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Stillwater, NY. 12170

12/26/94

The Northeast Region Sustainable Agriculture
Research and Education Program
Hills Building, University of Vermont
Burlington, VT.

RE: SARE/ACE Project FNE93-26
"Low Input Season Extension Greenhouse"

FINAL REPORT

The progress of the project, since the awarding of the "Farmer's Mini-Grant" in April, 1993 has been marked by a number of delays in the construction timetable, but also by a series of unanticipated and serendipitous occurrences which have further contributed to the project's overall scope and direction.

The delays were generally due to realities of small farm life in the northeast: lack of extra time to work on the project during the growing season, difficult to impossible winter weather construction conditions during the non-growing season and recovery from a recent injury which has precluded completion of the project's finishing touches. The essential experimental design features of the structure: the solar chimneys (which replace fans to provide ventilation), site drainage, exterior perimeter insulation, growing beds preparation and roll-up sides are completed and functioning to expectations. Still to go is covering the frame with double poly to complete the structure and start it functioning for an early start to the spring growing season. Enclosed is an abstract of the project's functions.

The project has beneficially gained in scope during this period, however. Several crops have been grown in the uncovered structure, and the open access to the interior for equipment resulted in opportunities to further balance soil conditions and incorporate soil amendments and compost. Also, a number of unanticipated situations, experienced initially as obstacles, became further points of departure for additional research. For example, the excessively wet Fall of 1993 and the heavy snows of Winter, 1994 necessitated extra drainage provisions - and bulldozer expense - to rectify. The resultant "raised platform" system of the entire greenhouse structure surrounded by definitive drainage swales has proven to be an ideal construction feature that pertains to a wide range of greenhouse applications.

The project has also attracted the attention of a number of farmers, solar designers and researchers who have brought much to bear toward furthering the scope and dimensions of the project. An engineer, for example, has arranged to supply the equipment and instruments necessary to determine and monitor the exhaust capacity of the solar chimneys, which will determine the cubic feet per minute values of the structure for comparison to electric fans. Another solar specialist is helping to design a photovoltaic array to power the double poly inflator fan so the structure can become completely free of the power grid.

Also, some greenhouse equipment suppliers have introduced a number of manufacturers to the project who have donated some new products for appropriate technology testing and applications. The exterior perimeter insulation of the structure, for example, is designed to reduce frost infiltration and consists of a ground layer of "Ewe Mulch" - a natural wool felt material - in combination with "Weed Barrier" - woven polypropylene - and a cover of wood chips.

Project demonstration and dissemination of results has been ongoing throughout the period - please see the enclosed materials. A series of "Season Extension Structures" workshops were given during this past year with more scheduled for this coming Winter and Spring. We also hosted a Farm Tour this Fall, co-sponsored by NOFA-NY and Cornell Cooperative Extension. In addition, I have written a number of articles for various farming publications and hope to eventually combine all the material in a book or manual. The presentations and the nature of the project continue to attract great interest. The Farm Tour, for instance, was listed in a large number of publications and brought in participants from hundreds of miles away.

Finally, in an unforeseen aspect of the project, I was prompted to defend the project's local and state tax status - for the structure to be classified as "equipment" rather than as a "building" with no building permit or fees required - and appeared several times before the Assessors and the Town Board before I was ultimately successful. Hopefully, this will provide a positive precedent for others who encounter similar difficulties.

Steve Gilman

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RUCKYTUCKS FARM

"SEASON EXTENSION GREENHOUSE"

FUNDED in part by a 1993-1994 Farmer/Grower Grant from the Northeast Sustainable Agriculture Research and Education (SARE) program of the U.S. Dept. of Agriculture.

PURPOSE: To design, construct, and monitor a working prototype field greenhouse that functions without electricity, added heat, or other conventional inputs. Also, to extend the growing season for compatible cool weather crops into the winter, provide an extra-early start for spring crops, and produce warm weather crops for early summer markets.

DESIGN: A central feature is an array of five "solar chimneys", some fixed some with vortex-inducing wind turbines designed to create a draft, or "chimney effect". In conjunction with manual and solar automatic vents these provide critical ventilation functions in lieu of electric fans.

