ASPI
APPALACHIA
SCIENCE IN THE PUBLIC INTEREST
Route 5, Box 423 Livingston, KY 40445

YEAR-ROUND GARDENING

ASPI Technical Series

INTRODUCTION

The goal of this paper is to encourage vegetable-growing in temperate zones on a year-round basis. In tropical climates vegetables can be grown year-round but in frigid climates this is restricted to only a small during only part of the calendar year. With care and innovative techniques we have found that central Appalachia can have fresh vegetables from gardens and greenhouses every month of the year, even January and February.

The extra effort required for year-round gardening may be worth while because --

* The produce gathered directly from the field, cold frame or greenhouse is fresher and more nutritious than imported varieties;
* Environmental costs of transporting and refrigerating produce grown in distant sunny regions are eliminated;
* Fresh food is often inaccessible or high priced in low-income areas
* A well-planned approach to year-round gardening will reduce the demand for food preservation during traditional growing seasons;
* One can develop good growing techniques through economies of space in cold frames or reduced growing areas;
* The economic cost and human input are so low that almost anyone can garden with a cold frame or covered beds;
* Utilizing such techniques gives a pleasing appearance to the landscape and enhances the worth and testimony of your garden to neighbors.

THE ASPI WINTER GARDEN

MULCHING AND NATURAL CROP COVER

The use of mulch to hold soil moisture and retard weeds in the summer growing season is better known than its effectiveness in winter months. Through crop cover of leaves, straw, hay, and other coarse organic material, air is permitted to reach the plant roots and still provide weather protection. This type of crop cover is most beneficial in climates where little long-term frigid weather is expected. Mulch offers protection for perennials but it doesn't always allow plant growth, as do seasonal extenders.

Some root crops which can be harvested in either unmulched or mulched patches include turnips, parsnips, rutabagas, radishes, horseradish, potatoes, and carrots. Onions may remain depending on moisture content and soil conditions. To some extent kohlrabi, cabbage, kale and other brassicas, mustard, Swiss chard, spinach, and celery (if protected from the wind) can be covered by natural materials and preserved well into the winter.

Mulching must not be overly thick nor too thin. Proper amounts come through experience with one's particular weather conditions. Accept the fact that some crops, or even all, will be lost in severe (sub-zero weather). This method is less protective than others for long term winter-cropping, but it may prove beneficial for late greens which produce early in the spring. This technique works well in the mid- and lower South. Note: In early spring, immediately after the normal growing season begins, mulch may serve as an insulator keeping the ground cold. For this reason it should be removed for a month or so from early tomatoes.

Winter rye, wheat, hairy vetch, peas and other cover crops can be planted over areas as natural cover and as a green manure for spring.Planting these on top of or intermingled with root crops (e.g. carrots) can serve as added winter protection. With care the crops can be harvested with little disturbance to the natural cover. The trick is to plant each so as not to disturb the other. Normally allow the all season vegetable crop a head start. Plant just after mid-summer and in sufficient time to sprout and take root before cool weather.

SEASON EXTENDERS

A variety of season extenders exist for gardening work. We will describe four which are well suited for temperate climate gardening: temporary cold frames; permanent cold frames, hot beds, and covered pits. These work well in the autumn and/or in the spring, depending on the gardener's expectations. All types are relatively low cost, utilize local building materials, require no non-renewable energy heating source, and are easily maintained.

Temporary Cold Frames

Temporary cold frames may be constructed using Reemay or other light weight natural or synthetic fabric. These coverings are stretched over hoops (steel, curved one-inch PVC pipe, or bamboo) which are raised no higher than necessary to minimize the heated space above the growing crop. An outer hoop may be used to hold the covering in place. We have found that a bank of loose sawdust surrounding the edge of the cover is an efficient insulating agent. The entire "tent" should be anchored well with rock or other weights to protect against loss by wind.

Normally we recommend natural "cotton" traditionally used for plant beds. However, this is becoming increasingly difficult to obtain and has been replaced by a textured synthetic cloth called"Reemay." In the past we have used 4 or 6 mill plastic which can withstand cold weather and protect delicate vegetables from windburn. However, plastic has certain disadvantages:

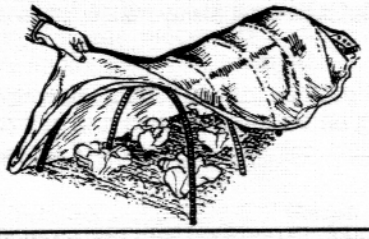
* It does not "breathe" but allows moisture to accumulate under the sheeting, which can rot sensitive produce.

