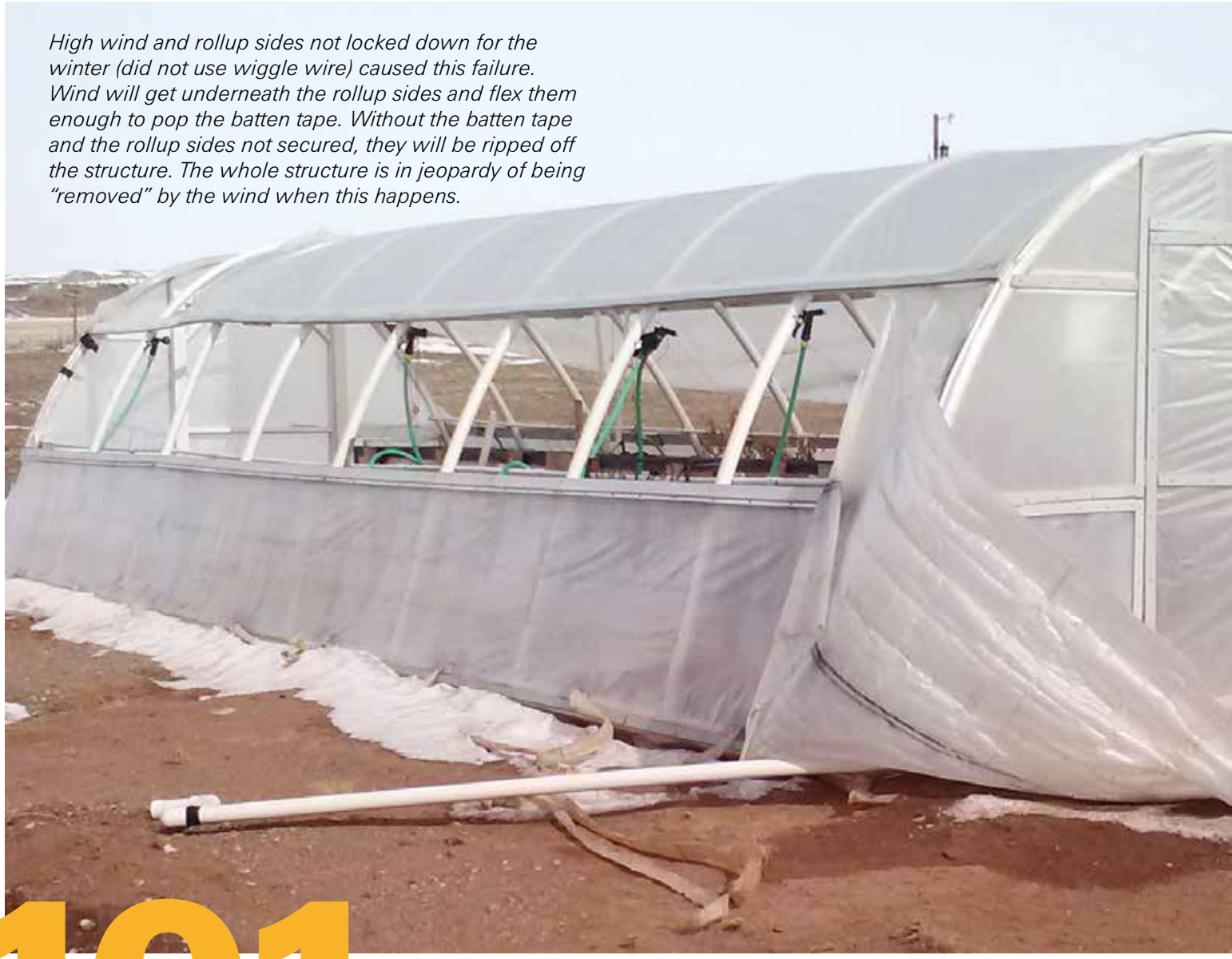
Photo Meredith Taylor



High wind and rollup sides not locked down for the winter (did not use wiggle wire) caused this failure. Wind will get underneath the rollup sides and flex them enough to pop the batten tape. Without the batten tape and the rollup sides not secured, they will be ripped off the structure. The whole structure is in jeopardy of being "removed" by the wind when this happens.

101 (almost) WAYS FOR A HIGH

Jeff Edwards

Barnyards & Backyards magazine has been publishing high tunnel articles for about five years – most have centered on building them, growing plants in them, and controlling pests.

Neglect and weather can compromise the structural integrity of a high tunnel, so here are suggestions to keep a high tunnel in good, productive condition for years to come.

Neglect is the main reason for structural failure. These structures take lots of abuse and require regular maintenance and minimal repairs to keep them productive. Wind, hail, and snow are the top contributors (besides neglect) to the death of a high tunnel.

