Using Silage Tarps for Improved Production

Let's come clean about sustainable farming's dirty little secret; it's heavily reliant on plastic! Plastic products have become a stable in all aspects of production, including: drip irrigation, greenhouse poly, floating row cover, insect and weed barriers, trellis materials, harvest totes, among others. No matter what your relationship is with plastic, we should all agree that whenever possible it's best to use recycled products, strive to maximize material lifespan, and recycle or re-appropriate products after their initial intended life is up.

One of the newer applications of plastic in smaller-scale agriculture is silage tarps. These large sheets of opaque, UV-stabilized polyethylene have traditionally been used to cover hay or manure piles on commercial farms. As highlighted in Jean-Martin Fortier's popular book, *The Market Gardener*, small farms have gotten creative with silage tarps as a means to improve production while minimizing impacts on natural resources.

In light of these burgeoning production opportunities, this past winter the Headwaters Incubator Program (HIP)—Oregon's only advanced-level, land-based farmer development program—coordinated with the nonprofit *Simply Agriculture Solutions Inc*. in Saskatoon, Saskatchewan to obtain a semi-truck load of used silage tarps. This mutually beneficial arrangement provided low-cost tarps for incubator farmers and other growers near the Portland Metro. The tarps were procured for the cost of shipping, which in the winter months was just 0.07¢/lb. In addition to providing low-cost access to agricultural resources, the arrangement removed 40,000lbs of plastic from the waste stream.

In Canada, most of these tarps are only used once for the temporary storage of grain. Unlike in the United States, Canadian farmers are required to recycle the "grain bags" after their use. However, the lack of facilities capable of processing this plastic has meant that the tarps are being shipped to recycling centers in the United States or Asia.

Silage Tarp Applications

Farmers in the Headwaters Incubator Program are using the salvaged tarps for a variety of uses, including: season extension, weed suppression, specialty crop production, incorporation of crop residues, and reduced irrigation and tillage. Here is a brief overview of each application:

Season Extension – growing seasons in the Pacific Northwest are often determined by moisture as opposed to temperature. It was an extremely wet winter and spring this year, delaying when farmers could work up beds or even turn in cover crops. Laying silage tarps down over prepped beds in the fall is one way of ensuring dry, clean beds for early season plantings.

Weed Suppression – laying transparent poly on the ground to solarize is effective in places where the sun is out and temperatures are high. However, in more temperate climates solarization can have mixed results, especially on perennial weeds, and can even create ideal growing conditions for some heat-loving problem weeds like yellow nut sedge. Conversely, virtually all weeds die under silage tarps from light deprivation. In many cases fields will be free of weeds in just three weeks. Perennial weeds or those with ample underground reserves will take longer. The most tenacious weed under silage at

Headwaters Farm has been Canada thistle, which in extreme cases has survived through the entire summer without light. An added benefit of this management practice is that the warm, moist soil environment under the tarps is ideal for seed germination. This helps to reduce the soil's seedbank as the weed seedlings quickly die from light deprivation.

Specialty Crop Production – the Pacific Northwest isn't always the best growing environment for warm season crops like solanums and cucurbits. Planting crops through small incisions or holes in the silage tarps keeps the roots warmer and aids their establishment during the early season. Faster and more abundant root development leads to better nutrient and moisture update, pest resistance, and results in greater overall yields.

Incorporation of Crop Residues – the warm moist soil conditions under silage tarps are perfect for microorganism proliferation. These microbes work as a catalyst to break down trash and mineralize amendments within or on top of the soil. These tarps can be an effective tool for passive incorporation of mowed cover crops in fields that are slated for later season plantings.

Reduced Irrigation – without wind or direct sunlight, soils tend to retain their moisture content. While it can be more challenging to get an accurate assessment of soil moisture percentages, plants growing through silage plastic will require much less irrigation throughout the season.

Reduced Tillage – the applications above provide a package of benefits that equate to less soil disturbance and passes with the tractor. When used effectively, these practices can result in less erosion and compaction, better soil structure, greater biodiversity, and healthier soils. Not to mention less diesel and tractor time. What farmer wouldn't want that!

Downside, Difficulties, and Considerations

For all their benefits, silage tarps are not a silver bullet solution to all your production woes. Before application, it is important to understand when the tarps are most appropriate and what challenges will likely be faced.

The most obvious consideration when it comes to silage tarps is they can be incredibly heavy. Headwaters Farm's delivery consisted of an assortment of tarps which were grouped into three general size categories. The smallest tarps average around 30ft by 40ft and could be moved or lifted by one person. The mediums were up to 30ft by 100ft and the larges hovered around 30ft by 175ft, with a few reaching almost 300ft in length. Most of the medium tarps required a tractor with bucket or multiple people to move them, whereas the large tarps always required heavy equipment for transport. When it comes to stretching them out in the field, three people can maneuver the largest rolls, although it is much easier with a couple extra bodies.

