

New Resource!

All About the High Tunnel Tool Kit

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High Tunnel Resource Guide for Kentucky Producers





High Tunnel Tool Kit: Introduction

Follow in tool kit: chapter 1 – Introduction (p 8)



high tunnel

photo credit: Kathryn Pettigrew



greenhouse

photo credit: Arundathi Sharma



caterpillar tunnel

photo credit: Rachel Rudolph



low tunnels

photo credit: Brett Wolff

What is the high tunnel resource guide?

- Curated resource guide for New/Prospective High Tunnel Producers
- Clickable PDF File or Hard copy in a binder with tabs
- The guide itself is 8 chapters, 57 pages
- The guide houses 92 separate high tunnel resources to facilitate deeper learning

Why create this resource guide?

Dr. Emery Emmert, a horticulture professor at UK, developed the first high tunnels here in KY

Around 2,000 high tunnels in Kentucky

- NRCS EQIP and RCPP Programs
- Many producers new to high tunnel production

Critical difference between high tunnel and open field production - **steep learning curve**

Rapidly growing body of knowledge tends to be scattered, and not always regionally appropriate

FARMER VOICE: HOWARD FARM

Nestled in the eastern Kentucky mountains near Vancleve, you'll find the small piece of land Jeff and Sue Howard have turned into a thriving farm through regenerative agriculture methods, hard work, and persistence. What began as a way to pay the mortgage when Jeff was laid off from the mines, is now a diversified farm with chickens, honeybees, maple syrup production, blueberries, gooseberries, black raspberries, cherry tomatoes, lettuce, onions, broccoli, and much more.

Thanks to two high tunnels and a greenhouse, they produce fruits and vegetables year-round. In particular, their hydroponic lettuce operation feeds students in the Jackson Independent school district during the school year and summer feeding program.

You can find them around eastern Kentucky at the Breathitt County Farmers Market and occasionally the Magoffin and Perry County Farmers Markets and delivering produce to Jackson Independent Schools and supplying local restaurants with farm-fresh ingredients.



Photo 2.3 & 2.4 Scenes from Howard Farm high tunnel growing operation (above) and marketing through their local farmers market (below). *Source: Jeff and Sue Howard*

Our process

Comprehensive collection of resources in one place

Curated resources that are:

- regionally appropriate
- from reputable sources
- accessible for new/prospective producers

Multimedia including how-to videos, webinars, fact-sheets, and publications/guides

Interface/structure designed to guide producers to the resource(s) they need

Our Design Process



How to use this guide:

- **Table of contents**—by order of importance when considering high tunnel production, the most comprehensive entry point
- **High tunnel graphic**—navigate by clicking the element you wish to learn about
- **Resource Numbers** link either to a document within the toolkit, to a video on a YouTube playlist or to an external website
- **Book icon** indicates more info can be found on that topic in another section
- **Back to My Spot button** will take you back to your previous place in the document.



**Click any section above
to jump to that section of the guide.**

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High Tunnel Tool Kit Check List for New/Beginning High Tunnel Producers

- ☐ If you are a beginning grower or this is your first high tunnel, start reviewing this tool kit and creating a plan one year in advance of high tunnel construction.

[Click here to learn more about this tool kit and how to use it](#)

- ☐ Ensure you know precisely what a high tunnel is and how it is used compared to other forms of season extension.

[Click here to learn the basic definition of a high tunnel, and how it differs from other forms of season extension](#)

- ☐ Learn why you would grow crops in high tunnels in Kentucky, the benefits and challenges of high tunnels compared to other forms of production, and the basics of season extension in Kentucky.

[Click here to learn more about the benefits and challenges of high tunnels in Kentucky](#)

- ☐ Consider the **financial/economic factors** of high tunnel production, and **your goals** for producing in a high tunnel:
 - ☐ Will this be a financially viable production method for your farm or garden?

[Click here to learn more about the financial/economic considerations for high tunnel production](#)

- ☐ If you plan on constructing a new high tunnel, consider your proximity water for irrigation and electrical power.

