



United States Department of Agriculture
Natural Resources Conservation Service

High Tunnel Systems

Practice, Successes, and Bumps in the Road

Dave Mason, FAPD Program Manager, Washington DC

Glenn H. Carpenter, National Leader Animal Husbandry, Washington DC

Helen Denniston, SRC, Alaska

Tom Akin, SRC, Massachusetts

Darryl Williams, DC, Crestview, Florida

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Dave Mason
Financial
Assistance
Programs Division
National
Headquarters

High Tunnel System (HTS) Background

- Has been offered as a practice since FY 2010
- Required to be offered in AMA and EQIP programs in FY 2016 per NI 440-307.14
- \$116 million obligated to over 17,200 HTS practices since FY 2010

High Tunnel System (HTS) Practice Benefits

- Reduce nutrient and pesticide transportation
- Improve soil and plant quality
- Extends growing season
- Reduces transportation energy cost by local marketing of products

High Tunnel System (HTS)

Primary participants

- Rural
- Urban
- Historically Underserved (includes Veterans, Beginning Farmers)
- Organic producers
- Community groups
- Diverse operations (Large operations on small acreage)



Glenn Carpenter
National Leader Animal Husbandry
Ecological Sciences Division
National Headquarters

High Tunnel Systems (325) Started in 2010 as
Seasonal High Tunnels for Crops (798)

Funded under Farm Bill (2008) under EQIP

Became permanent Standard in 2015

Summary of High Tunnels since 2011:

FY	Planned	Applied
2011	1647	1436
2012	2530	1750
2013	2268	2174
2014	2604	1889
2015	2357	1884
2016 (325)	2582	290
2016 (798)	119	1285
Total	14102	10708

Summary of High Tunnels:

- In FY 2015 High Tunnels had the 18th highest FA out of over 160 conservation practices
- \$14.99 million dollars

Definition

An enclosed polyethylene, polycarbonate, plastic, or fabric covered structure that is used to cover and protect crops from sun, wind, excessive rainfall, or cold, to extend the growing season in an environmentally safe manner.



High Tunnel Systems Practice, Successes, and Bumps in the Road

- Purpose: To Improve plant health and vigor
- Conditions where practice applies:
 - ❖ Where sun or wind intensity may damage crops, or where an extension of the growing season is needed due to climatic conditions;
 - ❖ Does not apply to crops not grown in the natural soil profile!!!

High Tunnel Systems Practice, Successes, and Bumps in the Road

Criteria:

- Crops must be grown in natural soil profile;
- Raised beds maximum 12 inches in depth;
- Tunnels not greenhouses;



High Tunnel Systems Practice, Successes, and Bumps in the Road

- Criteria:
 - Must be from a manufactured kit;
 - Build to manufacturers specifications;
 - Warranty will be that provided by the kit manufacturer;
 - At least 6 feet at peak;



High Tunnel Systems Practice, Successes, and Bumps in the Road

- Criteria:
 - Covering minimum of 6-mil greenhouse grade, UV-resistant material with 4-year minimum lifespan;
 - Shade cloth and additional support



NRCS High Tunnel System Survey

- Survey was distributed to field staff in April-May 2016

- Over 1,800 survey responses

- Damage from wind and weather (37 comments)

Due to the weather, we have had a number of high tunnels that have been severely damaged and replaced at least once with a lot of them being fixed over and over again due to wind damage.

High Tunnel Survey Comments

- 765 individual comments in addition to the 1,800 answers to targeted questions.
- Comments ran the gamut from just a couple words to long paragraphs on the pros or cons of the high tunnel program.

Example High Tunnel Survey Comments

- We should not be funding High Tunnels. We were created to address natural resource concerns - to help people best work within the conditions they have chosen to live and conserve the natural resources. If USDA wants to address 'food deserts' through high tunnels, they should use a different agency within the department such as CNPP or FNS. It does not fit NRCS.

Example High Tunnel Survey Comments

- High tunnels have been the most successful tool we have ever had to reach small and HU producers. This small, but very vocal group, is learning about conservation and spreading the good work NRCS is doing across the landscape.
- I don't see the resource concern related to seasonal high tunnels. The whole initiative seems production oriented and puts people into business. It often ends up causing a resource concern. (soil erosion)

Example High Tunnel Survey Comments

- In my opinion, and I am strongly biased against HTs...HTs do not fit NRCS - they do not fit resource concerns, as we know them. WE have millions of acres of croplands that are degraded and need assistance that we can't get done. As such, they are a structure, and ENG has avoided them. HTs would fit better under USDA-RD or USDA-FSA grant program. I completely agree that we need to diversify our food production and to assist locally grown food - - just not sure NRCS involvement in HTs is the way for us to do this.

