

## Landscape Benefits of Silvopasture Systems

Michigan Chapter of the Soil & Water Conservation Society ANR Month Seminar  
SUSTAINABLE INTENSIFICATION OF THE RURAL LANDSCAPE:

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MSUE Educators



## Agroforestry

A natural resource management system that, through the integration of trees on farms and in the agricultural landscape, diversifies and sustains production for increased social, economic and environmental benefits for land users at all levels.



**Forest Farming**

**Silvopasture**

**Alley Cropping**

**Riparian Forest Buffers**

**Windbreaks**

USDA National Agroforestry Center: <https://www.fs.usda.gov/nac/>



## Silvopasture

- Silvopasture is the deliberate integration of trees and grazing livestock operations on the same land. These systems are intensively managed for both forest products and forage, providing both short- and long-term income sources.



Image source: Brett Chedzoy, Angus Glen Farm, Watkins Glen, NY

<https://www.fs.usda.gov/nac/practices/silvopasture.php>



## Silvopasture Benefits Livestock

- Potential livestock can include: cattle, sheep, goats
- Trees supply fodder or mast such as acorns and honey locust pods
- Trees also reduce heat stress for livestock
- Trees provide shelter from cold in our areas (living barns)
- Can increase wildlife diversity and improve water quality



## Where did the idea come from?

- 2017 Grassfed Exchange Conference, Albany, New York
  - Jerry Lindquist & Kable Thurlow
- Attended a session and tour on Silvopasture by the Cornell Team
- According to 2012 Ag Census (NASS), there are over 110,000 acres of wooded pastures in Michigan
- Can we help these farmers turn these “wooded pastures” into Silvopasture?



## There are two basic types of grazing management

1. **Continuous Grazing** – continuous access to the same piece of land for an extended period, usually the entire grazing season, or until the animals run out of grass and need to be fed.
2. **Rotational Grazing** – we control where and when animals graze an area of land ( a must for Silvopasture)
  1. Management Intensive Grazing (MiG)
  2. High Stock Density or Ultra High Stock Density Grazing (a.k.a. MOB Grazing)
  3. Adaptive multi paddock
  4. Non-selective

