

# Forage Establishment in Silvopasture by Subtraction in Wisconsin

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Managed woodlands present an opportunity for silvopasture, but questions remain regarding which forage species should be planted.

This factsheet highlights the results of a two-year experiment conducted in southern Wisconsin whose primary objective was to evaluate establishment and productivity of orchardgrass grown alone or in mixtures with other grasses or legumes. A secondary objective was to evaluate the management of existing understory vegetation with herbicide prior to planting.

## Site description and preparation

Plots were established at two thinned hardwood woodlands at the USDA Dairy Forage Research Station in Prairie du Sac, Wisconsin that differed in canopy cover (57% and 88% light interception). The study area was fertilized following fertility guidelines for pastures. Shrubs in the understory were controlled before the start of the study with a forestry mower and herbicides applied to resprouting shrubs.

## Treatments

Glyphosate was broadcast at 1.5 lb ae/acre (29-44 fl oz of commercial products depending on concentration) in October 2022 in half of the study area, with the other half remaining untreated. Plants were actively growing at the time of application. Forage mixes (Table 1) were broadcast seeded to both treated and not treated areas in spring the following year (April 2023).

## Measurements

Establishment was assessed using cover measurements 3 and 13 months after planting (MAP). Forage productivity was estimated with three harvests the year after planting (June, August, and September). Results are presented as dry biomass/acre.

Table 1. Species planted and seeding rates for each mix. Each mix resulted in approximately the same number of pure live seeds (PLS) per area (152-158 seeds/ft<sup>2</sup>).

Seeding mix	Species	PLS/ft <sup>2</sup>	Lbs PLS/acre
Orchardgrass (O)	Orchardgrass	158	16.7
Orchardgrass + grasses (OG)	Orchardgrass	97	10.3
	Perennial ryegrass	15	4.7
	Smooth brome	17	4.8
	Meadow fescue	27	4.2
Orchardgrass + legumes (OL)	Orchardgrass	79	8.4
	White clover	32	2.0
	Red clover	41	10.4
Orchardgrass + grasses + legumes (OGL)	Orchardgrass	49	5.2
	Perennial ryegrass	8	2.5
	Smooth brome	8	2.3
	Meadow fescue	14	2.2
	White clover	32	2.0
	Red clover	41	10.4



Figure 1. Forage growth in herbicide treated area, 16 months after planting (August 2024).

## Results

### Establishment

Glyphosate applied in the fall before spring seeding was beneficial for forage establishment. Sprayed areas had more than twice the forage cover three months after planting compared to non-treated areas (Figure 2). Orchardgrass was the dominant species 3 MAP with 5 to 20 times as much cover in herbicide treated areas as other grasses. Legumes also established successfully and benefited from a fall herbicide application.

The benefit of controlling vegetation persisted 13 MAP. Cover of seeded grasses and legumes remained more than two times that of non-treated areas (Figure 2).

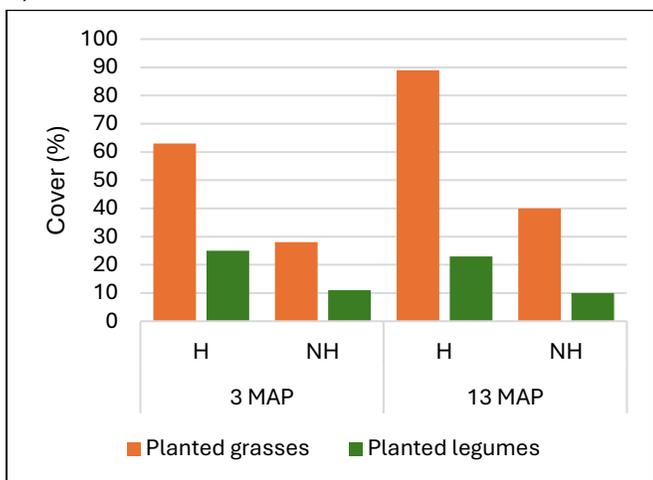


Figure 2. Cover of planted grasses and legumes in herbicide treated (H) and untreated (NH) areas, 3 and 13 months after planting.

Orchardgrass remained the dominant forage species with over 88% of the cover, while other forage grasses were never more than 5% cover when included in the mixture. Red and white clover persisted and were between 12-19% cover 13 MAP.

### Productivity

Forage was not harvested in the establishment year (2023) due to drought conditions, but it was harvested in June, August and November of 2024. The first harvest represented 50% of the total production for the year, with close to 40% in August and 10% in November. No herbicide application prior to establishment reduced yield by >80% due to weed competition. When weeds were suppressed,

orchardgrass alone yielded the most of all mixes (2,800 lbs/acre), while the combination of other forage grasses with orchardgrass yielded 2,500 lbs/acre (Figure 3). Legumes were not productive (<100 lbs/acre) and reduced overall yields by >20% (Figure 3).

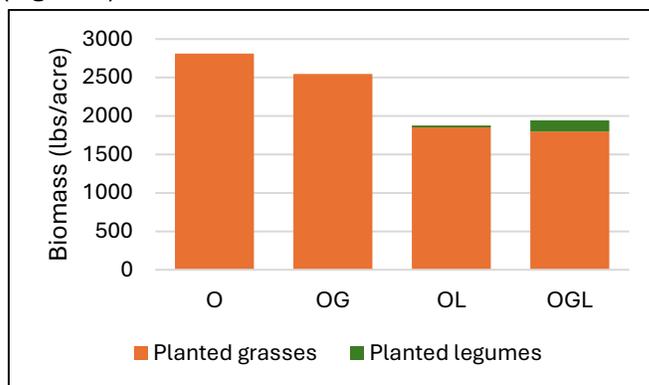


Figure 3. Biomass of planted grasses and planted legumes for each seed mix in herbicide treated areas throughout the three harvests of 2024.

### Key results

- ✓ **Controlling existing vegetation is key** to ensure good forage establishment and productivity in silvopasture by subtraction systems.
- ✓ After controlling existing vegetation, **orchardgrass proved to perform well in silvopasture.**
- ✓ Other grass species did not provide yield benefits.
- ✓ Legumes had low yield, which questions the value of including them in future mixes.

### Tips for establishment

- **Make sure forages will have enough light to allow for growth.** This may involve thinning and removing trees prior to seeding.
- **Remove unwanted understory woody shrubs** as these will compete for light and prevent establishment.
- **Manage existing understory herbaceous vegetation** prior to establishment.
- **Equipment** may be difficult to use in silvopasture; **plan on extra time.**
- **Be patient.** Establishing silvopasture by subtraction is a slow process.