CLEMSON UNIVERSITY
Student Organic Farm

STUDENT ORGANIC FARM

CLEMSON

CALHOUN FIELD

Virtual Tour

Post-Harvest Processing Area

Produce comes in from the field by truck or hand and is deposited and sorted on the first bench. Produce is then dunked in the 100 gallon stock tank filled with cold water. The cold water removes the field heat and helps clean excess dirt and debris from the produce. Produce then is set on the next table to drain before entering the cooler. The keyhole design reduces the distance people and produce have to travel through the system.

Other Points of Interest in the Post Harvest Processing Area

Walk–in Cooler

The cooler extends the life and marketability of the produce and allows us to provide our customers with a high quality product. The cooler floor is sloped toward the door to facilitate cleaning with the drain outside the cooler to maintain sanitation.

Rain Water Harvesting System

Collected via a large gutter at the center of the sloped roof of the adjacent building, rainwater falls into a 1600 gallon cistern. The first flush of dirty water that falls during a rain event is diverted through a tee and discarded. A significant percentage of pollutants washed off the rooftop are kept from entering the cistern by this exchange. Water from the cistern automatically replenishes water in the pond at A Sunny Place (Location 2) lost via evaporation and flood irrigation via a gravity fed system connected to a float valve.

A Sunny Place

The first pond in the series provides a sunny place to sit using an urbanite bench made from a recycled slab. The pond reflects sunlight into the Market Pavilion during the wintertime when the sun is low on the horizon. During the summer vegetation in the landscape direct winds over the pond cooling the air and oxygenating the pond.

Other Points of Interest in A Sunny Place

Turkey Nest Pond

Raised above grade, the elevated pond gives more gravity allowing us to drain the water to the catch basin at location 3. The principle overflow is attached to a threaded elbow allowing the pipe to be pushed over to drain water out of the pond

Fulcrum With Umbrella Net

To catch fish the pond can be drained or the fulcrum can be pulled down bringing the umbrella net up to the surface. Throwing some bait above the net will help bring the fish in range. Minnows in the pond can be fed to chickens as a high protein snack.

Landscape

The landscape in this area contains over 20 different microclimates. These microclimates provide a diversified area to grow mother plants for our nursery operation. Many plants in the landscape are edible or useful.

Rainwater Harvesting

Overflow from the cistern flows through a “wet” pipe into the turkey nest pond. A wet overflow system is similar to a P trap under a sink in that water stays in the pipe but a difference in elevation between inlet and outlet allows water to flow through the pipe. This pipe is drained in the winter to prevent the freezing water from expanding and breaking the pipe.

Plant Nursery

A hardening off bench provides a transition place for greenhouse plants on their way to the field. Nursery plants and mushroom logs can be flood irrigated from the upper pond. Overflow from the upper pond flows through this area on its way to the ponds in front of the greenhouses.

Reflective Pond System

A series of ponds are situated adjacent to the southern end of the greenhouse and hoop house structures. These buildings are on a 1% Southwest slope allowing rainwater to drain downhill into the ponds. Sunlight in the winter reflects off the ponds and into the greenhouses giving us extra heat and light. Water flows downhill through the series of ponds starting at the large greenhouse. The final pond in the series sits next to the office, kitchen and bathroom

Black Soldier Fly Digester

Food wastes from the farm and the school cafeteria are dumped into the digester. The larva of the black soldier fly, a non-pest, consumes the waste. The larva self harvest themselves into buckets and are used to create biodiesel, high protein feed and fertilizer. The castings from the larva are fed to earthworms and then the earthworm castings are used in potting soils and fields. Connecting the digester to the greenhouse extends the season of production and enables heat produced by the larva to transfer to the greenhouse.

Transplant Production

Making Potting Soil

The large drum holds four wheelbarrows full of potting soil. The ingredients are added to the drum and then the drum is turned to blend the mixture. Potting soil ingredients are stored nearby under the transplant tables.

Passive Solar

Inside the greenhouse black 55 gallon drums filled with water and painted black are placed along the southern wall. Sunlight, reflected off the ponds and entering the greenhouse directly, heats the water in the barrels during the daytime. Throughout the night the water radiates the accumulated heat, reducing heating costs. The building is also situated on a 1% Southwest slope. This south facing slope angle also collects more solar heat energy in the wintertime further reducing heating costs of the greenhouses. The passive system gives up to 23 degrees F of protection. A circular pattern allows transplants to easily be distributed to the benches using the hand cart.

Insulation

A blower pumps air between two layers of plastic to provide insulation to the greenhouse. Outside air is used to prevent condensation from forming between the layers and blocking sunlight.

Cooling System

The five stage cooling system was redesigned to take advantage of nature. The first stage opens the vent at the top of the greenhouse to release the hot air. The second stage opens the vents on the south side of the greenhouse to allow cross ventilation. The third stage closes the upper vent and turns the fan on low. The fourth stage turns the fan on high and the fifth stage will run a fountain in the pond for evaporation to cool the air before it enters the greenhouse.

Active Heating

A hydronic heating system (an energy efficient system circulating hot liquid through tubing to generate radiant heat) efficiently heats the greenhouses. Hot water is pumped through black EPDM tubing underneath transplant trays heating the soil to facilitate seed germination and plant growth. Hot water can also be pumped through underground tubing in the neighboring hoop houses to extend the growing season.