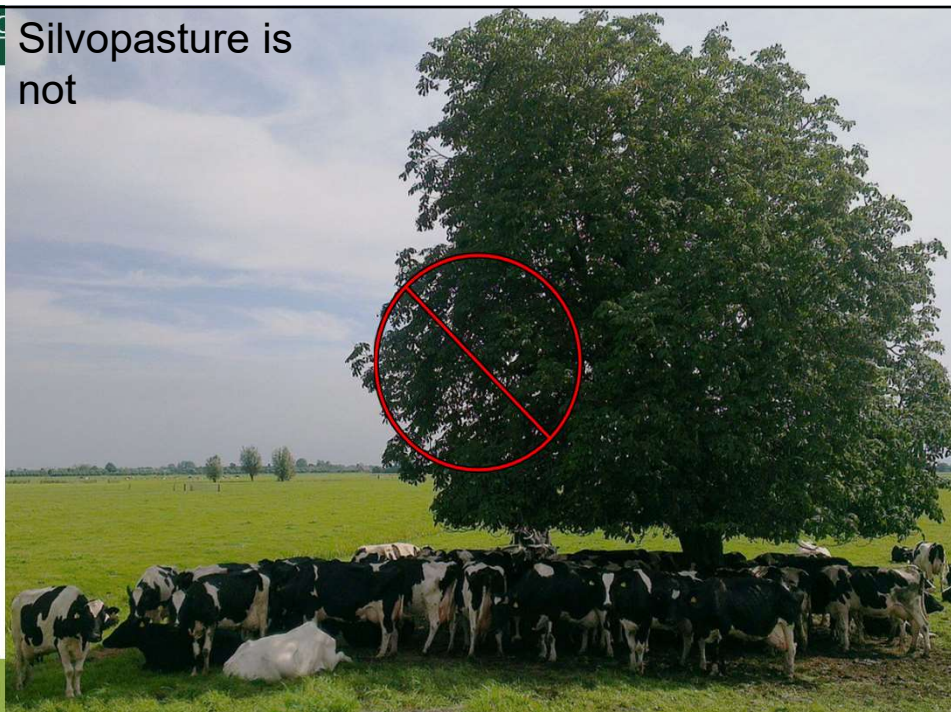




***Old paradigm: “Keep livestock out of the woods!”***



**Silvopasture is not**





## Mid-West Grazing Report Card

- One quarter (25%) of the Midwest Ag Land is in some form of pasture
- Over 80% of the pastures in the Midwest suffer from:
  - Lack of management (which can make pastures a poor forage source)
  - poor or uneven fertility, weed, and erosion problems
- Most pastures are continuously grazed
  - Lowest possible yield, because the plants are not allowed to recuperate

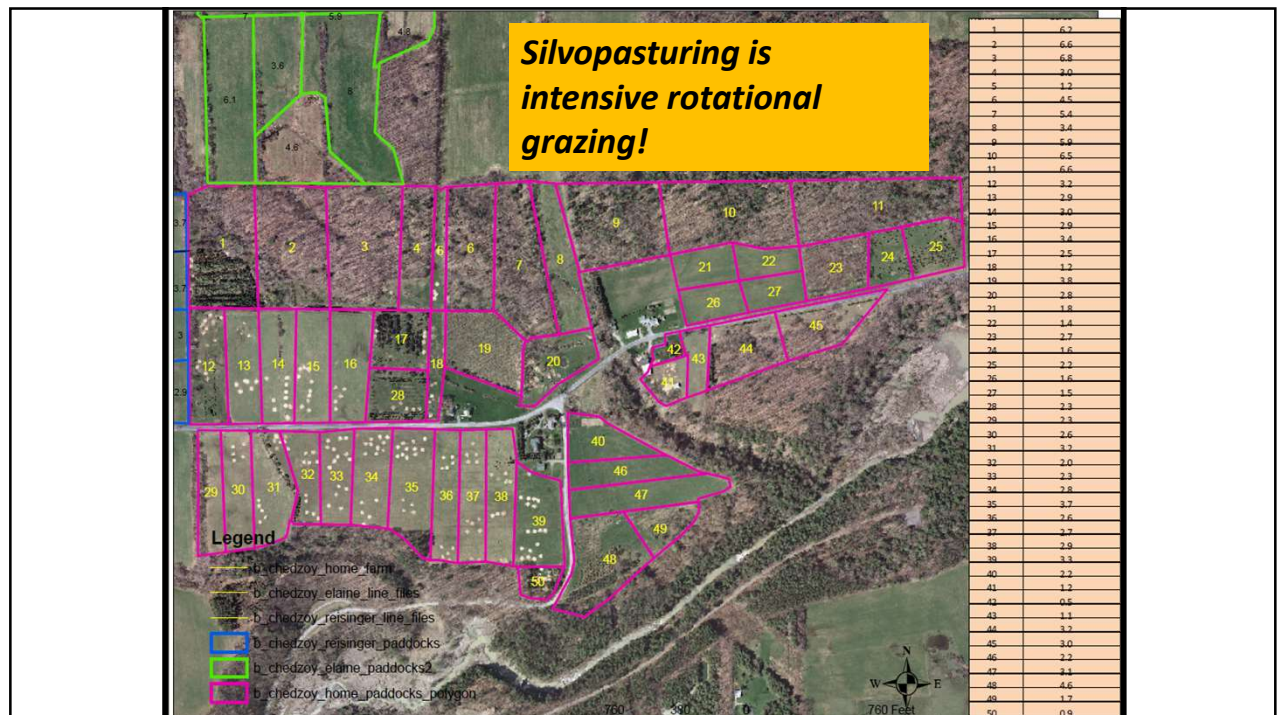
Source: Pastures for profit: A Guide to rotational grazing, A3529