Example High Tunnel Survey Comments

- Great practice. Keep it going.
- One program that benefits small scale farmers.
- I would like to see additional programs like the high tunnel for beginning farmers and urban farmers.

Example High Tunnel Survey Comments

- This is the most blatant cash handout to manufacturers second only to the tractor replacement program. SHTI is worse though because they don't really address any SWAPA resource concerns, the TA from them is basically nothing, and field staff waste tons of time with people that have no idea how to farm, build things (even from a kit), or deal with contracts. The tractors at least emit less air pollution, are super easy for staff because they work with people that actually know how farming and business work, and they are lucrative in terms of TA for the agency because of high relative value (i.e. machine vs tarps). SHTI is one of the worst ideas I've ever seen come out of NRCS in 14 years.

Alaska



Helen Denniston

State Resource Conservationist

Palmer, Alaska

Phone: 907-761-7756

Email: helen.Denniston@ak.usda.gov



United States Department of Agriculture

High Tunnels: Lessons Learned in Alaska

Helen Denniston, State Resource Conservationist
Palmer, Alaska

Alaska Statistics

- Since 2010 Alaska EQIP participants have installed **679** high tunnels
- Majority of those participants were beginning farmers who had never participated in USDA Farm Bill Programs
 - Pro- Helped us reach many new clients
 - Con- Farm Bill Compliance Determinations were overwhelming to our limited staff.

Alaska

Challenges:

- Installation costs are higher here due to the cost of shipping kits and other materials to remote, off the road locations.
- Payment rate is \$6.60 / sq ft
- TA costs are high
 - Due to remote, off road farm locations.
 - Level of assistance needed for new clients.

Alaska

Challenges: High Winds and Heavy Snow Loads

- Encouraged producers to purchase kits that had adequate warranties
- Order kits with a 4 foot rib spacing and add extra support kit if necessary
- Use an enhanced anchoring system (deadman or other secure anchor)
- Use a cover with fiber reinforced mesh to minimize tearing
- Fortunately less than 1% of high tunnels in Alaska have failed.

Alaska



An early and heavy wet snow collapsed this high tunnel.

