

## Grow Cover Crops within High Tunnels

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High tunnels have a soil-based growing system, so careful attention to soil health is important. Synthetic and natural fertilizers can be used to fertilize high tunnel crops. Synthetic fertilizers such as urea (46-0-0) are low-cost per unit of nutrient, but repeated use can lead to a buildup of soil salts which is harmful to growth of high tunnel crops. The soil can be amended with compost between crop cycles. Generally, manure-based composts are applied at 0.5-1 lb./square foot of high tunnel area. The compost should be tilled in after application. However, continued application of manure-based compost or high salt fertilizers can result in elevated levels of soluble salts or other macronutrients in addition to raising the soil pH. Organic fertilizers such as bloodmeal, bone meal, feather meal, etc. are expensive per unit of nitrogen and need to be applied prior to crop establishment.

The soil within high tunnels is highly sensitive to degradation due to intensive use of the soil, lack of crop rotations, high temperatures favoring organic matter decomposition and intensive traffic in the tunnel. Soil health is critical due to the premium value of space in the high tunnel. Cover crops are plant species which are planted between crop cycles or rotations in the high tunnel. The cover crops suppress weeds, increase organic matter, nutrient retention, available water holding capacity while providing nitrogen and reducing soil compaction.

While growers are encouraged to use high tunnels four seasons per year, there may be a planting window suitable for winter or summer cover crop establishment and growth. (Table 1) The range of cover crops that may be successfully grown within high tunnels in the Mid-Atlantic region is potentially greater than the open field given the protected environment of the high tunnel. The USDA-NRCS Seasonal High Tunnel initiative has funded construction of many high tunnels across the United States. With the rapid adoption of season extension technology by many beginning growers, there needs to be a focus on best management practices for soil and cover crop management within high tunnels.



**Figure 1.** Warm and cool season cover crops can be established within high tunnels.

Winter and summer cover crops can be grown successfully within high tunnels in West Virginia and most regions of the Mid-Atlantic area. (Figure 1) Cover crops can be integrated with profitable, warm and cool season vegetable crops, fruits flowers and herbs. Legumes such as white clover, re clover, crimson clover, hairy vetch, winter field peas, cowpeas and sun hemp will fix nitrogen for the subsequent crop. Legume seed should be inoculated with the appropriate *rhizobia* sp. To facilitate nitrogen fixation.

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**Table 1.** Seeding rate of cover crop species recommended for West Virginia high tunnels.

Cover crop species	Establishment Period	Broadcast seeding rate/1000 ft <sup>2</sup> (ounces) <sup>z</sup>	
		Single Stand	Mixed Stand
Austrian Winter Pea	Fall	37	25
Barley	Fall/Spring	46	31
Crimson Clover	Fall	11	7
Hairy Vetch	Fall	15	10
Red Clover	Fall	4	3
Ryegrass	Fall/Spring	11	7
Triticale	Fall	55	37
Winter Rye	Fall	55	37
Winter Wheat	Fall	55	37
Mustard	Spring/Summer	6	4
Buckwheat	Spring/Summer	33	22
Cowpeas	Summer	44	29
Sudangrass	Summer	18	12
Sun hemp	Summer	6	4
White Clover	Spring/Summer	5	3

<sup>z</sup>Source: *Managing Cover Crops Profitable*, 3<sup>rd</sup> ed.

