



Methods to establish native wildflowers into tall fescue pasturelands



USDA NRCS-CIG Project

Ben Tracy, Professor

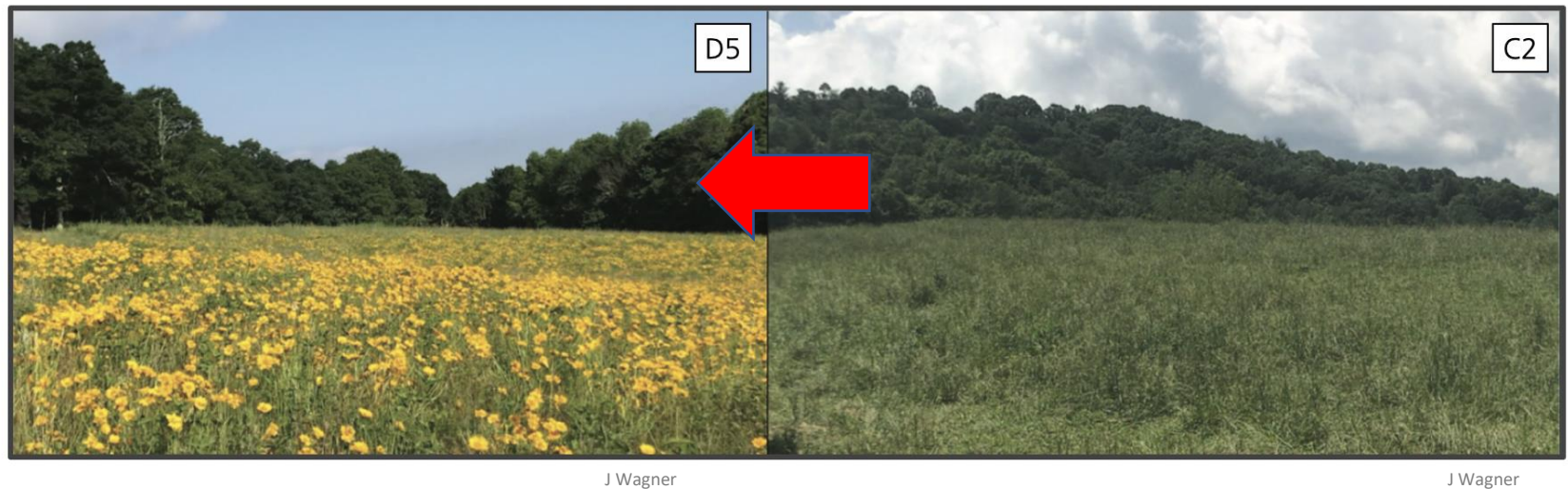
School of Plant and Environmental Sciences

Virginia Tech

The 'players' for wildflower establishment work...

Dr. Ben Tracy	Project Lead; Professor, Virginia Tech
Dr. Catherine Larochelle	Assistant Professor, Virginia Tech
Dr. Michael Flessner	Assistant Professor, Virginia Tech
Dr. Leighton Reid	Assistant Professor, Virginia Tech
Dr. Parry Kietzman	Research Associate, Virginia Tech
Dr. Gabriel Pent	Superintendent, Virginia Tech's Shenandoah Valley Agricultural Research and Extension Center
Elizabeth Chishimba	Ph.D. student, Virginia Tech
Jonathan Kubesch	Ph.D. student, Virginia Tech
David Bellangue	M.S. student, Virginia Tech
Raven Larcom	M.S. student, Virginia Tech
Dr. Patrick Keyser	Professor, University of Tennessee; Director, Center for Native Grasslands at the University of Tennessee
Dr. Laura Russo	Assistant Professor, University of Tennessee
Jessica Prigge	Ph.D. student, University of Tennessee
Caroline Sherony	USDA-NRCS, Natural Resource Specialist
Edward Henry	USDA-NRCS, National Ecologist

Tall fescue pastures are not diverse... but we can change that...



Diversified (D5) and Conventional (C2) sites in SW VA (June 14th, 2021).

Pollination Ecosystem Services - High

Pollination Ecosystem Services - Low

Pasture and Rangeland today...