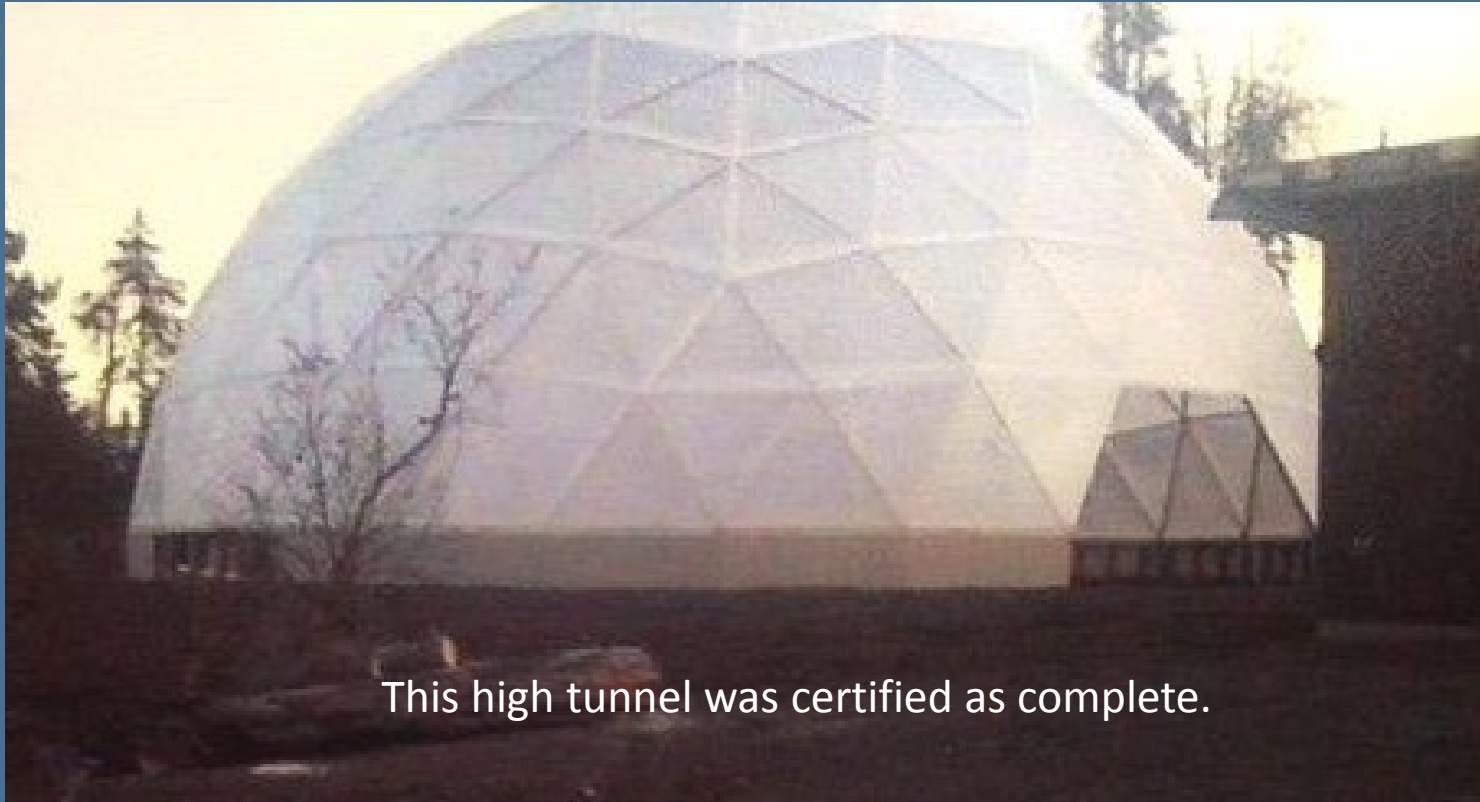
Alaska

Challenges:

Poor Business Practices by Vendors

- Vendor would bid on kit and installation, half finish job and then move on to new job delaying certification
- Vendor did not install adequate anchoring leading clients to believing that the 4 foot pony wall would anchor high tunnel
- Warranties not being honored
- Litigation occurred in some instances

Alaska



This high tunnel was certified as complete.

Alaska



Over the weekend a high wind lifted and destroyed it. The 4 foot pony wall was not heavy enough to anchor it down. Anchoring is extremely important in wind prone areas.

Alaska

Challenges:

Animal Damage and Vandalism

- Some high tunnels had to be fenced to prevent animal damage from moose and bears.
- High tunnels have been vandalized in some areas by persons cutting or tearing plastic covering.

Alaska

Challenges:

Lack of agronomic knowledge by

- Developed several new guides for high tunnel growers concerning variety selection, temperature control, irrigation and pests.
- Hosted “High Tunnel 101” workshops. A 1 to 2 day workshop that covered high tunnel basics: construction, planting, irrigation, pests, nutrients, cover crops and winter shut down.

High Tunnels have been successful in Alaska.