## NUMBER OF PADDOCKS & REST

- To begin, grazing periods should be less than 4 days.
- Shoot for 8-12 paddocks to allow an appropriate rest period.
- In the spring, you need shorter rest periods
- Midsummer, may require longer rest periods
- BE FLEXIBLE in your management!
- To maintain healthy stands of forage and trees they need rest
- A rest or recovery period is a very important tool in rotational grazing
- Continuous grazing = 0%
  - This is NOT Silvopasture
- 2 paddocks = 50% recovering
- 4 paddocks = 75% recovering
- 6 paddocks = 83% recovering
- 8 paddocks = 87.5% recovering
- 10 paddocks = 90% recovering
- 12 paddocks = 92% recovering



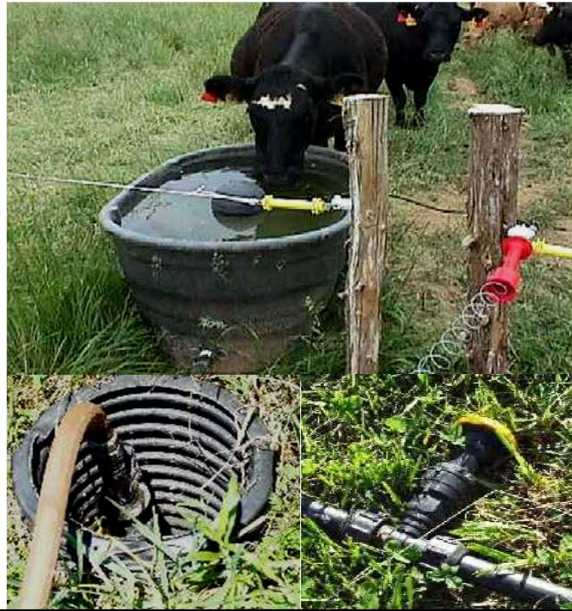


## Avoid Overgrazing

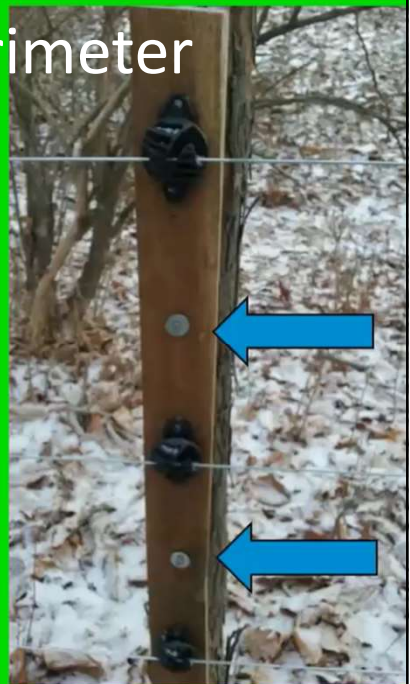
- Maintain adequate plant/forage cover to:
  - Reduce raindrop impact and slow runoff
  - Stop surface compaction
- Forages protect the soil from water and wind erosion, they also add organic matter improving soil health
- Lack of plant cover creates problems:
  - Reduced water infiltration
  - Increased runoff & nutrient loading of surface water
  - Increased soil erosion
  - Reduced forage yield
  - Reduced animal performance
  - Increased production costs
  - Reduced profitability



