

## Season Extension of Vegetable Gardens

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Preparing your garden for winter is one of the most useful things you can do. You may be sick of tending to your plot now but in spring when you can't wait to get out there you will be thankful that you did. Imagine it's the beginning of April and the snow had melted. What you find underneath is not heaps of weeds and rotten tomatoes. No, you find green winter rye or a dense mat of clover just waiting to grow.

Winter cover crops offer many benefits to the garden. First they draw up any excess nutrients that may be left in the ground after the crops have stopped growing. If left bare these nutrients would be lost to leaching which can become a pollution problem. It's like recycling organic matter. They improve soil structure by creating pathways for water and air movement through the root zone. Cover crops protect the soil from erosion by slowing or easing the intensity of hard rainfall. Finally they suppress perennial and winter annual weed growth.

Legumes would be my first choice for a winter cover. Manure and compost have equal parts nitrogen and phosphorus. But crops take up only about one-quarter the phosphorus as the nitrogen. You are left with lots of extra phosphorus. Having legumes as part of a crop rotation adds nitrogen to a system that needs more nitrogen but no new phosphorus. The problem with legume covers such as red or white clover, hairy vetch or alfalfa is they must be planted by the first week of September to be able to put on enough growth to survive the winter. For most folks there is much gardening left to do by that time. Try under sowing the legumes beneath the crops to try and get them established. Clovers are seeded at the rate of about one ounce per 1000 square feet, hairy vetch at half a pound and alfalfa at a quarter pound. In the spring simply till it in and it will die back. If it has grown large cut it back to the ground first then till in the crowns.

Winter rye is a much more widely accepted winter cover crop. It is very easy to establish because it will germinate at temperatures down to 40 degrees. Seeding even in November will catch and start growing. I have heard many complaints though, that well established winter rye is difficult to kill in the spring. Again, cutting it back to the ground and tilling in the crowns will improve the kill. But if you are looking for an alternative to winter rye try non-hardy oats or barley. You will get the same benefits of nutrient recycling and soil coverage but it will be winter killed. All three of these grasses are seeded at 3.5 pounds per 1000 square feet.

Growing vegetables in colder weather requires some extra inputs. The fertilizer or compost that you added during the summer is probably spent. The good thing about compost or manure is that it acts like a slow release fertilizer. There are some nutrients available right away and some that are released later when the soil microbes continue to break down the remaining organic matter. But in the winter garden the soil is cold and the microbes stop working. You need to add completely finished compost so most of the nutrients are readily available. Another advantage to finished compost is that it is black. Darkening the soil will increase the heat built up during sunny days.

While many cool season vegetables will survive freezing temperatures, it is still a good idea to cover them. By covering plants with floating row cover, plastic or grass frames you create a microclimate which dramatically increases growth. It is important to understand that the main reason for season extension materials is not frost protection, you will only get a few degrees protection over night. Their purpose is to improve growing conditions during the day. Seeds will germinate faster and plants will grow faster under these covers. The following is a brief description of the materials used for season extension.

Floating row cover is a spun-bonded plastic fabric that is used for season extension and insect control. The lighter covers, measured in ounces per square yard, are good for early spring crops, like brassicas, that don't need much cold protection and are at the mercy of flea beetle attack. The light cover will add 2 to 4 degrees

of night temperature while allowing 85% of the light through. The mid-weight covers only have 70% light transmission but give a frost protection of 4 to 8 degrees. The heavy weight cover will reduce light transmission to 40% and is strictly used for frost protection. Plants won't thrive under such low light. The heavier fabrics also last much longer, resisting tears. These fabrics are light enough to rest on the plants without any support though I use wire hoops on cucurbit crops to prevent tears from their spiny leaves and petioles.

Row cover offers adequate microclimate in September and October, but if you want to harvest fall crops in November or December, go with a low tunnel covered in 2 mil clear plastic. Place a layer of slitted agricultural plastic cover over the row then a second layer of clear 2 mil plastic. The double layer will increase insulation and allow you to vent the row on warm days. The plastic will build heat during the day much better than row cover. Plastic cover can increase the temperature by 35 degrees so venting is necessary.

Crops cannot take the weight of the plastic so it must be suspended on wire hoops. The wire must be thick, at least 3/16 inch or 7 gauge, to hold the plastic up off the crop. And, if you are over-wintering, thick wire will also support the snow. A 6 foot length of wire is needed to cover a 3 foot wide bed. The wire should be placed every 2 feet for proper support.

The next step in cold protection is a cold frame. This is a great way extend your season even longer or over-winter crops for early spring harvest. A cold frame is a wooden box made of a two by twelve on the back and sides and a two by eight on the front. This gives the top a slight angle to it. Place the frame in a sunny location. Cover with window frames. These can often be found at the town transfer station. Glass also builds heat inside the frame so it must also be vented on warm days.

If you have tall trees, consider the location carefully. What is a sunny location in September might not be in December when the sun is much lower in the sky. Last year I placed my frame in a location that got 7 hours of sun in September. By December 21<sup>st</sup>, the shortest day of the year, the sun was so low in the sky the same location was completely blocked from any sun.

As a comparison, I planted scallions, lettuce, spinach and some different brassicas (Asian mustard greens) like tat soi, bok choy, arugula and mizuna in the cold frame and under row cover, leaving it for the winter. Under row cover only the spinach survived. In the cold frame all the crops survived.

It is hard to develop a good planting schedule based on the days until harvest listed on the seed package because crops are slower to develop in the fall. The climate in your yard and the microclimate created by season extension materials will determine how quickly the crop matures. The following is a planting chart that can be adjusted to fit your observations of your own garden.

<b>Crop</b>	<b>Fall Harvest</b>		<b>Spring Harvest</b>
	<b>Last planting date</b>	<b>Last harvest</b>	<b>Planting date</b>
Carrot	September 1 <sup>st</sup>	Thanksgiving	December 15 <sup>th</sup>
Parsnip	June 15 <sup>th</sup>	No limit	Over-winters
Beet/Swiss chard	September 1 <sup>st</sup>	Thanksgiving	December 15 <sup>th</sup>
Spinach	November 1 <sup>st</sup>	Christmas	December 15 <sup>th</sup>
Heading Brassicas	August 15 <sup>th</sup>	November 1 <sup>st</sup>	None
Leafy brassicas	November 1 <sup>st</sup>	Christmas	December 15 <sup>th</sup>
Lettuce	October 15 <sup>th</sup>	Thanksgiving	December 15 <sup>th</sup>