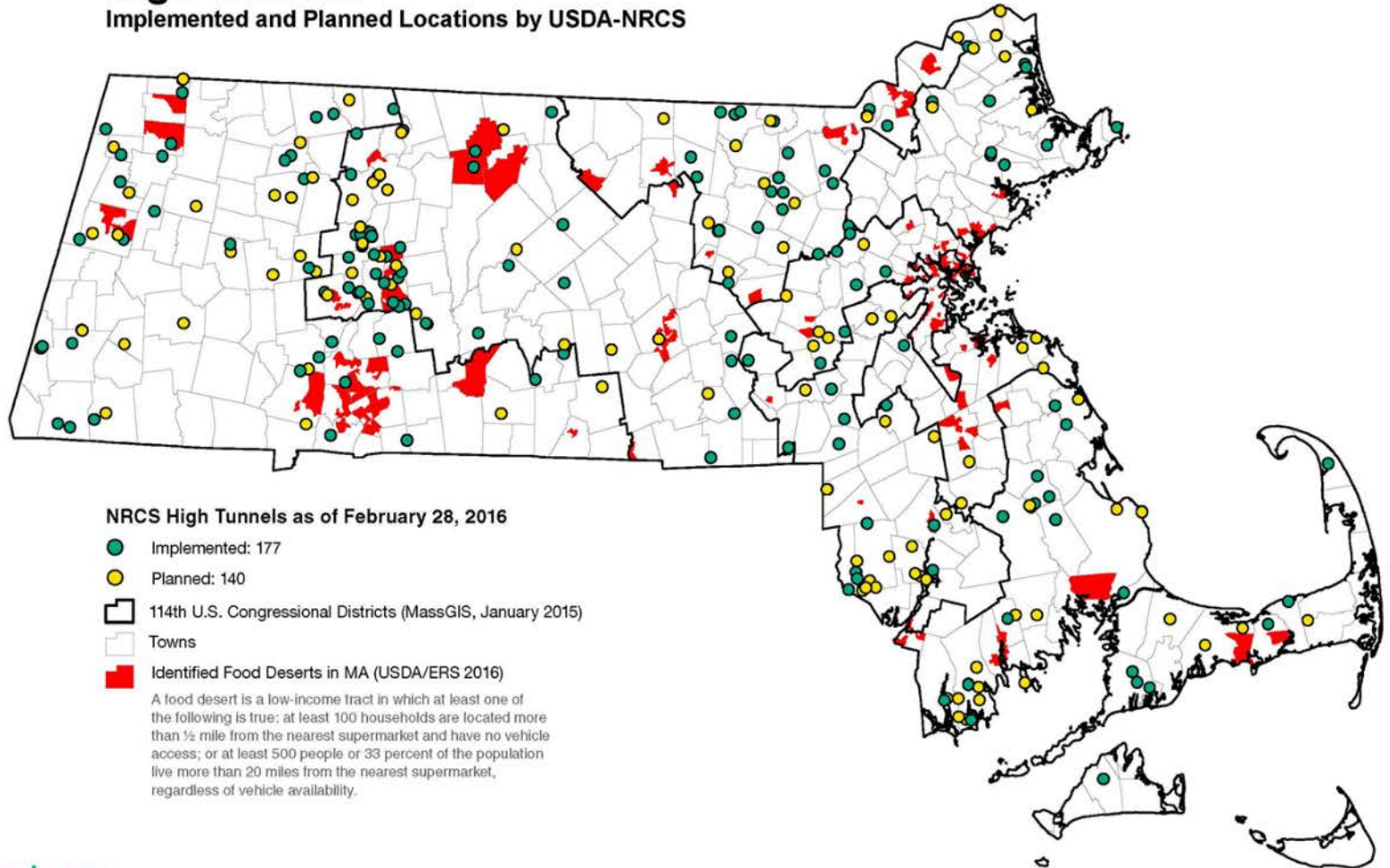




Thomas Akin
Massachusetts SRC

High Tunnels

Implemented and Planned Locations by USDA-NRCS









7 Failures in 2010-2011 Lessons Learned

- Accessibility during winter months is key;
- Snow removal during and after a snow storm;
- Avoid sites/openings that are long and narrow;
 - Wind tunnels
- “Gothic” style spans;
 - sheds snow better than rounded spans;
- No collapses/failures since 2011.



Enough Gloom and Doom!!



07.25.2012



05.23.2016





Florida (*Panhandle*) High Tunnel Production



Darryl Williams
District Conservationist
Crestview, Florida

Darryl.Williams@fl.usda.gov
850.682.3714 x109

Issues of Concerns with High Tunnels

- Natural Disasters – high winds, tropical storms, hurricanes, high rains events etc.
- Extreme Heat and Humidity
- Natural Diseases
- Insect control
- Winter Freeze
- Management of Crops is Keys to Success

Extreme Heat and Humidity



Crops Being Grown



Shade Cloth A Must Have!



Growing Tomatoes in High Tunnel (Issues)



Credits

- Robert C. Hochmuth and Dilcia E. Toro. 2014. “Characterization of the Florida Fresh Fruit and Vegetable Industry Using Hydroponic Systems or Protected Agriculture Structures.” HS1240. EDIS. <http://edis.ifas.ufl.edu/hs1240>.
- Black, Brent and Drost, Dan. 2010. “Temperature Management in High Tunnels.”
- Hochmuth, George. 2015. “Production of Greenhouse Tomatoes – Florida Greenhouse Vegetable Production Handbook, Vol 3.” HS788. EDIS. <http://edis.ifas.ufl.edu/cv266>.
- Black, R.J. 2003. “Florida Climate Data.” EES5. <http://ufdc.ufl.edu/IR00004786/00001>.
- Temperature Management for Optimal Tomato Production under High Tunnel in Northwest Florida by Jennifer Bearden, Agricultural Agent, Okaloosa County.
- “Siting High Tunnels.” 2015. <https://articles.extension.org/pages/18365/siting-high-tunnels>.

High Tunnel System Webinar Contacts

Dave Mason, FAPD Program Manager, (202) 260-9232;

dave.mason@wdc.usda.gov

Glenn Carpenter, National Leader Animal Husbandry, (301) 504-2293;

glenn.carpenter@wdc.usda.gov

Helen Denniston, SRC, Alaska, (907) 761-7756;

helen.Denniston@ak.usda.gov

Tom Akin, SRC, Massachusetts, (413) 253-4365;

thomas.akin@ma.usda.gov;

Darryl Williams, DC, Florida, (850) 682-3714;

darryl.williams@fl.usda.gov