

# TUNNEL VISION

*By Rupert Jannasch*

**Season extension is a fact of life for Maritime vegetable growers wanting to compete in the produce trade.**

**H**ere on Ironwood Farm, we began with a 2500-ft<sup>2</sup> (230-m<sup>2</sup>) greenhouse enclosed by a double layer of poly to grow tomatoes, peppers, early and late greens, and sweetpotato slips. A wood furnace supplies supplementary heat. More greenhouses would be an asset. However, new structures can be costly and there is a creeping middle age reluctance to stoking midnight fires and handling bulky fuelwood.

In the field, black plastic mulch and floating row covers help capture extra heat near the crops and protect them from punishing winds and cold. Sometimes, the proximity of the Bay of Fundy helps when the tide pushes warm air up the Avon River early in the morning and provides a buffer against untimely frosts.

Nonetheless, it is always risky to plant tender crops without cover before the end of May, and an early frost in September can spoil an otherwise fine fall growing season. Prolonged summer wet periods over the past six years—even frost in July, 2009—are reasons to consider more permanent and expanded systems of season extension. Tunnel houses make an appealing option.

## Homemade or store bought?

Initially, the option of several small, homemade tunnel houses was appealing because they seemed cheaper and more versatile than a single, large steel structure. Accordingly, the advantages and disadvantages of rebar, electrical conduit and PVC pipe for building arches were carefully considered. None of these materials, it turned out, were particularly cheap. Moreover, even a 20-foot (6-m) piece of rebar moulded into an arch will produce only a relatively narrow structure with very little headroom. Suitable anchors are essential to avoid the fate of many hoopouses as wind-borne ornaments in a nearby hedgerow. All things

considered, I couldn't devise a method to generate a substantial amount of sturdy, protected space with a reasonable investment of cash and labour.

Fortunately, I met a chap selling the British-made, field-size Haygrove tunnel. The price was attractive, and, several weeks later, the kit for a 200 x 28 foot (61 x 9 m) unit landed in the yard. This article will summarize some benefits and pitfalls encountered in making effective use of this structure.

Just to be clear, this tunnel is a very basic model—about ten feet (3 m) high in the peak. It is not to be confused with the high tunnels that seem all the rage these days—the more lofty structures are constructed by connecting almost vertical steel stanchions at the base of each arch. The Haygrove “Solo” tunnel is just a basic arch supported by a near vertical knee-high section over each anchor.

## The structure

Several features illustrate the tunnel's simple yet highly functional construction. Each arch is mounted on steel pins secured in the soil by auger-like anchors. These can be screwed into the ground either by hand or with a motorized post hole auger. Installing about

**T**he plastic supplied with the Haygrove tunnel contains a thermal heat barrier, which gives it a slightly translucent appearance. This material generates a modest shading effect, so with the sides pulled up it is possible to work inside on a hot day. The plastic has an expected lifetime of four to five years. The replacement cost is \$6000/acre. Some abrasion occurs along the ridge and directly under the ropes; however, these damaged areas can be moved each time the plastic is ‘skinned’ (applied) so that less worn plastic is beneath the pressure points.

60 anchors (by hand) took two people about 2.5 hours, and the tunnel has a better foundation than Ironwood's main greenhouse.

The plastic is secured largely by ropes woven back and forth over the length of the tunnel. Special clips and reinforcing tape are used to clamp the plastic at the ends and around the doors (one weak point in the Haygrove design is that the doors tend to flap in windy conditions). The tunnel can be vented by lifting the plastic up under the ropes. Stretching the 220-foot (67-m) plastic sheet can be accomplished by two people in calm conditions. Removing the plastic each fall (the tunnel will not support much snow) is a simple job. The entire sheet can be rolled up inside a four-foot (1.2-m) wide piece of plastic mulch and left alongside the arches over winter.

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### **Siting the tunnel**

A remarkable feature of the tunnel is its very simple ridge support. Rods, wires and, in some recent designs, tape are used to connect the arches. Accordingly, the structure is extremely flexible and enables construction on uneven terrain and on slopes. Many tunnels are 500 feet (152 m) or longer and resemble an oversized tube of silage.