## Water Delivery in Pastures



## Living Fenceposts - perimeter





Living  
fenceposts –  
interior  
divisions



### **“Bale bombs” or Bale Grazing**











## Water Runoff Happens...

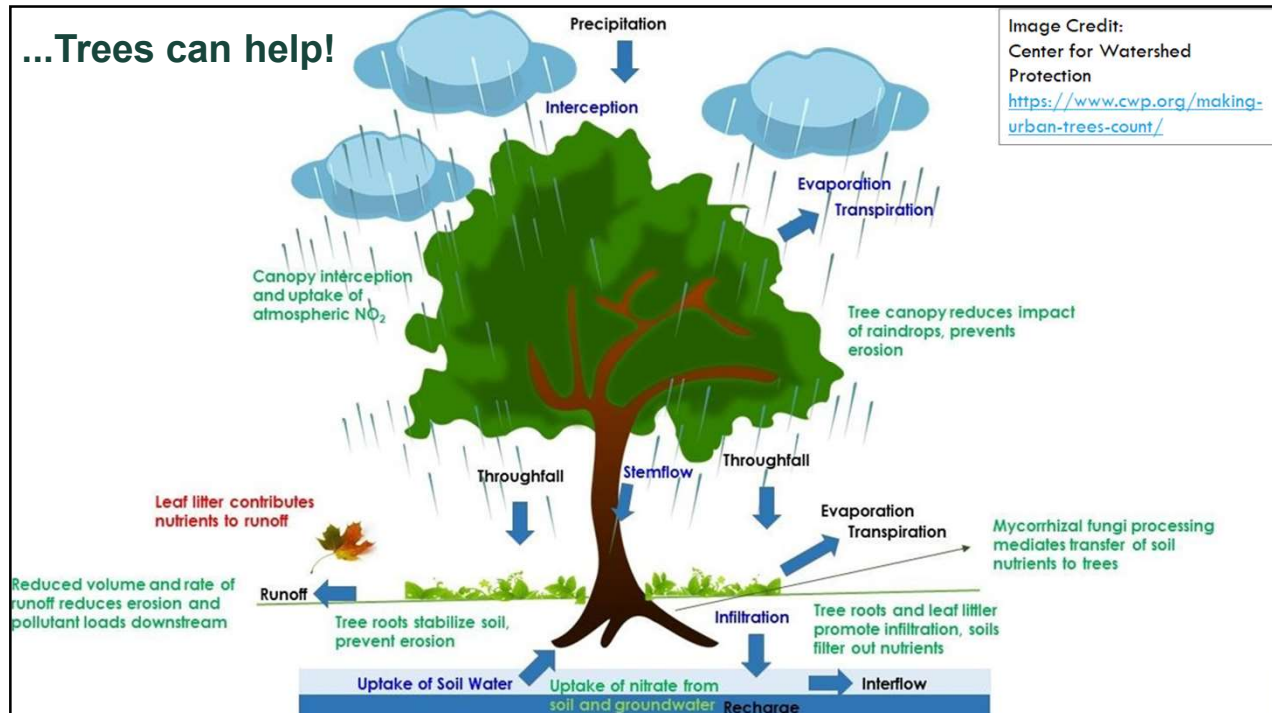
Land uses	Runoff from a 4-inch rainfall (inches)		
Forest	0.5 inch		
Grass (meadow, lawns, parks )	0.8 inches		
Corn/soybeans	2.0 inches		
Roofs/pavement	3.9 inches		
		Land uses	Runoff (inches)
		Residential (1-acre lots)	1.2 inches
		Residential (1/4-acre lots)	1.7 inches
		Industrial	2.7 inches
		Commercial	3.7 inches

SOURCE: [PURDUE ENGINEERING](#)





...Trees can help!



## Benefits of Rural Trees for Water Quality



<https://www.whitetailproperties.com/hunting-land/missouri/monroe/small-ag-and-rec-farm-bordered-by-indian-creek-and-close-to-mark-twain-lake>

