3 N	< 3.0 ppm
NO2	< 2.0 ppm
pH 7.0	7.5 ppm
Cl:NO2(Ratio)	7:1 ppm
Alkalinity	150 ppm
Hardness	> 100 ppm
C02	< 40 ppm

TILAPIA FEEDING RATES

<u>Fish size</u>	<u>% Feed</u>
0-20 gr	8-10%
20-60 gr	6%
60-150 gr	5%
150-250 gr	4%
250-400 gr	3%
400-500 gr	2%
> 500 gr	1%

* % of feed x total grams of fish
= feed per day

System Management (cont.)

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