Careful consideration should be given to drainage. On my farm,



*Rupert Jannasch's tunnel on Ironwood Farm.*

a low section in the tunnel is often wet and this interferes with tillage. Also, the soil at the end of the upper part of the tunnel is heavy and there is some seepage of surface water. These faults are inconvenient and, unless addressed (perhaps with tile drainage), they can substantially reduce the tunnel's productive area.

### **Tillage and fieldwork**

A field-scale tunnel provides the opportunity for tillage with a farm-size tractor. At Ironwood, the plastic is applied in early April after the risk of heavy snow has largely passed. After several weeks, the soil is dry enough to work with a ten-foot, S-tine harrow. The 65-hp tractor is a little large, perhaps, but the harrow protrudes enough on each side to reach almost to the tunnel borders. To minimize skull fractures and rents or rips in the plastic, I have learned to steer a fairly cautious line and now expect to work the edges with a rototiller or digging fork.

Laying plastic mulch is a different story because the mulch layer is no wider than the tractor. Therefore, it is only possible to lay three four-foot-wide strips in the middle of the 28-foot wide tunnel. The outer beds are mulched with straw or nothing at all.

Tractors work fine in the spring because usually all the crops are started from scratch—on bare ground, so to speak. Invariably, however, on small, mixed vegetable operations, a variety of crops might be grown in the same tunnel. They will have different maturity periods and the early harvest of tomatoes, for example, might enable the planting of a second crop of beans. Suddenly the opportunity for tractor work can be lost because it becomes impossible to manoeuvre around growing crops, plastic mulch and trellises. Generally, by late summer any tillage must be done with a walk-behind tiller, unless of course, only one crop, such as indeterminate grape tomatoes, is



*Tomatoes in a Haygrove tunnel with the plastic pulled up under the ropes for ventilation.*

being grown for the entire season.

When considering multiple crops and staggered plantings, growers might miss the versatility of owning several smaller tunnels. Large tunnels are well suited to a few crops with similar requirements in terms of heat, moisture and space. Field-scale tunnels may be cumbersome for growing a large variety of crops at once. In this regard, tunnels are little different from greenhouses, something growers need to realize before making a purchase.

### Crop choices

A 28-foot tunnel is most easily laid out in five beds. Lower growing crops are planted on the outside beds. Crops requiring trellising or staking are planted in the middle beds.

In the past two seasons, I have grown peppers, eggplants and tomatoes as main crops. String beans and lettuce might also be good early season choices, but

both these crops can be grown outside (under row cover if necessary) if the land is dry enough to be worked. Tomatoes and eggplant seedlings are planted on May 1st, making sure that the edges (where the plastic meets the soil) are well insulated with straw. Row covers can be used inside the tunnel if it gets really cold.

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In 2009, the first grape tomatoes and eggplant were harvested on June 28. The harvest season was advanced by an entire month. The general goal is to harvest main crops by early August when field production of

the heat-loving crops begins, and then to plant second crops for harvest in October and early November when field production drops off. Second crops might include beans, spinach and other greens, and possibly lettuce.

Establishing a sound rotation for the tunnel is important. It can take many shapes and forms depending on the creativity of the grower. One novel idea is to make use of the simple and inexpensive anchors and move the tunnel every few years by installing an additional set of anchors 28 feet to one side of the tunnel. If the plastic is removed each fall anyway, why not remove a few braces in the spring and pop the arches on a new line of anchors adjacent to the first? It should only take about thirty extra anchors. Ah, the possibilities one dreams up!

### Why I like my tunnel

The main reason I like my tunnel is because it provides most of the benefits of a greenhouse without the expense of heating. Furthermore, at \$1.25 per square foot (in 2008), the cost is about half that of a greenhouse. The payback period should be four years, depending on the production methods (eggplant certainly won't pay off the loan, but the crop can be beautiful).


Field-scale tillage is economical, especially in the spring. Furthermore, the chilling effect created by removing the plastic over winter helps control pests and disease.

Tunnels are good for cash flow and provide regular work for employees in springtime and during rainy weather. The past five summers have all had extended wet periods of three

weeks or more and large tunnels provide a certain piece of mind that at least some crops will be weeded and harvested on time. If the climate continues to be erratic, more tunnels may be erected to enhance the greenhouse effect on Ironwood Farm.

*Rupert Jannasch operates Ironwood Farm, a mixed vegetable, berry and beef farm near Nova Scotia's Annapolis Valley. He is the Organic Extension Specialist with ACORN.*

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