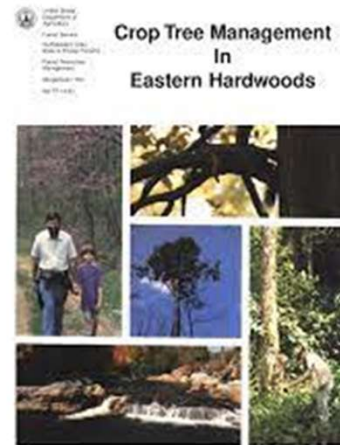
- Reduce wind erosion
  - Reduce spray drift
- Filter for excess Ag fertilizers in runoff
  - Deciduous more so than conifer trees
  - Up to 89% excess nutrients
- Some species more efficient than others
- Consider flood tolerance along rivers



## Benefits of Rural Trees for Water Quality

### Nutrients Absorbed by Trees

- Nitrogen (to a point): red and white oak, red maple, quaking aspen
- Calcium, phosphorous, potassium absorbed by basswood, yellow poplar, dogwood, red cedar
  - Slower uptake: American beech, red spruce, pines, eastern hemlock



## Silvopasture: Two Paths

### Trees into Pasture



"Cherry Orchard Grazing"  
Carrie Woolley  
[silvopasture.ning.com](http://silvopasture.ning.com)

### Pasture into Trees



"Goats and sheep enjoy multiflora rose"  
Peter Smaligde  
[silvopasture.ning.com](http://silvopasture.ning.com)

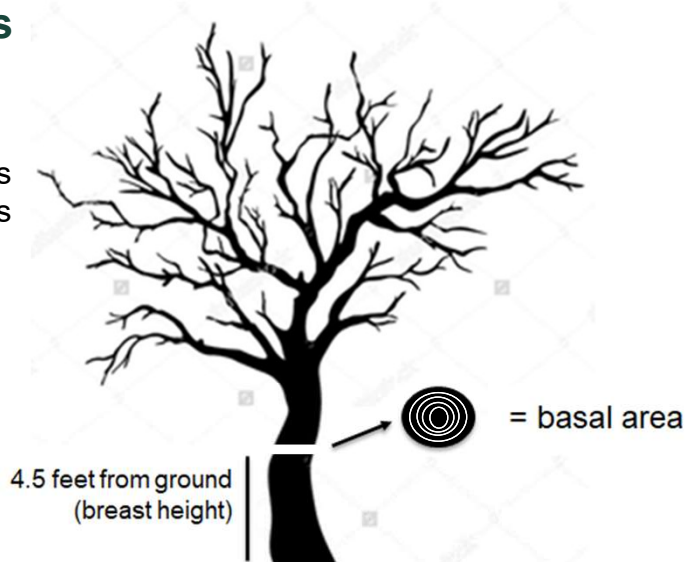


## Pasture Into Trees

Work with a forester

- Identify the existing trees
- Assess the existing trees
- Measure current basal area of the woodlot

Basal area is the cross-sectional area of a tree trunk at 4.5', measured in square feet.



## Pasture into Trees: Forest Density

(see "Evaluating the Potential of a Site for Silvopasture" handout)

Forest adequately stocked with AGS (Acceptable Growing Stock\*)

- 50 - 60 square feet basal area

Understocked

- Less than 30 square feet basal area

Overstocked

- Over 90 square feet basal area

\* defined in upcoming slides

Refer to this handout...





## Acceptable Growing Stock (AGS)

Vigorous growing trees with the potential to grow into quality timber.

Invasive species leaf out earlier and lose leaves later than native shrubs!

### Early leaf out:

- Maples
- Poplar
- Buckeye
- Willow\*
- ~~Black cherry~~

\*not a timber species

### Later leaf out:

- Oaks
- Sassafras
- Hickories
- Walnut
- Basswood
- Beech



## Conifers and Living Barns

- Winter shelter
- Not managed for forage/timber
- Periodically thin for tree health and vigor
- Areas should rest and recover
  - Use 1-2 times a year
- Avoid concentrated hay feeding
  - Smothers roots
  - 3-day supply spread out is best
- Rotate livestock through to avoid bark damage
  - Roots are sensitive to compaction



