

Low Tunnel System Guidance Document – Interim Practice 821

Table 1. Material Specifications and Uses: Specifications are not exhaustive. They are approximate and may differ by manufacturer, availability, and technology. Contact UNH Extension, IPM Specialist, Agronomist and/or Manufacturer for recommendations and uses for specific crops and timelines.

Covering	Used for		Frost protection	Thickness or porosity	Weight	Light transmission
Used in spring, summer, fall; increase heat during the day; reduce rain, soil splash, and disease associated with leaf wetness						
Light duty impermeable plastic (often with ventilation holes)	Single row (e.g., strawberries, ginger)		Increase temp during day	0.8 mil slitted or punched to prevent disease	--	--
				1.5 mil	--	--
	Multi row cover (e.g., tubers, brassicas, sweet corn, strawberries)		3.5-5.5°F increase soil and air during day	1.6 mil perforated	--	--
Frost protection; overwintering; shedding snow and ice (degree ranges are approximate and dependent product and site conditions)						
Spun-bound polypropylene row cover	Standard/light weight. General frost protection down to 28°F		Up to 2-4°F	AG-19; Pro19	0.55-0.6 oz/yd ²	85%
	Medium weight for moderate overwintering		Up to 3-5°F	Pro22	0.8 oz/yd ²	79%
			Up to 4-6°F	AG-30; Pro30	0.9 oz/yd ²	70-75%
	Heavy freeze protection	overwintering containerized plants	Up to 5-7°F	Pro40	1.2 oz/yd ²	70%
			Up to 6-8°F	AG-50	1.5 oz/yd ²	50%
	Extra Heavy protection		Up to 8+°F	AG-70	2.0 oz/yd ²	30%
Impermeable greenhouse plastic	Use in addition to spun-bound row cover to shed snow and ice load while overwintering		With heavy row cover AND greenhouse film up to 15+°F	4 mil	--	Comparable to glass when used singly
				6 mil	--	
Insect exclusion *Confirm the pore size dimensions from the supplier to assure it will exclude the target pest*						
Fine mesh, woven, or knit exclusion netting	Small pore size to exclude small pests (e.g., flea beetle, aphid, thrips)		No frost protection	Pore size: 0.35 x 0.35mm 62% porosity to rain	0.74 oz/yd ²	89%
	Medium pore size to exclude medium pests (e.g., cucumber beetle, potato beetle, squash bug, squash vine borer)		No frost protection	Pore size: 0.72 x 0.97mm	47 g/m ²	~89-93%
Spun-bound polypropylene	Exclude small to large pests – less durable		None; minimal heat increase during day	Agribon+ AG-15	0.45 oz/yd ²	90%
Protect crops from excessive heat and sun; reduce soil temperature						
Shade Cloth	Reduce bolting in heat-sensitive crops (e.g., spinach, lettuce); prevent sunscald (e.g., eggplant; pepper); exclude large pests.		No frost protection	Knitted 30% Shade cloth	--	70%
			No frost protection	Knitted 50% Shade cloth	--	50%

Table 2. Timeline: Determine when the covering will be deployed. Use the Range from Table 3 and the map from Figure 1 to set a date when the covering will be deployed, based on crop and covering material. Incorporate input from grower, UNH Extension, Manufacturer, IPM Specialist and/or Agronomist.

Covering Type	Used to	Season by which the covering will be deployed	Target Crop and Pest	Actual Target Date of Completion based on Range from Table 3 and Figure 1 map (attach to IR)
Light duty impermeable plastic (often with ventilation holes)	Increase heat during the day; reduce rain, soil splash, and disease associated with leaf wetness	Spring, Summer, or Fall		
Spun-bound polypropylene row cover (0.55-2.0 oz/yd ²)	Frost protection on the shoulder seasons	Spring or Fall. Overwintering if used as floating row cover for strawberries.		
4-6 mil impermeable greenhouse plastic	Overwintering if used in addition to 4-6mil impermeable plastic	Between end of Fall and Overwintering		
Fine mesh, woven, or knit exclusion netting	Insect exclusion	Spring, Early Summer, Summer, Early Fall, Fall		
Spun-bound polypropylene (0.45 oz/yd ²)	Insect exclusion	Spring, Early Summer, Summer, Early Fall, Fall		
Shade cloth	Protect crops from excessive heat and sun; reduce soil temp	Early Summer, Summer, Early Fall		

