Coldframe Gardening
A solution to school gardening.

Since our growing season does not typically coincide with the school year, our students do not always experience gardening to its fullest. Coldframes are a very effective and inexpensive way to expose students to the healthy aspects of gardening and a way to overcome the obstacles of traditional on-site gardens.

For many school gardens, just as the danger of frost is over and gardens are thriving, school lets out for the year. In the fall, the first frost limits the amount of time students can utilize their gardens. The use of Coldframes extends the growing season, allowing students to experience all the aspects of gardening; they are able to nurture plants throughout their stages of growth, understand the importance of this process, and taste the fruits of their labor.

What are Coldframes?

Coldframes are easy to construct, require very little maintenance and space, and can be used as a teaching tool throughout the school year. A Coldframe is a transparent-roofed enclosure, built low to the ground and is used to protect plants from cold weather. The transparent top allows radiant (light) energy from the sun to pass through. The light arrives inside the closed space and is absorbed by the surface within. It is radiated again as thermal (heat) energy. The heat energy does not pass as well through the transparent material and is trapped inside. The entire process is known as the greenhouse effect.

Essentially the Coldframe acts as a miniature greenhouse, allowing students to extend their growing season. A microclimate is created that provides increased temperature of the air and soil within the Coldframe as well as insulation from the wind. The Coldframe allows you to have fresh vegetables even when the temperatures outside the coldframe fall below freezing.

Coldframes can provide your class with a permanent home for cold hardy vegetables or provide a site to over-winter plants. Classes can start seeds or harden off the plants you have started inside on the window sill.

Where can I purchase a Coldframe?

Coldframes can be purchased through a number of garden supply companies. The type used by the Gardens of the Fox Cities in our pilot program was the Juliana Double Coldframe. We also utilized an automatic opener arm for ventilation. Even though the purpose of the Coldframe is to trap heat, too much heat defeats the purpose. Therefore, it is important to have a way for your setup to release that excess heat. Ventilation also helps prevent disease. It is also important to remember that some crops rely on pollination so the pollinators need to be able to enter.

The companies who sell Coldframes include FarmTek.com, Amazon.com, MasterGardening.com and Coverlite.com. The cost of a Coldframe can range from $100 for a single frame to $200 for a double frame. The automatic opener arms cost between $50 and $60 dollars. Assembly is required and instructions are provided by the company.

How can I build my own Coldframe?

Coldframes can be constructed using the simplest of material. You do not have to be a carpenter to construct one. Your students may be able to come up with their own ideas for this project.

The basic standard Coldframe is rectangular; 3 feet wide and 4 to 6 feet long. The material for the sides can be as simple as hay bales or as elaborate as lumber made from recycled plastic. Other material ideas include masonry block, concrete, brick or wood. If you are using wood you will want a type that will not rot such as cedar. If you are using treated lumber be sure it is not treated with a preservative that is toxic to plants such as creosote or pentachlorophenol. Your lumber can be as little as an inch thick however two inch thick lumber is more durable and will provide more insulation.

The front should be 10 to 12 inches high and the back 18 inches high. The slope is not necessary but it will help catch more sunlight during the cooler months.

The cover or lid should be made of transparent or semi-transparent material; ideas include glass, rigid plastic or Plexiglas. The top will either need to slide off or open via hinges.

As mentioned earlier, the Coldframe will need to be ventilated. The method will depend on the type of lid you install. You can either slide it open, prop it open or you can purchase a controlled arm that will open the lid when temperatures reach a specified level. If you do not use an automatic control arm, attach a thermometer so you and your students will know when to ventilate your Coldframe.

Where should I place my Coldframe?

Ideally you would like your Coldframe to face south for maximum sunlight exposure and place it in an area sheltered from the wind. If there is a wall or a fence, you should consider placing your Coldframe up against it. If southern exposure is not an option, the second choice would be western exposure, and the third would be an eastern exposure. The least desirable would be a northern exposure due to minimal sun in the winter months and harsh after noon sun in the summer.

What kind of soil preparation is needed for the Coldframe?

Soil should be prepared to a depth of at least 12 inches. To create a fertile soil for planting, mix compost, processed manure, peat moss or other forms of organic humus with your existing soil. You may find it necessary to amend your soil every two years.

What crops should I grow in the Coldframe?

For best results grow cool season crops in your Coldframe. A cool season crop is defined as a vegetable that grows best with air temperatures of 60-65 degrees Fahrenheit. These crops can be planted when the ground temperature is around 50 degrees Fahrenheit. Cool season crops can tolerate light to moderate frost, but are intolerant of high summer temperatures. On a warm spring day ventilation of your Coldframe is important.

The following 10 vegetables are easy to grow when sown in Coldframes, all these crops can grow directly from seed:

1. Arugula
2. Beets
3. Chard
4. Kohlrabi
5. Green onion
6. Kale
7. Lettuce leaf
8. Mustard
9. Radish
10. Spinach

Leaf lettuce is the best crop to grow. It grows rapidly and abundantly in a Coldframe. Spinach is also an excellent choice. Other crops that grow well include onions, radishes, round or little finger carrots and endive. Your class is not limited to these

crops when using your Coldframe. Experiment with other crops for fun and learning.