- ☐ Weigh the cost and benefits of optional additions or accessories to the main tunnel structure:
 - ☐ -end wall options—size and material
 - ☐ -side wall styles—drop down or roll up
 - ☐ -automation for opening and closing the high tunnel
 - ☐ -fans
 - ☐ -water catchment

[Click here to learn more about high tunnel site selection, site preparation, and construction](#)

At this point, if you decide to proceed with a high tunnel, it is recommended that you consult with one of the following technical assistance providers in Kentucky. These providers can help you assess the suitability of a high tunnel, connect you with potential sources of funding or financing, and help you create a plan for the construction and utilization of a new high tunnel:

- ***Your county's Cooperative Extension service***
 - ***The Natural Resources Conservation Service of the US Department of Agriculture***
 - ***Grow Appalachia***
 - ***The Kentucky Horticulture Council***
-

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- ☐ As you are planning for your high tunnel, ensure you understand what regular maintenance and management is required for the structure, systems, and soil, and what may need to be replaced overtime (depreciation) as these can be hidden costs that should be factored in as part of an enterprise budget.

[Click here to learn more about high tunnel maintenance](#)

- ☐ Create a production plan for your high tunnel, ideally working with one of the technical assistance providers listed above. A production plan should be composed of the following elements:
 - ☐ Careful selection of high value crops proven to be successful in high tunnels
 - ☐ A crop budget for each crop
 - ☐ A layout of where you will plant the crops in the high tunnel that takes into consideration plant/row spacing, pathways between the crops, etc.
 - ☐ Calendar dates for key activities such as starting seeds for transplants, preparing the soil and systems (irrigation, trellising) for your crop, planting, harvesting, etc.

[Click here to learn more about high tunnel production](#)

- ☐ Plan the production materials needed for each crop. All crops will need some form of irrigation in a high tunnel due to lack of rainfall. Other materials might include:
 - ☐ Ground cover/mulch for weed management
 - ☐ Trellising materials for supporting certain crops as they grow
 - ☐ Additional equipment for climate management based on season/crop (shade cloth, row cover, etc.)
 - ☐ Equipment and materials for pest/disease management and scouting (sprayer, sticky cards, etc.)

[Click here to learn more about high tunnel production](#)

- ☐ Soil management in a high tunnel has key differences from open field production. However, many of the same important concepts, such as crop rotation and cover crops, still apply to high tunnels. Soil should be sampled and tested annually.

[Click here to learn more about managing high tunnel soils](#)

- ☐ Consider how you will manage pests and disease. As with all crops, an integrated pest management approach suited for each crop is recommended. Some pest/disease control products used in open field production may not be permitted for high tunnel production.

[Click here to learn more about managing pests and diseases in high tunnels](#)

Chapter 4 - Site Selection, Design, and Construction

If you have assessed the costs and benefits of high tunnel production and decided that owning and operating a high tunnel is the best direction for you, there are several more steps to take before you can begin growing crops. Site selection is an important next step as it can strongly affect the longevity of the high tunnel structure, the amount of maintenance that will be required, as well as long-term production success.

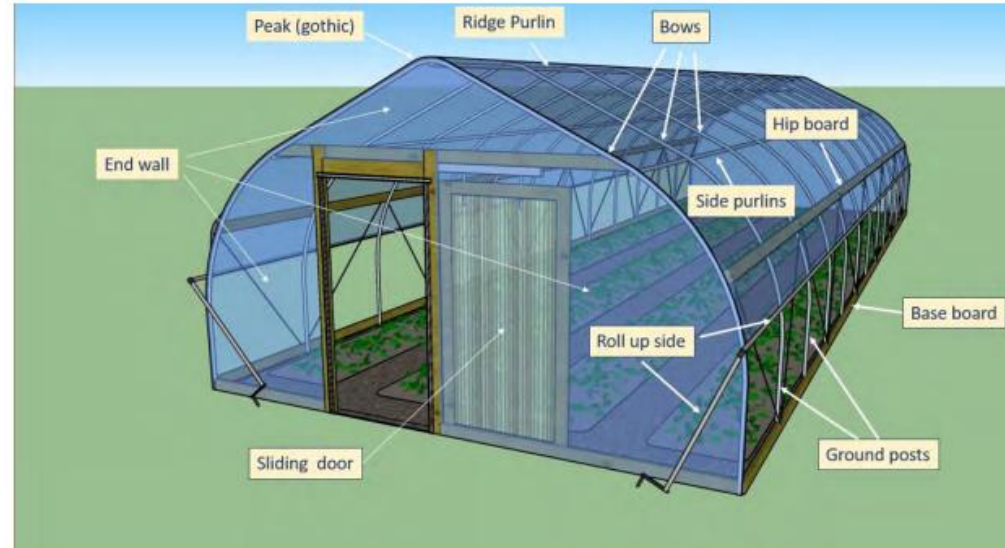


Figure 4.1 An illustration of a high tunnel with all key parts of the structure labelled. *Source: Grow Appalachia*

High Tunnel Management for Beginners (Resource 017)

- This is a video from University of Kentucky Vegetable Extension Specialist that discusses site selection, design, and construction options.