- Roll-up Sides are utilized to provide additional cross-ventilation during the hot weather months.
- An insulated north wall (side of the solar chimney array) is faced inside with a highly reflective membrane to boost ambient light and radiant heat levels. Four foot high side curtains provide a similar function.
- A solar photovoltaic charger and storage batteries will power the small fan used to inflate the double poly greenhouse cover.
- The structure is a conventional, low cost 28'x96' bent steel tubing pipe frame with additional cross-bracing for increased snow load capacity and to provide support for tomatoes and other vine crops.
- The foundation is pipe sleeves for the structure, and "Post Ups"- ground-driven fence post holders- for the solar chimneys. All structure components are movable and comply for "Temporary Greenhouse" status as "Equipment" under New York State Building Code.
- The north wall/solar chimney array is constructed of dimension lumber and 1/2" plywood bolted to the pipe frame structure.
- Additional outside perimeter ground insulation to limit frost penetration is provided by matting covered with a layer of wood chips.
- Further wintertime crop protection is given by rolls of "Floating Row Covers" mounted to the north wall which can be pulled out the length of the growing beds [four 90' in-ground raised beds] to retain heat and provide additional frost protection.
- Irrigation is accomplished by "Irrigo" microporous drip irrigation tubing from storage barrels from a gravity fed spring.

MONITORING: A series of recording thermometers ["Min-Max"] will be mounted at crop height throughout the greenhouse to monitor temperature extremes during the different seasons. Hydrometers will track relative humidity. Solar Chimney performance will be analyzed with specialized equipment to produce Cubic Foot per Minute [CFM] ventilation values under a wide range of operating conditions.

-Crop production, growth rates, plant health, and pest incidence will also be continually monitored to provide final verification of design and structure effectiveness.

DEMONSTRATION: A series of conference workshops, articles, slide presentations and On Farm Demonstrations are being conducted and are addressed to farmers and growers as well as consumers, researchers, government officials and Land Grant College personnel.



NOFA-NY 1994

Farm Tours

Sunday July 17 • Ithaca

The Gardens of Earthly Mirth—
*Demonstrations, talks, horse-drawn
wagon tours.*

9:00 to 4:00 PM.

Contact Neal Wecker at (607) 273-0756

Sunday July 17 • Rose

Rose Valley Farm—*25 acres in
NOFA-certified vegetables and small
fruit featuring cover cropping for green
manure and weed control.* 1:30 PM.

Contact Kim Buell at (315) 483-8155

Saturday July 30 • Pulaski

Grindstone Farm—*A NOFA-certified
farm growing vegetables and small
fruit.* Tour for farmers, 9:00 to 2:00, and for
consumers, 2:00 to 8:00.

Contact Dick de Graff at (315) 298-4139

Saturday September 17 • Corning

Ash Grove Organic Farm—*Farm
tour, demonstrations, music and games.*
10:00 AM to 4:00 PM.

Contact Dori Green at (607) 524-6836

**Sunday September 18 • Calverton
(Long Island)**

Peconic River Herb Farm—
Farm tour and potluck. 2:00 to 5:00.

Contact Cris Spindler at (516) 369-0058.

Sunday October 2 • Alton

Alasa Farms—*Low spray apple
workshop & commercial IPM
orchard management.*

Contact Kim Buell at (315) 483-8155.

Saturday October 29 • Bronx

New York Botanical Garden—
*A day-long series of workshops and
presentations featuring NOFA
farms and gardens.*

Contact Kay Magilavy, Coordinator at
(201) 863-1741.

Saturday November 12 • Saratoga

Ruckytucks Farm—*Season
Extension structures for cold
season crop production.*

Contact Steve Gilman at (518) 583-4613.



The Northeast Organic Farming Association of New York is consumers, gardeners, and farmers creating a sustainable regional food system which is ecologically sound and economically viable. Through demonstration and education, we promote land stewardship, organic food production, and local marketing. NOFA-NY brings consumer and farmer closer together to make high quality food available to all people.

For more information and directions call the contact numbers above.