Farm scale is another major consideration. In most cases big operations simply can't source or manage enough tarps to make it worth their while. On the other hand, small farms might find it challenging to utilize silage tarps since field-scale application (the mediums and larges, depending on your bed length) requires labor for setting and removing the tarps. What scale operation is the best fit? In our experience

it's those with at least two regular farm workers and bed lengths between 100ft and 200ft. Any bigger than that and the tarps get extremely unruly!

Despite their size and weight, the tarps will move in a windy area. This can be incredibly destructive for crops planted through the plastic as a shifting tarp can cover young plants or loosen them from the soil. Using sandbags liberally is the best way to keep the tarps static. Go extra heavy with sandbags on the windward side.

Voles and slugs are common pests that will prosper under silage tarps. If these are major problems on your farm you might want to think of ways to mitigate before you incorporate tarps into your production plan. One recommendation that was given to us for season-long application was to pull the tarps back for a week or two occasionally. This action doesn't give the weeds a chance to reestablish but removes the cozy habitat and gives the raptors, coyotes, and other predators an opportunity to balance population levels.

If you decide to source used tarps, keep in mind that their secondary life wasn't always a consideration of the original user. Some tarps will have rips or frays, or will come rolled (or unrolled!) in an awkward manner. In most cases you probably won't know the full quality of the tarp until it has been spread out on the ground. Another minor inconvenience is that there are often leftover bits of grain in the tarps. This may attract rodents or leave a pungent fermenting smell until the tarp has been thoroughly hosed down.

Silage tarps can also equate to a huge area of impervious surface. That means if you leave tarps over winter or live in an areas with heavy summer precipitation, the water that falls on them will need to go somewhere. Excess runoff onto other production areas can cause other problems, including increasing erosion. When applied over raised beds, water can get trapped in the aisles, making it exceedingly difficult to pull the tarps off when desired. Pumping or bailing this water out may be necessary if you can't wait for it to evaporate.

Accepting delivery of used tarps is an ordeal in itself. Our delivery came in a closed trailer that was stuffed full from floor to ceiling. The best equipment for loading/unloading of large silage tarps is a skid-steer with a grapple working off a loading dock. However, few small farms have these resources handy. We made do with a John Deere 2040 with bucket forks, some sturdy ropes, and six willing laborers. The unloading took about three hours and was a fairly grueling process which was additionally challenging because many of the tarps had ice in them. Make sure you have a good plan for how you intend to navigate the delivery.

User Feedback

The silage tarps from our order this winter were distributed to roughly 20 farms in the greater Portland Metropolitan region. The overall feedback was that while the tarps usually had some minor holes and frays, they were generally well worth the low price and hassle of transporting and loading. The biggest issue people brought up was the pungent smell of rotting grain.

A few notes of wisdom from farmers who were part of this order include:

Know your goals – are you placing the tarps to keep beds dry, reduce weed pressure, incorporate debris, or something else? Sometimes the different goals will conflict with each other and knowing your priorities will help determine when to apply and remove.

Timing is everything – when you know what your main goals are you will want to make sure to time application and removal well. There are variables that may need to be considered including the time it takes to do a proper tarping job, availability of labor, weather, and equipment on hand.

Have a strategy for moving – you will either need labor or equipment. One user mentioned they found it effective to fold the tarps up and chain them to the back of the tractor to slide around the farm.

Headwaters Incubator Program silage tarp plan – because moving tarps is such a pain, our strategy is to have a slow rotation that leaves the tarps in one place for an extended duration. Since we are working with beginning farmers at Headwaters Farm, there is a desire to mitigate weed, fertility, and other issues before passing that land on to the next user (a "reset," so to speak). One way we plan to manage plots after incubator farmers graduate from the program is to mow the winter cover crop the spring after the field has been vacated, apply silage tarps on as much area as possible, leave the traps throughout the summer, pull them back in the early fall and then drill our winter cover crops directly into the undisturbed, weed-free soil. That gives the land about 18 months without tillage while greatly reducing weed pressure. That's a great investment in the next beginning grower's ability to use the land to successfully launch their fledgling farm business.

Whatever approach you decide to take with silage tarps, we recommend seeking used tarps at a reduced cost. For more information on coordinating a used silage tarp delivery for your small farm community, contact Travis Quirk at *Simply Agriculture Solutions Inc.* (travis@simplyag.ca).

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