

# “Underground” Greenhouse Grows Citrus In The Snow

Growing lemons and oranges in Nebraska? Impossible, would be the first word most people would think of, but not Russell Finch. He bills himself as the largest citrus grower in all of Nebraska. Besides citrus he also grows pears, avocados, figs, roses, yucca, agave, hibiscus, and hundreds of other types of flowers, fruits, vegetables, trees and plants. His secret? A home-built “underground” greenhouse.

Finch first developed an interest in using earth heat in 1979, when he was planning the heating system for a new house. He wanted to use a heat pump as the only source of heating and cooling, but was told it would have to be supplemented with electric heat during the coldest days in winter. Knowing that the temperature is stable at 52 to 57 degrees F at 8 to 10 ft. below ground, he reasoned that if he could extract air at that temperature the heat pump would function as if it were in a southern climate. Russell contacted scientists at the University of Nebraska to evaluate his idea but was told it wasn't feasible.

Ignoring what he had been told, he pressed on. Next, he phoned the heating division of the Coleman Company in Kansas. After speaking with one of their engineers, who encouraged him to pursue his idea and agreed it could work, he was furnished with a heat pump at dealer cost. It was installed and has been functioning as predicted for over 22 years.

The system uses a 1/3 hp blower to pull air through 1,100 ft. of 6-in. dia. solid plastic pipe, buried along one side of his house.

The underground-heated air is blown into the greenhouse before it's channeled to a room that houses the heat pump. Then the air is pushed out again by the blower to the underground tubes. An additional tube heats and cools the garage area.

The greenhouse is buried 5 ft. below ground and has an overall height of 14 ft. The trees inside are not in pots but actually planted in the ground.

Nebraska winters average low temperatures of 10 degrees. Typically, 20 days per year are below zero. The temperature in the greenhouse, even during the coldest weather, has never fallen below 35 degrees even when the outside temperature has plummeted to minus 40 degrees. Plant loss due to frost is zero.

In a region where homeowners frequently spend over \$200 per month to heat their homes, Russel estimates that it costs about \$450 per year to keep air circulating in the greenhouse and to keep the plants watered. His total energy costs per year, including a substantial amount of energy used to water over an acre of grass, plants and trees surrounding the home, is about \$2,400. The size of the house is over 5,500 sq. ft.

To be able to grow both heat-loving plants and plants that need cold weather to go into dormancy, he had to divide the greenhouse into a tropical section and a cold weather section. By diverting the heating pipes to the tropical room, and opening a door at one end of the cold room, he was able to drop the temperatures enough to force dormancy.

The greenhouse measures 80 ft. long by 16 ft. wide. Finch says the only thing he would change about his design is to use a metal frame instead of wood for the greenhouse, even though the redwood frame has held up for over 20 years.

The benefits have far outweighed the costs to build the system. “Our cost for the greenhouse was around \$7,500 for the material and excavation work,” says Finch. “I did all of the building and only needed help from my wife handing me the 6 by 12-



“Underground” greenhouse is buried 5 ft. below ground and measures 80 ft. long by 16 ft. wide. It uses earth heat as the only source of heating and cooling.



Russell Finch divided the greenhouse into tropical and cold weather sections, allowing him to grow both heat loving plants and plants that need cold weather to go into dormancy.

ft. Lexan panels. Included in the cost was lumber, 6-in. tubing, Lexan panels, foam insulation, metal roofing, the blower motor, electric wiring, and other miscellaneous parts. These are 1992 prices so the cost could be higher now.”

Finch says he's going to upload a set of plans

to the website [www.greenhouseinthesnow.com](http://www.greenhouseinthesnow.com) by the end of March 2013.

Contact: FARM SHOW Followup, Russell Finch, 1750 County Road 59, Alliance, Neb. 69301 (ph 308 762-3042; [snowkist@hotmail.com](mailto:snowkist@hotmail.com)).

## John Deere Hot Rod Turns Heads

Gene Brass gets lots of looks, whether driving down the highway, stopping in town or at a hot rod show. His green and yellow hot rod has enough tractor in it to get plenty of double takes.

“The hood came from a Deere 6400 tractor, the air cleaner from a 4230 tractor, and the cab is a Year-A-Round model often found on older Deeres,” says Brass.”

Adding to the agricultural look are rectangular lights, a toolbox off an old implement and a one-row planter on the back. However, while it may look a bit like a Deere tractor, it runs a little faster. The 350 Chevy engine and transmission give it the speed, and the hot rod frame and components give it the ride, cruising at road speeds of up to 80 mph.

“I started out with a custom-built frame and set it on an S10 rear end and a 1940 Ford front axle with Chevy disc brakes,” says Brass. “The pipes are Sprint headers with short extensions to balance them. The steering system is from Speedway with a pop-off steering wheel for easy in and out.”

Mounting the cab required a bit of modification. His first step was to cut it down. He retained the front window glass and windshield wiper, but removed the other three sides. He also fabricated a new dash.

Brass turned to a friend who is an expert pipe welder to cut about 4 in. off the bottom. He then set it in place and checked weight for springs and coil shocks. The 8-gal. fuel tank was mounted beneath it.

Initially Brass installed a 1940's radiator, but after it sprung a leak, he replaced it with a new aluminum one. The grillwork is expanded metal mesh in front of the fan.

Brass stayed true to Deere green and yellow throughout with appropriate detailing and

insignia. Even the steering wheel has a deer at its center.

Brass says the rig came together smoothly, though there was a little shaking when he first took it out. “An experienced hot rod builder told me to check alignment. I was off about 3/4-in. After I adjusted it, I drove it down the road at 80 without a shake.”

The front mounted weights, rear mount quick-tach hitch, rear-mount planter and Deere GPS housing on top of the cab add to the “tractor” look. The weights are wooden replicas of Deere garden tractor wheels.

“A friend picked up the quick-tach at an auction, and I made some brackets and welded it to the rear of the cab,” said Brass. “I wanted an implement on back, but a plow would have been too heavy.”

With the help of his local Deere dealer, Brass fabricated a scaled down planter unit. He used an insecticide box for the seed hopper and fitted it with disc openers and closing wheels.

“People ask if it's real,” says Brass. “I tell them it's my replant machine. The box is handy for keeping cleaning cloths and things for shows.”

Brass has had his hot rod at several shows and enjoys road trips with his wife or grandkids. He has had several offers from prospective buyers. After a recent one, he called a family meeting for input on possible sale.

“The family voted no on a sale,” says Brass. “I'll just continue to enjoy driving it and giving rides to my grandchildren and their friends.”

Contact: FARM SHOW Followup, Gene Brass, 1900 440th St., Buffalo Center, Iowa 50424 (ph 641 561-2209).



Gene Brass's green and yellow hot rod looks like a Deere tractor but can cruise at road speeds up to 80 mph. Quick-tach hitch on back of cab supports a 1-row planter unit.