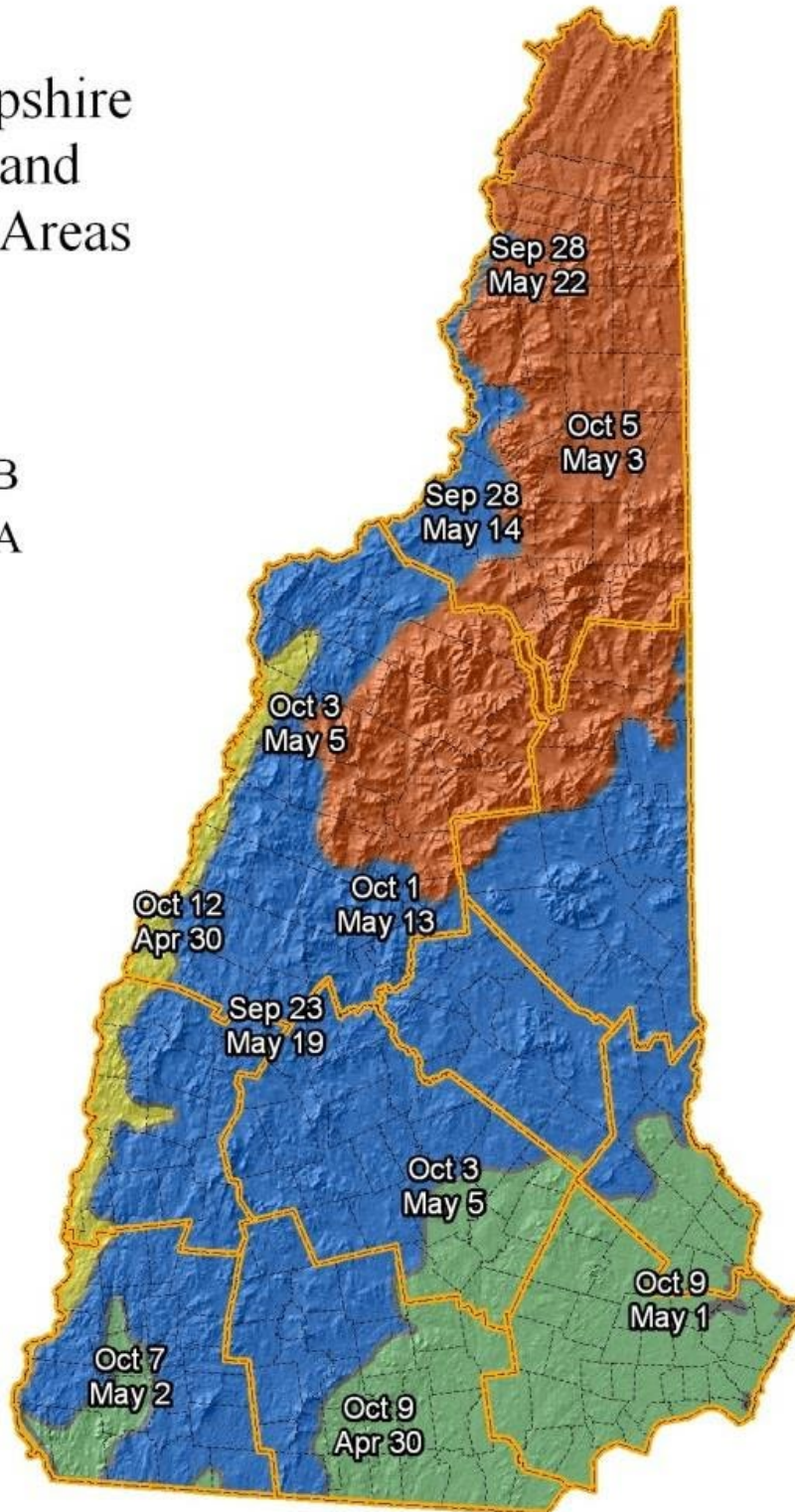
Table 3. New Hampshire Seasons by Range and Date: Use Figure 1 map to determine Major Land Resource Area (MLRA)