Northeast Organic Farming Association of New York • P. O. Box 21, South Butler, NY 13154-0021



CUTTINGS/Anne Raver

Extending the Gardening Season Until Winter

MY incredible good luck with a winter salad garden in Maryland last year has turned me into a born-again winter gardener.

But first things first. This weekend, you'd better get out there and sow your fall vegetable garden.

I'm going to try fall peas, even though most people start their second crop right after the Fourth of July.

And in theory, if I count back from my first frost date (mid- to late October, in Maryland), I have a good two months to grow some of the 60-day varieties.

Now you can't get away with this if your garden is the Catskills, but if your pea patch is on eastern Long Island or in southern New Jersey, you may get lucky — even with a fast-maturing bush bean, like Royal Burgundy (51 days) — because frosts usually hold off in those parts until late October.

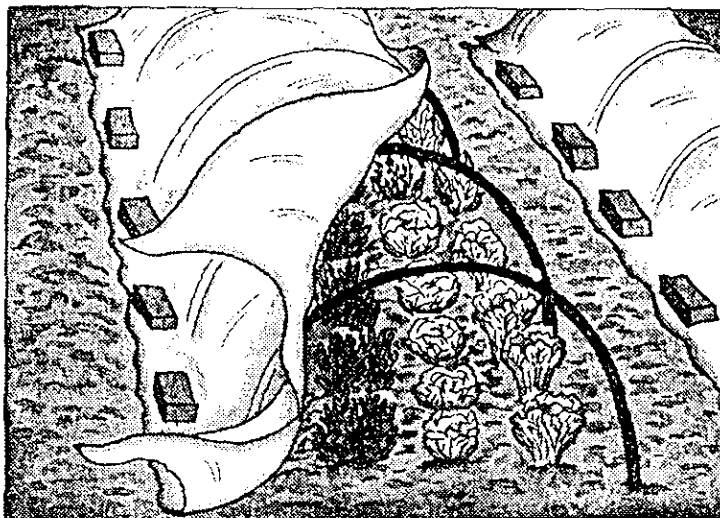
Only gamblers should plant peas this late, but this is the perfect time for sowing beets, carrots, kale, kohlrabi, mustard greens, bok choy, shungiku, dandelion greens, chard, endive, spinach, lettuces, turnips and radishes. You can also comb the mom-and-pop garden centers for leftover broccoli and Brussels sprouts seedlings, because they thrive in cool weather and have few insect problems.

For years now, I've kept on sowing lettuce and spinach seeds right into mid-September, protecting the plants, when frosts threatened, with spun plastic fabric, like Reemay.

But I never planted as late as I did last November, when I broadcast seeds of whatever I had left over from the summer — mache, arugula, loose-leaf lettuce, cress, spinach — in a thick layer of nice, rich compost at the bottom of my cold frame. I insulated the frame's sides with bales of hay and got out the old storm window that I use for a cover on cold nights. (You have to vent any cold frame when the sun comes out, or else your plants may get a heat stroke.)

We forgot about the whole thing when the snow and ice came last winter, but sometime during a thaw, my mother cracked the lid and couldn't believe her eyes: a little jungle of spinach, arugula and lettuce that had been insulated by the snow and incubated by the sun.

I'd read about such things in "The New Organic Grower's Four-Season Harvest" (Chelsea Green Publishing, \$17.95) by Eliot Coleman, who grows greens and vegetables year-round — in cold frames and plastic-covered "mobile tunnels" that can be slid, on rails, over whichever beds of plants need protection from the cold. But it all seemed a little too complicated to me, until I had some arugula in the middle of the winter.



Felipe Galindo

You don't need a luxury-liner cold frame. Mine is an 8-by-4-foot bottomless wooden box made of 2-inch lumber, with a slight slope to the south to let in as much light as possible.

Mr. Coleman's book gives directions for the classic design. You need three 8-foot boards, two of them 12 inches wide and one 8 inches wide. One 12-inch board is for the back wall, the 8-inch board is for the front; then you cut the other 12-inch board into two 4-foot pieces (these become the sides), and cut each side section diagonally, so that the back end is 12 inches wide and the front end 8 inches wide, to give you the slope.