Wind

As we all know, wind blows in Wyoming – I recommend installing a batten strap (also called batten "tape" – but is not sticky) between each rib to hold the plastic skin tight to the structure and reduce wear points. When (not **if**) the batten tape breaks, do not delay replacement. My recommendation for batten tape is 2-inch wide seat belt webbing (there are many sources on the Internet).

If using rollup sides, these should be rolled up in the summer and locked down (using "wiggle" wire or some other mechanism that secures the plastic from flapping in the wind) in winter. The only time to roll the sides up or down on a daily basis

side design that starts in the center of the structure also allows extra skin material to be buried all the way around the structure – this serves as an additional anchor point for the structure.

Finally, if the prevailing wind hits the structure along the side (versus an end), it can "airplane wing" the structure – tall on one side and shorter the other. This constant flexing will break the door frame posts at ground level contributing to structural failure. Door frames can also be beefed up using two 2x4s screwed together, a combination of a 2x4 plus a composite 2x4 (to prevent rot), or a 4x4 wood or composite post.

Hail

Hail is not an annual event for some but occurs multiple times per year for others in Wyoming. I highly recommend using woven polyethylene fabric instead of traditional greenhouse film for the skin material. The woven polyethylene material is hail tolerant and, if damaged, can remain that way for several years without contributing to total structural failure. A structure in Lingle at the James C. Hageman Sustainable Agriculture Research and Extension Center and one in Torrington each have had a 4-inch rip that has not been repaired and seems to not affect the efficiency of the structures.

As far as repairing rips – the only product I have found to withstand the humid conditions is white or clear Gorilla tape placed on the inside and outside of the structure at the rip site. Traditional greenhouse film will not tolerate hail and must be replaced after hailstones penetrate the film.

I have had multiple conversations with people concerning which covering to use, and I always recommend using the woven polyethylene – I respect that people are operating on a budget and the woven polyethylene may seem like an expensive luxury, but it is well worth the investment at $0.27-$0.35 per square foot if it will last six-plus years.

You may need to replace traditional greenhouse film annually because of hail events. If that is the case, the woven polyethylene product will be less expensive in the long run.

Snow

Snow has not been too much of a problem. Light, dry snow will generally blow off the structure or will melt off the structure when the sun

TUNNEL TO DIE

is when daytime temperatures are above 40 degrees F and below 32 degrees F at night.

When the batten tape fails, and the rollup side is not locked down for the winter, the rollup side will catch in the wind and rip portions, if not the entire cover, from the structure.

If the high tunnel is in an unprotected location, I recommend at least four of the screw-in house anchors as attachment points – just to keep the structure on the ground. The rollup

Use of structural anchor plus batten tape to help anchor high tunnel in place in very windy conditions.

Photo Donna Hoffman

Photo Ted Craig

Heavy spring snow load crushed the Gothic high tunnel at Douglas.

Photo Laurie Degenhart

The snow load kinked this PVC rib around the center support of this high tunnel at Encampment. The PVC rib has been compromised suggesting the use of additional bracing to prevent the complete collapse of the structure and replacing ribs when a new cover is needed.

shines. What you must be aware of are the heavy, wet snows, which have a tendency to stick and not slide off. As little as 8 inches can crush a high tunnel – whether constructed of PVC hoops or steel frame hoops.

Depending on the situation, PVC hoops may bounce back to their original hoop shape – but not without issues . Steel framed high tunnels will not. The solution is to knock off the snow as it accumulates – not the most convenient, but it will preserve the high tunnel.

Traditional hoop styles will shed the snow much better than a Gothic-style high tunnel (I am no longer recommending Gothic style high tunnels for Wyoming).

Snow/Wind Combination

A snow and wind combination, besides outright neglect of needed repairs, is probably the number one way for a high tunnel to die. Heavy snow loads will crush the structure and then the wind will get underneath and blow off the top (this has happened to two Gothic-style structures in Wyoming). One more bit of advice – high tunnel kits that are available often come with end closures that are zippered or use Velcro (hook and loop material) that function as doorways. Both of these closing mechanisms will fail in Wyoming – primarily due to the wind. The best solution is to build a door that will work for you (size based on your equipment needs).

For more information on structural modifications for Wyoming high tunnels, visit http://www.wyomingextension.org/whhin/ There are construction manuals on this website for how to "Wyomingize" a high tunnel.

Contact me if you need more information. The best recommendation I can offer is to be diligent and repair issues as they become apparent, and your structure will have many useful and productive years.

Jeff Edwards' *middle name isn't "Hoop" – just yet. He's erected many high tunnels across Wyoming through a specialty grant from the Wyoming Department of Agriculture. The University of Wyoming Extension pesticide applicator training coordinator, Edwards can be reached at (307) 837-2000 or at jedward4@uwyo.edu.*