Range	MLRA	Spring	Early Summer	Summer	Early Fall	Fall	Overwintering
Northeastern Mountains	143	April 21-Jun 7	May 21-Jul 1	Jun 7-Jul 14	Aug 1-Sep 1	Aug 14-Sep 14	Nov 14-Apr 21
Northern NE Upland	144B	April 14-Jun 1	May 14-Jul 1	Jun 1-Jul 21	Aug 7-Sept 7	Aug 14-Sep 21	Nov 21-Apr 14
River Valley/Seacoast	144A/145	April 7-May 21	May 7-Jun 21	May 21-Aug 1	Aug 14-Sept 14	Sep 14-Oct 7	Dec 1-Apr 7

Figure 1: New Hampshire Major Land Resource Areas (MLRA). New Hampshire can be divided into 4 areas/ranges that reflect patterns of temperatures over date ranges. Determine the MLRA that is closest to the farm where Low Tunnel System will be deployed.

New Hampshire Major Land Resource Areas

- 143
- 144B
- 144A
- 145



DATES INDICATE 50% CHANCE OF MODERATE FROST(<28°F) OCCURRING BEFORE THE FALL DATE OR AFTER THE SPRING DATE AT NOAA WEATHER STATIONS

Considerations:

- Consider pairing low tunnels with Raised Beds (812), Mulching (484), and Conservation Crop Rotation (328), particularly when planning on crops that have previously experienced soil-borne pests.
- Weigh down edges with materials that will not damage the covering.
- In high wind areas consider keeping row cover length shorter than 40-50 feet. The material at the end of polypropylene or polyethylene covers can be tied to pipes or T posts driven into the ground.
- Consider the ability for water and snow to shed the tunnel. If water is not able to permeate quick enough and there are not an adequate number of bows, pooled water could result in a collapsed tunnel.
- Row cover may trap moisture and create an environment for pathogens to thrive; for tunnels not benefiting from insect exclusion, lift sides periodically to facilitate ventilation and control temperature.
- Overwintering low tunnels create a perfect environment for winter annual weeds such as shepherd's purse and chickweed. Manage winter weeds for plant productivity and to reduce hosts for aphids. Rotate low tunnel crops to reduce the buildup of winter weeds.
- Anticipate that vertebrate pests such as voles and woodchucks may infiltrate low tunnels and feed on crops; consider a scouting and trapping preventative management plan.
- Crops grown in low tunnels are protected from sun and wind which may result in more tender crops. Consider harvesting on overcast and windless days to prevent sun scald and wind damage.
- Cool season crops typically require a temperature of 40°F or greater to germinate. If implementing a low tunnel in the winter, cover the low tunnel a few weeks prior to seeding or transplanting to allow the soil to warm up.
- Row cover may increase temperature, reduce airflow, and create a moist environment. Do not use on crops that already have had issues with moisture contributing to pathogens that thrive in moist environments.
- For insect exclusion, carefully determine the pore size of woven netting to allow for adequate airflow, light transmission and reduce the chances for secondary pest outbreaks while still excluding the target pest.
- Apply shade cloth appropriate to treat the objectives and site conditions. 10% - 60% shade cloth exists with different size pores that can potentially exclude larger pests. Contact land grant university for specifications.
- For coverings that are impermeable leave row uncovered during periods of rest to prevent accumulation of salts and other minerals in the soil.

Further Technical Resources:

- [Using Row Covers in the Garden](#) (Bernitz, UNH Extension)
- [Temperature Moderating Effects of Low Tunnels Over Winter in Cool Climates – 2010](#) (Sideman et al., UNH Extension)
- [Research Report: Using Low Tunnels for Overwintering Crops](#) (Sideman, UNH Extension) -- Spinach, mustard, kale, broccoli, cilantro, lettuce, Swiss chard, and onion
- [Research Report: Overwintering Onions, 2014-15](#) (Sideman et al., UNH Extension)
- [Research Report: Effects of early season heating, low tunnels, and harvest time on ginger yields in NH, 2017](#) (Sideman & Beck, UNH Extension)
- [Low Tunnel Strawberry Production Guide](#) (Orde et al., UNH, Cornell, Penn State, & Tunnel Berries)
- [Community Garden Guides](#) (NRCS)
- [Low Tunnels for Beginners](#) (Harris et al., West Virginia University)