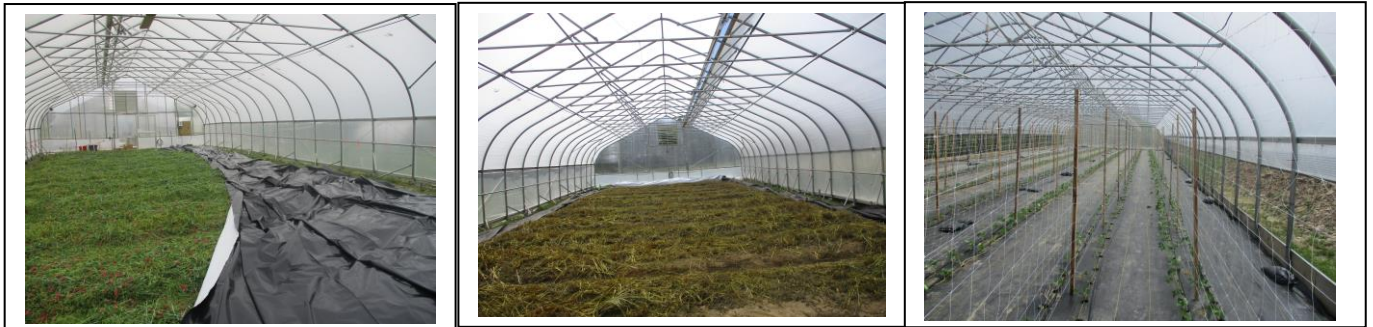
Stand establishment of cover crop species within high tunnels is crucial given the lack of rainfall and elevated temperatures. For winter cover crops, a mid-October seeding date will produce significantly more biomass than seeding in November. However, seeding of winter cover crops within high tunnels in West Virginia can be done until November 15.

Crop residue from the previous crop must be removed. If the soil is friable enough, light surface tillage with a rake may be satisfactory. The cover crop seed can be broadcast-seeded as a single or mixed, polyculture stand (Table 1). After seeding, a light raking is performed followed by a light top dressing of clean straw or hay. Overhead irrigation is applied regularly to facilitate germination and emergence. Growers must schedule irrigation of cover crops much as they do traditional cash crops. Tensiometers and subjective soil moisture measurements have been used to schedule irrigation. Row covers can be used to protect the winter cover crops beginning in January. Generally, the row cover should be supported above the cover crop canopy to avoid freezing of the fabric to the plants.

Generally speaking, most cover crops are terminated at the point when they start to flower. This corresponds with the highest level of biomass and maximum nitrogen fixation. The cover crops should be terminated approximately 2 weeks before the scheduled planting date. Cover crops can be mowed with a string trimmer, flail mower or sickle bar mower. A small roller/crimper which attaches to a walk-behind tractor can also be used to roll and crimp the cover crops. This tool works more effectively on cover crops which have upright stems such as rye or crimson clover. If the cover crop is rolled or mowed, a silage tarp can be placed over the cover crop for

2-3 weeks to smother the cover crops. (Figure 2) Avoid using herbicides in high tunnels to kill cover crops.

After the cover crop has been desiccated, the cash crop can be planted in the residue. A woven, groundcover fabric or plastic mulch which can be rolled out over the cover crop residue and the cash crop planted on the fabric (Figure 2). A top dressing of fertilizer can be applied if needed. If a legume is grown as a single stand or mixture, no preplant fertilizer will be needed. However, supplemental fertilizer can be applied through the drip irrigation later in the growing season. Drip irrigation tape is applied prior to planting under the mulch.



**Figure 2.** A silage tarp can be used to terminate the cover crop after it has been rolled or mowed. A groundcover fabric can be used as a surface mulch over the cover crop residue and the cash crop planted into holes cut into the fabric.

### Sources for cover crop seed<sup>1</sup>:

**Center Seeds**  
[www.centerseeds.com](http://www.centerseeds.com)

**Southern States Coop., Inc**  
(seek regional/local store)

**Fedco Seeds**  
[www.fedcoseeds.com](http://www.fedcoseeds.com)

**Green's Feed & Seed**  
Charleston, WV

**Hancock Seed Co.,**  
[www.hancockseed.com](http://www.hancockseed.com)

**Yauger Farm Supply**  
Southside, WV

**High Mowing Seeds**  
[www.highmowingseeds.com](http://www.highmowingseeds.com)

**Johnny's Selected Seeds**  
[www.JohnnySeeds.com](http://www.JohnnySeeds.com)

**Peaceful Valley Farm Supply**  
[www.groworganic.com](http://www.groworganic.com)

**Seven Springs Farm**  
[www.7springsfarm.com](http://www.7springsfarm.com)

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<sup>1</sup>Does not imply endorsement or exclusion of any vendor.