* It is a synthetic material which decomposes with relative ease in sunlight;

* It is harder to fold and store than a fabric covering;

* It contains plasticizers which can volatilize and contaminate the growing atmosphere. Airing out the sheets before use is highly recommended.

Figure 1. TEMPORARY COLD FRAME



In this fashion items planted in areas with an average minimum temperature range of -10 to 0 degrees Farenheit in mid-fall will begin producing in mid-February. With proper protection vegetables planted in mid-summer will continue to bear through November and much of December. In milder winters the temporary cold frame will protect vegetables until January and again in the late winter months, as the autumn plantings start growing again. Few temporary cold frames -- even well insulated ones -- can fill the critical gap of 45 days between the first of January and mid-February.

Due to the flimsy nature of temporary cold frames, the following suggestions may assist in increasing effectiveness and yield: protect from harsh winds, tie or strap down the coverings,check after major storms because uncovered areas may survive if returned to cover quickly, and harvest before anticipated very deep freezes.

Steps to Building a Temporary Cold Frame

a) Measure area of bed (4 by 25 feet is ideal).
b) Obtain proper materials
(ribs, plastic (cotton, Reemay), stakes, weights, string).
c) Cut ribs (average five feet apart).
d) Prepare ribs (smooth or paint depending on material).
e) Mark off places to insert ribs into the ground.
f) Insert ribs into earth at specified places.
g) Cut cover material to fit.
h) Lay cover over ribs.
i) Bind the ends of the cover.
j) Make pointed stakes and hammer in at ends of bed.
k) Tie ends of cover around stakes.
l) Insert outer rib over inner ribs and cover.
m) Weigh down edges and hill around with sawdust or leaves for added insulation.

Note

This is the only technique where gardening supply places offer modified alternatives in the form of individual tents and plastic water-jacketed covers for early tomatoes and peppers. These products are somewhat expensive and could be easily substituted with cut-out one-gallon milk jugs (with an optional smaller plastic water containers to protect against late spring freezes.

Permanent Cold Frames

An inexpensive alternative to the attached or free-standing solar greenhouse (see Technical Paper 4) is the permanent cold frame. This is a relatively low-cost, low maintenance, easily accessible mini solar greenhouse in its own right. The permanent cold frame has several advantages over the temporary one: it can be used year-round, even in summer and requires no summer storage; it can be better insulated and thus fill the coldest gap in winter; its plants do not suffer from wind-burn; it can endure storms better. Disadvantages include: the need to replace soil after one or more growing seasons; the extra care to open windows for rain and watering; inability to cover crops where they are grown as done by the temporary devices in the row or bed used during the summer.

All permanent cold frames should:

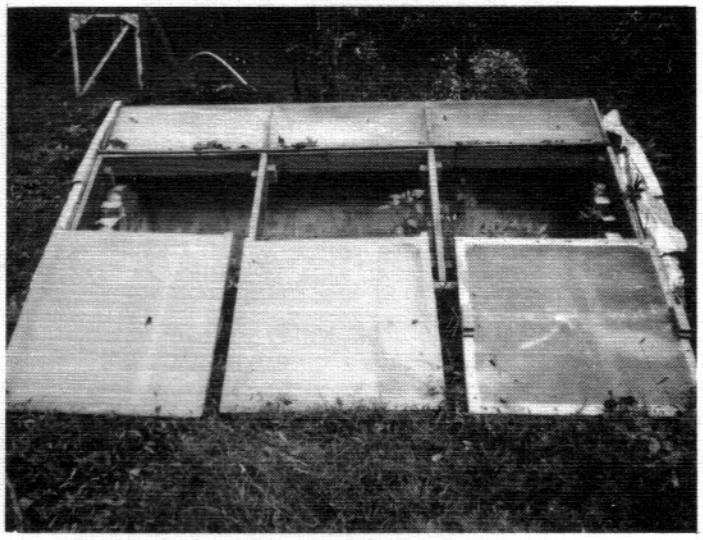
* face the south sun and where possible be protected from north or west winds;

* be covered with windows made with translucent material that is properly insulated (Kalwall weighs less than double - glazed glass. It is available from Solar Components, P.O. Box 237 Manchester, NH 03103);

* be insulated on the back sides or depress the cold frame surface in the soil to take advantage of its insulating potential;

* minimize opening for servicing in winter.