Orientation

When thinking about which direction to orient your high tunnel, **consider both sun and wind**. Kentucky is south of the 40-degree latitude line, so the general guidance for sun exposure is to **layout a high tunnel from north-to-south** to minimize shading and ensure a more even distribution of sunlight throughout the course of a day. However, those wishing to prioritize fall/winter/Spring production may choose an east-to-west orientation, which helps to maximize sunlight exposure during low-light months. Orienting a high tunnel **perpendicular to prevailing winds** can offer the benefit of **helpful airflow through open side walls, improving ventilation**. Other factors to



See more resources on crop irrigation in chapter 6 of this toolkit

Replacing boards and other resources

Installing the Baseboards

(Resource 029)

- A nine-minute video on installing baseboards to a high tunnel structure

Attaching the Hip Boards

(Resource 030)

- Eight-minute video from Grow Appalachia demonstrating the installation of hip boards

Optimizing High Tunnel Production

(Resource 031)

- This publication from University of Vermont Extension describes ways to improve the high tunnel structure and your production practices.



A major part of maintaining your tunnel is monitoring salinity buildup in the soil. Resources on managing high tunnel soil salinity can be found in Chapter 7 of this toolkit, 'High Tunnel Soil Health'



Photo 5.4 Many tunnels use wood in addition to metal for their structure. Wood components can wear down and get damaged. The easiest time to fix them is when you have the plastic off the tunnel for replacement. *Source: Kathryn Pettigrew*

Season Extension Tools & Techniques

Introduction

Season extension techniques can be as simple as selecting early maturing varieties; or they can be a more complex combination of multiple methods. Regardless, the objective is to extend the growing season by producing earlier crops in the spring and/or push production later into the fall and early winter.

Marketing and Market Outlook

Growers able to provide the earliest locally grown fruits and vegetables frequently capture premium prices. The same can be said for those who harvest crops well into fall and winter. A longer production season may place Kentucky growers in a better position to compete with producers to the south. Some season extension techniques can also result in higher yields and improved product quality. Extending the season has the potential of spreading out cash-flow, increasing overall farm profits, and gaining new customers.

Marketing avenues include roadside stands, farmers markets, U-pick, restaurants, locally owned grocers, community supported agriculture (CSA) subscriptions, produce auctions, and wholesale markets. Growers primarily selling their produce via farmers markets may find they have to locate alternative markets for products available outside the regular season. However, some farmers



Specific Tools and Techniques

Planting site

The location of the growing site can have an impact on the length of the growing season available for production. Selecting a site with a southern exposure, especially a south-facing slope, can help increase the earliness of certain crops. Avoid the top of a hill, where wind exposure can be a problem, as well as the bottom of a slope where cool air will settle.

Factors that affect soil warming, such as soil type and soil color, can impact earliness, as well. Darker soils will warm up more quickly in the spring; the addition of organic matter can help to darken light-colored soils. Loam and clay soils absorb and hold the heat better than sandy soils. Soil warming is also improved in raised beds and with the use of dark mulches.

Transplants

The use of transplants is another way of getting an earlier start to the season. Harvests of transplanted crops





High Tunnel Winterization & Maintenance

Play (k)



0:08 / 1:25:20 • Intro >



High Tunnel Winterization and Maintenance Workshop



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Key Takeaways

- High tunnels come decisions/tradeoffs that must be informed by your specific situation
- The information in this guide is meant to serve as a starting point
- There is a huge amount of information in the resources housed in the guide - the guide is meant to help you find information you need specifically.
- There is a network of service providers who can help!
 - UK Extension
 - Grow Appalachia
 - NRCS
 - KY Horticulture Council
 - Many others!

Download the Guide



OR

<https://ccd.uky.edu/resources/systems/hightunnel>

For questions about how to access or navigate this resource, contact Chris McKenzie at:
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