Photo credit: Brett Chedzoy, "Living Barns"  
silvopasture.ning.com

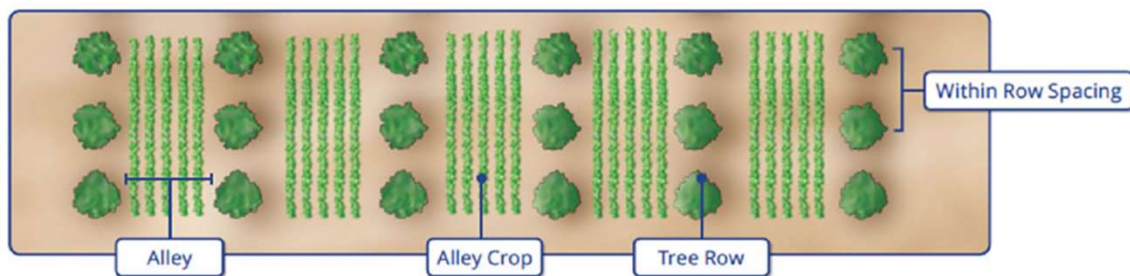


Avoid excessive impact!



Photo Credit: Brett Chedzoy, Cornell Cooperative Extension

## Silvopasture: Trees into Pasture



Alley Cropping – alley crop is forage





## Silvopasture: Trees into Pasture



Photo credit: <https://thisnzlife.co.nz/the-most-beneficial-trees-for-livestock/>



AgroForest Wisconsin at Sunnyhill Acres in Sheboygan County, WI.  
40 feet between rows; 100 trees per acre



## Forage Selection

- Shade tolerance
  - Light Intensity meter
- Nutrient scavenging
- Toxicity concern







https://forage.msu.edu

Search



MICHIGAN STATE UNIVERSITY

FORAGE CONNECTION



Home Research Extension Events Variety Trials Links People

## Welcome to the MSU Forage Connection

This web site is the homepage for the MSU Forage Research Program and an information hub for forage production and use in Michigan and the Great Lakes region.

Forages are the third most valuable agronomic crop in Michigan, encompassing over 3.5 million acres dedicated to permanent hay and haylage, and a variable acreage devoted to annual forage and pasture crops. In addition to traditional use as stored or grazed livestock feed, forage crops improve soil health via use in crop rotations or as cover crops, are a vital link in preserving water quality, and provide biofuels. Forage crops thus have a direct or indirect connection to many facets of Michigan agriculture and to ecosystem services that affect all residents.

We hope you will enjoy exploring these connections through this website.

- 2020 Michigan Forage Variety Test Report
- 2019 Michigan Cover Crop Variety Test



Selecting forage species and mixtures for hayfields and pastures may seem overwhelming. Let our new MSU Extension bulletin help you



## Ecological Services

- Diverse Mixture
- Nutrient Cycling
- Beneficial Insects



### Michigan Agroforestry Systems

#### Evaluating the Potential of a Site for Silvopasture Development

**Directions:** Answer the following ten questions on a scale of zero to ten points, using the descriptions below as a guide. Complete the ranking section at the end. Also, briefly answer each question in the space provided and make notes where additional evaluation will be needed.

1. \_\_\_\_ Established Zone for Bovine Tuberculosis (refer to Michigan Department of Agriculture and Rural Development Zoning order of 2018)

- 10 points: Site is not within an established zone for Bovine Tuberculosis (TB).
- 0 points: Site is within the TB zone, the practice of silvopasture is strongly discouraged.

2. \_\_\_\_ Site Quality (soil type, observable drainage, observable vegetation)



## Questions?

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- Julie Crick, Tree  
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- Monica Jean, Crop  
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## Resources

1. <https://www.fs.usda.gov/nac/>
2. <https://forage.msu.edu/>
3. <http://silvopasture.ning.com/>
4. [https://www.mdwfp.com/media/4194/basal\\_area\\_guide.pdf](https://www.mdwfp.com/media/4194/basal_area_guide.pdf)





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