ASPI'S PERMANENT COLD FRAME



Some Added Caveats on Using Cold Frames

* Seek out the most sunny and wind protected areas for the cold frames. Even a short location or directional change will make differences as to the heat of a given place;

* Start late fall crops as early as summer weather permits so that they are strong and well-developed by the first freeze;

* Refrain from planting beans, melons, cucumbers, sweet potatoes and peppers. They will only be disappointments for they need warmer weather. The same applies for many types of tomatoes;

* Don't plant crops that take up too much room. The space in cold frames is limited. Don't grow gourds when you can grow greens.

* Keep a record of cold frame activities. Certain herbs and flowers along with varieties of other vegetables such as some Oriental varieties will prove excellent.

Note

Your own experience could help us in later editions of this paper. Consider yourself a "bare foot" cold frame horticulturist-- and share research and experience with us.

SOME IDEAL SEASON EXTENDER CROPS

Beets	Collards	Mustard Greens
Bibb Lettuce	Dandelions	Onions
Broccoli	Dill	Oregano
Brussels Sprouts	Endive	Parsley
Cabbage	Escarole	Parsnips
Carrots	Garlic	Peas
Cauliflower	Horseradish	Radishes
Celery	Japanese Radishes	Rutabagas
Chicory	Kale	Sorrel
Chinese Cabbage	Kohlrabi	Spinach
Chives	Leeks	Swiss Chard
Corn Salad	Lettuce (leaf and head)	Turnips

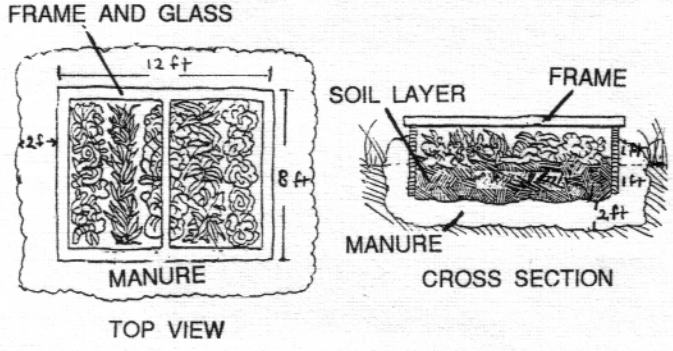
HOT BEDS

The hot bed is an ideal spring season extender in areas where animal manure is plentiful. The decomposing manure furnishes heat and nutrients for the seeds to sprout and grow during times when it is still too cool for rapid growth.

Hot beds contain banked piles of manure around the sides and more manure beneath a layer of dirt which is then sowed with seeds. A wider variety of seeds for summer crops, such as tomatoes, sweet potatoes and peppers can be included here --normally warmer weather vegetables.

The basic hot bed design consists of a portable frame on which windows are placed to protect the seedlings. The windows should be sturdy and light weight and should have latches or some way to keep them from being blown off during strong spring winds. Double pane construction is better for maximizing heat retention. Bordering and trim may enhance insulation.

Figure 3. HOT BED



Hot beds require less insulating materials than permanent cold frames, are easily accessible, permit growing seedlings with low overhead cost, permit manure reuse after the hot bed is removed in early summer, and allow for mobile set up at different locations.

Note: The manure needs to be fresh and warm. Very old manure has lost its heating capacity and is also devoid of some of its nitrogen content. Manure with good carbon/nitrogen balance is perfect for it can be immediately applied to the garden after hotbed use. Chicken manure is very hot and could burn roots. Horse or cow manure is better. The soil layer should be deep enough to prevent root burn. Depth depends on the quantity and quality of the manure and soil.

AESTHETIC VALUES

A garden with season extenders is a symbol that winter will give way to spring, that the grower has an ongoing commitment to stay in touch with the soil, and it stands vigilant for any signs of warming and growth. The presence of such devices give us a sense of warmth even in cold weather, a feeling that we know things continue to grow in a sleeping and dormant world, and that new life follows the old. Extenders are a sign of resurrection, hope and victory. They help make a drab landscape alive and wholesome.