Hoop Houses

Hoop houses are designed with roll up sides to easily manipulate inside temperatures throughout the season providing a place for extended production; beginning earlier in the spring and lasting later into the winter. Inside, raised beds are covered in long lasting landscape fabric to keep weeds under control and outfitted with drip tape irrigation. Trellising is easy using string tied to the frame of the hoop house.

Other Points of Interest In the Hoop House Area

Solar Vent Opener

To further facilitate control of indoor temperatures, vents are installed on each endwall of the hoop houses. Wax in the black cylinder expands when heated pushing the piston out and opening the greenhouse vents. Springs pull the vents closed at night.

Greenhouse Pond

Ponds in the greenhouse collect heat during the day and release the heat at night making the greenhouses 7 degrees F warmer than adjacent greenhouses without ponds. Tilapia fingerlings overwinter in the heated ponds for an early season start in the ¼ acre grow out ponds. The greenhouse plastic is sealed at the bottom of the pond to isolate the greenhouse pond from the rest of the pond. A U shaped pipe allows rainwater to flow around the greenhouse pond to prevent it from cooling off the water inside the greenhouse.

Edible and Useful Landscapes

Turkey Nest Pond Area

This landscape has over 20 different microclimates and contains mother plants for nursery production. Plants you can find here are horseradish, prickly pear, daylily, watercress, pickerel weed, duck potato (Katniss), Jerusalem artichoke, ground nut, Asian persimmon, Egyptian walking onion, bog sage, goldenrod, pineapple guava, curly dock, sweet grass, soft leaved yucca, iris (4 varieties), yarrow

Zinnia Garden

This landscape helps to protect the building from the cold Northeast winter winds. Plants found here include Asian persimmon, heirloom apples, Jerusalem artichoke, elderberry, ground nut, Egyptian walking onion, Virginia sweetspire, rabbiteye blueberries, comphrey

Heirloom Apple Windbreak

This area contains heirloom apples and comphrey. The comphrey provides nutrients to the apple trees and prevents competitive weeds from establishing themselves.

Parking Area Berry Border

Rabitteye blueberries planted on the north side of the Greenhouse and hoop houses are shaded in the winter delaying flowering to protect from late freezes. Hydronic heating tubes can also be pulled out of the greenhouses to protect the blueberries if needed. Comphrey, Yucca filamentosa, and sweet grass can also be found in this area.

Blueberries in the area across the parking area from the hoop houses the get reflected light off the parking lot in the winter and flower early for an early harvest.

Buildings

Designed and built by Clemson University architecture students, the farm office, kitchen and bathroom complex is nearing completion. The vivid green color was intentionally used to blend into the landscape to minimize distraction from the natural beauty of the area. The opposing sloped rooflines were indented to mimic the look and feel of the larger open air Market Pavilion across the parking area, also designed and built by CU architecture students. The open air space is used for production work, classes, meetings and is the site for our CSA pickup.

Farm Roads

Farm roads follow the high ridges on the farm keeping them dry and accessible. Beds in the fields slope downhill from the roads at a 0.1%-0.5% slope to facilitate field drainage and workability while limiting erosion.

Field Production

Production starts with a cover crop to build soil organic matter and provide nutrients to the succeeding crop. The cover crop is mowed down, allowed to dry for a few days and then, using a disc harrow, is turned into the soil. After two to four weeks and several discings, the raised beds are made in the field using the bed maker.

Fertilizer is then added only to the beds so we avoid fertilizing weeds in the pathways. We use cottonseed meal and a nature safe 13-0-0 blended fertilizer.

Next, a rotary tiller mixes the fertilizer into the tops of the beds and breaks up soil clods to prepare a fine seed bed for planting. An Earthway precision seeder is then used to plant the seeds or mark the rows for transplants. If transplants are going into the bed, irrigation drip tape is placed in the rows marked by the Earthway seeder and the emitters in the tape dictate the spacing of the plants.

Automated Irrigation

Once the drip tape is in place the transplants go into the field and the drip tape is turned on for a few hours to water them in. Each field is connected to an automatic valve and timer for precise control of irrigation water through drip tape.

Several cultivations with collinear hoes, wheel hoes and/or the tractor drawn cultivator are required to ensure a weed free bed.

Equipment

Mower

Used to cut cover crops and mow lawn areas.

Disk Harrow

Used for primary tillage and to incorporate cover crops into the soil.

Bed Maker

Used to make raised beds to prevent waterlogging, facilitate drainage and reduce disease problems.

Fertilizer Spreader

Used to distribute fertilizer and cultivate single rows.

Walk Behind Tiller

Used to cultivate between rows.

Rotary Tiller

Used to mix fertilizer with soil and prepare a fine seed bed for direct sowing.

Sprayer

Used to spray organic pesticides.

Potato Digger

Used to dig potatoes and sweet potatoes.

Colinear Hoe and Wheel Hoe

Used to cultivate around the plants

Rotary Spreader

Used to plant cover crop seeds and distribute lime.

Thank you!!

Guided tours are offered several times throughout the season.

Please see
www.clemson.edu/sustainableag/Farm_tour_registration.html
for further information.