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USDA Northeast Climate Hub
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CLIMATE ADAPTATION RESOURCES FOR NORTHERN NEW ENGLAND FARMERS: SILVOPASTURE

Carolyn Hricko[1]
Sonja Birthisel[2]
Adam Daigneault[2]
Joshua Faulkner[1]
Eric Gallandt[2]
Beth Holtzman[1]
Stephanie Hurley[1]
Erin Lane[3]
Rachel Schattman[2]
Meredith Niles[1]

1 University of Vermont
2 University of Maine
3 USDA Northeast Climate Hub

OVERVIEW

Early Fall Silvopasture. Photo Credit: Brett Chedzoy

Silvopasture is an agroforestry system that intentionally combines trees, forage, and pastures to generate both livestock and forest products on the same unit of land. Silvopasture systems are diverse and varied and can be designed to meet farmers' unique goals and complement existing and desired farm characteristics. Silvopasture can be incorporated into farm systems that have numerous types of land use, including open pastures, woodlands, and orchards. This brief focuses on pasture enrichment, which involves adding trees into existing pasture area and is eligible for federal cost-share programs. Silvopasture may also take other forms, such as forest thinning in which trees are thinned in uniform, patch, or irregular patterns, and pasture forage species are seeded. Converting an existing forest to silvopasture may involve natural resource concerns, so farmers interested in this option should consider trade-offs, ensure proper planning and design, and consult with silvopasture experts and foresters to ensure success and compliance with local regulations.

Silvopasture offers numerous climate change adaptation benefits that address challenges such as increased frequency and severity of weather extremes (i.e. drought, heat, and heavy rains). Pasture enrichment with trees provides shade and protection for livestock, may enhance carbon sequestration, and can improve water filtration and retention. Skilled and active management of enriched pastures together with sound livestock husbandry are essential to achieving a sustainable and successful silvopasture system. Experience with and knowledge of rotational grazing systems form a strong foundation for skilled management of silvopasture systems. Without proper management, farms using silvopasture may experience issues with soil degradation and compaction, decreased water retention and quality, and damage to tree roots, bark, and branches.

COMPONENTS OF NORTHEAST SILVOPASTURE SYSTEMS MAY INCLUDE BUT ARE NOT LIMITED TO:

TREE SPECIES	TREE PRODUCTS	LIVESTOCK SPECIES	FORAGES
Oaks	Firewood	Cattle (beef, dairy)	Red clover
Maples	Saw timber	Goats (meat, dairy)	White clover
Fruit trees	Fence Posts	Pigs	Orchard grass
Eastern White Pine	Scion wood	Sheep (meat, fiber)	Bent grasses
Hickories	Fruit	Chicken (meat, eggs)	Blue grasses
Commercial nut trees	Nuts	Turkeys	Fescues
Black Walnut	Maple sap	Horses	Timothy
			Rye grasses

SILVOPASTURE ADOPTION COSTS AND BENEFITS

Carefully consider trade-offs before installing silvopasture systems. It may not be possible to realize all or even some of these potential benefits, though potential challenges may be mitigated through management and/or silvopasture system design.

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POTENTIAL BENEFITS	POTENTIAL COSTS
Improved animal performance through greater comfort with shelter and shade	Livestock exposure to toxic plants, predators, parasites, diseases, physical hazards
Improved animal health through diversified diets	Silvopasture establishment and maintenance costs, time, and labor
Diversified farm products and income	Managers' lack of silvopasture management experience and knowledge
Balancing of seasonal forage growth and increased forage availability during droughts	Depending on silvopasture design, farm equipment mobility in grazing areas may be reduced or hindered
Cost-effective vegetation control	Implementation of silvopasture may impact farms' Current Use designation and enrollment
Creation of wildlife habitat	Reduced ability to harvest and dry hay in pasture areas
Improved soil health	Possible reduction in total forage yield, depending on amount of shade from trees
Improved water retention and quality	
Carbon sequestration	
Beneficial farm aesthetics	

VISUALIZATIONS

These visualizations are designed to help the viewer picture how the implementation of silvopasture appears in the context of a real New England farm. These images depict the different stages of practice implementation and help the viewer anticipate how silvopasture will appear over time and what implications it may have for the farm. To use these images, please request permission from Stephanie Hurley (stephanie.hurley@uvm.edu).

PERSPECTIVE VIEW OF BLACK WALNUT TREES IN CATTLE PASTURE

Cattle graze in a pasture on a New England farm. Livestock density is average for a small to medium size farm.

Trees intended for future timber harvest are planted at 17-21 basal density in the pasture. Example trees: Black Walnut.