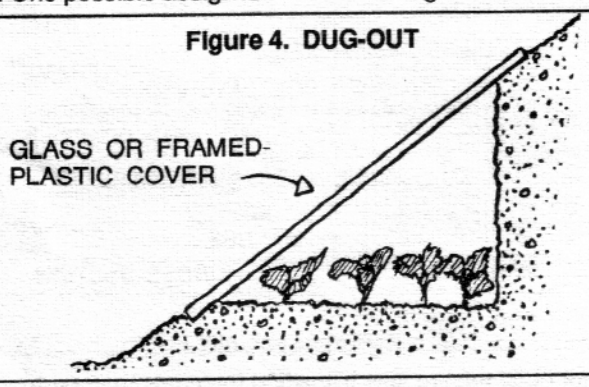
The variety of greenery under cover with the grey-brown of winter is aesthetically pleasing to both resident and visitor. People are generally drawn to growing things. Let the extenders be truly attractive and beckon people to spend winter time in the garden.

DUG-OUTS

One of the older ways of extending the growing season is through a variety of dug-out designs. These are pits or holes of varying shapes which contain growing vegetables or those which maintain their freshness in an enclosure. The general principle consists of a hillside or bank which has been evacuated of dirt or clay. More ideal conditions consist of the plants facing south on tiered levels surrounded on three of the four sides and partial covering on the south side. Over this is placed glass or some covering, at least during colder weather and this is manually removed in warmer or above-freezing weather.

The technique was perfected by Afro-Americans in the South during slave days and has been carried, to some degree, well into this century. Collards and other hearty greens were the favorite vegetables grown under such protected and insulated circumstances, but a greater variety is possible. A disadvantage is one of less accessibility, unless care is taken to permit someone to step down or into the pit. One possible design is shown in the figure below.

Figure 4. DUG-OUT



The advantages of this technique include: few parts that need storing or maintaining; very low cost; high insulating capability; and ability to protect materials from the wind. Disadvantages include a permanent dangerous hole on the property, an inability to permit total aeration unless some vent is constructed into the pit, a temptation for rodents to seek protection, and the propensity to flood in wet areas (unless properly engineered with drainage).

MAINTAINING SEASON EXTENDERS

Nothing comes maintenance-free. No matter how simple a design is there are parts that wear, weather, erode, or are susceptible to damage in inclement weather. The extenders are in this category as well. Temporary cold frames are more like tents. Winters may be severe and winds can blow these down. The following have more or less general pertinence:

* Keep all covers and windows tight during stormy weather. Secure coverings properly with latches, hooks, pegs or heavy weights (rocks, brick, logs, etc.).

* Open on warm days in fall, spring and even in winter, so excess moisture can escape and fresh air and carbon dioxide can enter the chamber area.

* Don't let plants touch the cover as they will be damaged by the colder weather.

* In very severe weather applying an extra blanket or insulating material to exposed surface will ensure less damage to plants.

* Pull weeds that tend to grow in such a protective environment and remove dead materials from the beds so that mold will not form.

* Store covering materials, frames, pegs, and hoops in a dry place during the summer. Make sure materials are dry before folding and storing. Suspending cloth coverings from the ceiling on a wire prevents nesting by rodents.

* Rigid wind barriers on the north and west sides may also give added winter protection.

* Occasionally clean glass surfaces during times of use.

* Keep a record of crop planting dates and yields. note which crops grow best.

* Replace soil in permanent cold frames every other year for better microbial activity. Care for soil (fertilizing, mulching, etc.) in a manner similar to the remainder of the garden.

REFERENCES

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* SOLAR RAISED BEDS, Garden Way Bulletin, Garden Way Publishing, Storey Communications, Inc. Pownal, Vermont 05261.

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* DESIGN, CONSTRUCTION, AND OPERATION OF THE SELF-VENTING COLD FRAME, forthcoming from Eastern Kentucky Appropriate Technology" (EKAT) 414 South Wenzel Street, Louisville, Kentucky 40204.

* INTENSIVE GARDENING ROUND THE YEAR, Paul Doscher, et.al., Stephen Greene Press, 1981

* THE INTEGRAL URBAN HOUSE, Olkowski, et al., Sierra Club Books, 1979.

SOURCES

Ready made plastic film cold frames from SHELTER SYSTEMS, P.O. Box 67 Aptos, CA 95001.

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