I was perfectly happy with this game plan until I went to the Northeast Organic Farming Association's summer conference last weekend in Amherst, Mass., and heard a farmer named Steve Gilman describing a simple plastic-covered hoop house that he uses to grow spinach and lettuce until Thanksgiving — and this in the icy upper Hudson Valley.

Mr. Gilman and his wife, Sherrie Mickel, own Ruckytucks Farm, in Stillwater, N.Y., just east of Saratoga. Anything that can extend the growing season is money in the bank. For example, each 100-foot raised bed of spinach or arugula, covered with a hoop house, earns \$1,500; each 100-foot bed of protected lettuce, \$800.

Now home gardeners are not likely to be interested in this much spinach, but Mr. Gilman's design can be easily scaled down.

The basic idea is to sow seeds of leafy greens from now until early September in a raised bed, say, 4 by 20 feet. Let the seedlings get sturdy over the next month or two, and then cover them with Reemay (lay it right over the plants) when the air gets nippy. "The beauty of Reemay is that

it will retain the heat from radiational cooling more than plastic," Mr. Gilman said. "So we use it up here through October, when we're liable to get hard frosts. Then it pays to shift to plastic, because it keeps the frost off the plants."

Enter Mr. Gilman's hoop house, which is basically a row of steel hoops covered with plastic.

"I buy 20-foot lengths of steel reinforcing rods — known in the trade as rod or rebar — three-eighths of an inch in diameter, because it's hard to bend anything thicker," Mr. Gilman said. He has each 20-foot steel pipe cut in half at the local lumberyard. "And I found a handy bolt hole in my bucket loader, which I use to bend each 10-foot piece into a semi-

circle," he added. Each hoop is then placed, at six-foot intervals, down the length of his raised beds.

(If you don't have a bucket loader, use your imagination.)

He pushes the ends of the steel hoops about a foot into the ground and then keeps an eye out for frost, which usually sweeps up the Hudson Valley about mid-September.

Mr. Gilman uses six-millimeter-thick plastic that is 12 feet wide and more than 100 feet long. The width is generous enough to cover the hoops with a foot left over, which is weighted down with bricks. And the strips are long enough to close off the end of each bed and keep out the wind.

A home gardener could do the same thing, over a much shorter bed.

The plastic protects the plants from frost, which can cut right through a soft fabric like Reemay. But don't remove that cozy blanket of Reemay; leave it there for double protection.

"The lettuce leaves might look frozen solid by morning, but they'll thaw as soon as the sun comes out," Mr. Gilman said. "It's the frost that bursts the cells of the leaves. And since the frost stays on the surface of the poly, you protect the crop."

A hoop house may help you grow greens until January. But then take the plastic off, he advises, to freeze insect larvae in the ground and to give your soil a rest. Start some seeds inside in February, and get ready for the next round in March.

I don't know. Maybe we'd better all just yank out that bitter arugula and plant some rye as a cover crop. I feel exhausted just thinking about year-round gardening.

THIS WEEK

Planting the Seeds, Rolling the Dice

Plant your fall vegetable garden, or admit you're tired of homesteading and go to the beach.

If you're a gambler at heart, following are some fast-maturing pea varieties to try, but plant immediately: Daybreak (52 days), Knight (56 days) and Maestro (57 days), all available through Johnny's Selected Seeds in Albion, Me., (207) 437-4301; Precovelle, a 60-day French variety, from Shepherd's Garden Seeds in Torrington, Conn., (203) 482-3638, and Burpeeana Early (63 days) and Petit Provençal (60 days), sold by W.

Atlee Burpee in Warminster, Pa., (800) 888-1447. Snow peas and snap peas are also supposed to mature in about two months, so I say take a chance.

Steve Gilman, a market gardener, says his favorite winter lettuces include the Grand Rapids leaf lettuces, like Black-Seeded Simpson, Simpson Elite and Waldmann's Dark Green, all available from Johnny's.

Tyee and Indian Summer, which mature in about 40 days, are the workhorses of his winter spinach beds, both available at Johnny's.

ANNE RAVER