Mature trees in the pasture 15-20 years after planting. Cattle graze among the trees, some of which are selectively harvested.

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AERIAL VIEW OF TIMBER TREES IN PASTURE

Aerial view of open pasture.

Mature timber trees of two ages: 30-40 year old and 10-15 year old trees.

Selective harvest of timber species in both fields.

PERSPECTIVE VIEW OF APPLE ORCHARD IN SHEEP PASTURE

Sheep and cattle graze in adjacent pastures on a New England farm.

Apple saplings are planted 15-20 feet apart in the sheep pasture.

Mature apple trees in the pasture 5-15 years after planting.

AERIAL VIEW OF ORCHARD IN PASTURE

Aerial view of open pasture.

Young orchard crop, bearing some fruit after 2-3 years.

Mature orchard crop, consistently bearing fruit after 8-10 years.

ADDITIONAL RESOURCES

Interested in silvopasture? Visit our website at nefarmclimate.com for more information and to explore our economic tool to determine potential costs and revenue. Check out these additional resources for more information:

VIRTUAL TOUR AND VIDEOS

- Agroforestry Angus Glen Farms, NY (USDA Northeast Climate Hub)
- Dickinson College's Farm Silvopasture PA (USDA Northeast Climate Hub)

FACTSHEETS, GUIDES, OVERVIEWS

- A comprehensive collection of silvopasture resources (including economic case studies, powerpoint presentations, workbooks, frameworks for silvopasture planning and implementation, guides, and factsheets) compiled by Cornell Cooperative Extension in the Department of Natural Resources can be found here.
- Photo Guide to Northeastern United States Silvopasture (Orefice, Carroll, & Ketner, June 6, 2016)
- Nutrient Management for Pastures (Cornell University Cooperative Extension)
- Working Trees Info: How Can Agroforestry Help Landowners Adapt to Increased Rain Intensity? (USDA National Agroforestry Center)
- Working Trees Info: What Are Agroforestry's Income Opportunities? (USDA National Agroforestry Center)
- Working Trees Info: Mitigating Heat Stress in Cattle (USDA National Agroforestry Center)
- How can Agroforestry support mitigation of climate change? (USDA Northeast Climate Hub)
- Agroforestry Notes: Forest Grazing, Silvopasture, and Turning Livestock into the Woods (USDA National Agroforestry Center, August 2014)
- Agroforestry Notes: Silvopasture Water and Fencing Systems for Cattle (USDA National Agroforestry Center, February 2005)
- Silvopasture: An Agroforestry Practice (USDA National Agroforestry Center)
- Water Quality (USDA National Agroforestry Center)
- Working Trees: How can agroforestry increase carbon sequestration? (USDA National Agroforestry Center, April 2021)

OTHER

- Association for Temperate Agroforestry (association promoting the wider adoption of agroforestry by landowners in temperate regions of North America)
- Northeast/Mid-Atlantic Agroforestry (NEMA) Working Group (network of researchers, technical service providers, agency staff, farmers and producers focused on educating, promoting and implementing agroforestry systems in the region)
- Silvopasture Ning Network (online forum and blog for silvopasture practitioners, advisors, and others)
- Silvopasture in the USA: A systematic review of natural resource professional and producer-reported benefits, challenges, and management activities (Smith, M. M., Bentrup, G., Kellerman, T., MacFarland, K., Straight, R., Ameyaw, L., & Stein, S. 2022. Agriculture, Ecosystems & Environment, 326, 107818.)

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RESEARCH TEAM

PRINCIPAL INVESTIGATOR: Dr. Meredith Niles

CO-PRINCIPAL INVESTIGATORS: Dr. Adam Daigneault, Dr. Nick Cheney, Dr. Joshua Faulkner, Dr. Eric Gallandt, Dr. Stephanie Hurley, Dr. Rachel Schattman

ADDITIONAL TEAM MEMBERS: Dr. Sonja Birthisel, Dr. Bradford Demarest, Tim Harrold, Beth Holtzman, Carolyn Hricko, Erin Lane, Ruthie Clements, Devon Johnson, Thomas Wentworth

We thank the following contributors for their expert review of the irrigation practice materials:

Joe Orefice, PhD, Lecturer and Director of Forest & Agricultural Operations, The Forest School at Yale School of the Environment

Brett Chedzoy, Senior Resource Educator, Cornell Cooperative Extension of Schuyler County

Kate MacFarland, Agroforester, USDA National Agroforestry Center

Juan P. Alvez, Ph.D., Research Associate Faculty, University of Vermont Extension, Center for Sustainable Agriculture

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Holly Greenleaf, Greenleaf Design, LLC
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