Directions on how to plant your seeds can be found on the back of the seed packets or can be easily found on the Internet. This may be assigned to your students as a research project. They will need to know the depth to sow seeds, seed spacing, row spacing and how tall the plant will be when mature. They will also need to know how many days to maturity.

The salad gardens we grew here at the Gardens of the Fox Cities were planted the third week of April with an abundant harvest the first week of June. The crops planted were leaf lettuce, radish and spinach. In the fall, crops planted were leaf lettuce radish, spinach, kale and chard. The planting was done the last week of September and temperatures were above normal that week. The last Coldframe in the program was not planted until the first week in October and temperatures had dropped off. The Coldframes were harvested just prior to Thanksgiving. The Coldframe planted in September had an abundant harvest except the Swiss chard. The Coldframes planted the first week of October only had lettuce grow well. If you are planning on planting the Coldframes in the fall for a Thanksgiving harvest it is recommended that planting takes place within the first two weeks of September.

Taking care of Coldframes when temperatures drop below 30F.

When temperatures drop into the teens and twenties, you will need to cover your Coldframe with a blanket, old burlap sacs, roofing paper, or any type of cloth material to provide added protection during the cold spell. Another way to hold heat is to keep plastic milk jugs painted black and full of water inside the Coldframe. Place these milk jugs against the back or on the north side of your frame. The milk jugs will absorb heat and release it at night when the temperatures drop. When the cold spell has

passed you should remove the blankets or other heating devices from the Coldframe.

Operating and maintaining temperature of your Coldframe.

Most seeds will germinate in soil that is about 70 degrees Fahrenheit. Warm season crops like soil temperatures slightly higher at about 75 degrees Fahrenheit. Cool season crops will germinate in soil that is about 65 degrees Fahrenheit. Following seed germination, it is important to keep the air temperature appropriate for the type of crops you are growing. Cool season plants grow best when daytime temperature are 65 to 70 degrees Fahrenheit with night time temperatures between 55 and 60. These crops can also withstand slightly lower temperatures without being harmed. Warm season crops like their air temperature between 65 and 75 degrees Fahrenheit during the day and do not like to be exposed to temperatures any lower than 60 degrees Fahrenheit at night. You will receive best results if your Coldframe is properly ventilated and temperatures are properly controlled.

How many Coldframes will I need for my class?

In the pilot program here at the Gardens of the Fox Cities we worked with a variety of class sizes. Class sizes of 16 or less per Coldframe worked best. Students all obtained hands-on experience and there was not a lot of idle time. The classes of 20 to 24 students were okay, but gardening time was limited and the idle time increased. Classes over 24 students in size were difficult to manage with the small size of the Coldframe. The amount of students who had idle time increased as did the length of idle time. If your class size is over 20 students the purchase of two double Coldframes is recommended.

How often and how much water does my Coldframe need?

Watering of your Coldframe will vary from day-to-day and season-to-season. Proper watering promotes healthy plant

growth and prevents disease. You may need to do some experimenting with your Coldframe. Here are some general watering rules to follow:

- During cooler seasons your Coldframe may only need to be watered once a week.
- Only a little water is necessary when plants are small and temperatures are cool.
- Coldframes should not be opened for watering any time the temperature outside drops below freezing.
- Watering should be done early in the day so foliage has time to dry before nightfall. This reduces the chance of fungal diseases.
- As plants grow larger and the temperatures increase the frequency of watering should also increase.
- Allow the soil to dry between watering to prevent disease and mold.

Do I need to fertilize my Coldframe?

If you have prepared the soil prior for planting there is no need to add fertilizer to your Coldframe. If your soil is poor and you feel the need for fertilizer, do not add any until your seeds have germinated. After your seeds have germinated and their first true leaves have developed, you can add a small amount of liquid fertilizer. A low dose of multipurpose fertilizer such as 10-10-10 is ideal.

Do I need to worry about insects in my Coldframe?

The warmth inside the Coldframe, the nice fertile soil and the new plant growth are havens for insects and slugs. Inspect your

plants for pests. If you have pests, try to pick them off first. If this does not work, try a soapy water solution in a spray bottle. Another common problem in the Coldframes are slugs. They love the moist, warm conditions so be on the look out. After finding the slugs hand removal should not be a problem students really seem to love to catch slugs.

Hardening plants in Coldframes:

If your class has started seeds indoors on your windowsill they need to be "hardened" prior to moving them outdoors. Hardening means they need to be gradually exposed to the wind and sun outside and to the evening temperatures if the nights get cool. An ideal place to do this is your Coldframe.

Educational uses of Coldframes may include but are not limited to:

- Basic gardening/Biology/Plants
- Biology Experiments
- Nutrition/Where does are food come from?
- Journaling
- Measuring
- Weather/Temperature/Frost/Seasonal sun
- Planting zones/Maps
- Greenhouse effect/Microclimates
- Insects/Molds
- History/Where did a specific plant originate from?