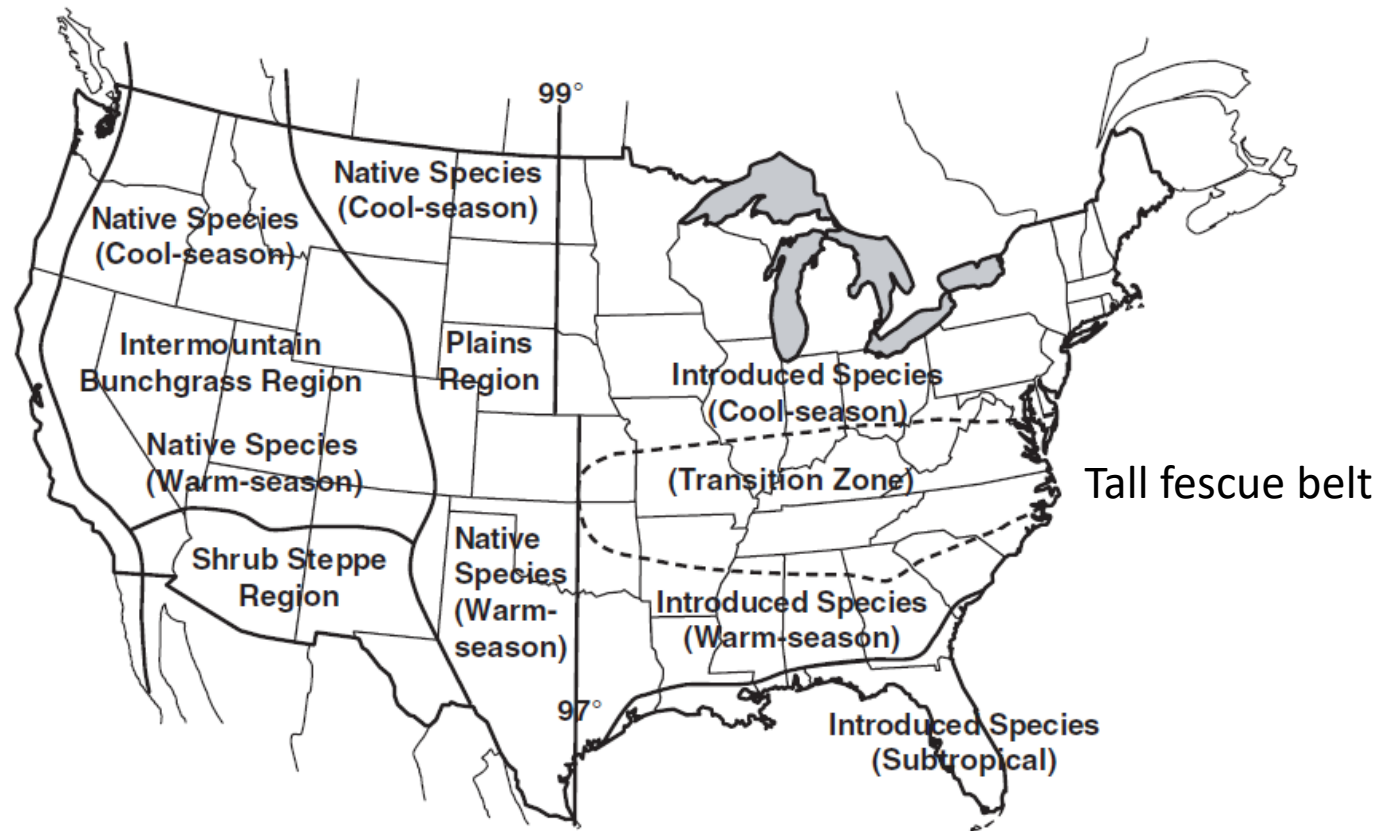


FIG. 1.5. Major grassland areas of the USA at present. Introduced species are dominant in northern areas along the West Coast and in areas of the east that were formerly wooded. Southern areas along the West Coast have primarily winter annuals in non-irrigated areas. (Constructed from authors' knowledge and Barnes, 1948.)

A photograph of a field filled with yellow wildflowers, likely Gaillardia, in the foreground and middle ground. In the background, a white house with a dark roof is visible on a grassy hill under a clear sky.

Project Goals

- **Purpose**

- Develop the necessary expertise to conserve pollinators in actively grazed pastures in the fescue belt of the Southeastern U.S.

- **Goal**

- Update the NRCS conservation practice standard for forage and biomass planting (code 512) to include guidance for pollinator conservation in actively grazed pasture lands in the 37 million-acre fescue belt

- **Funding Period**

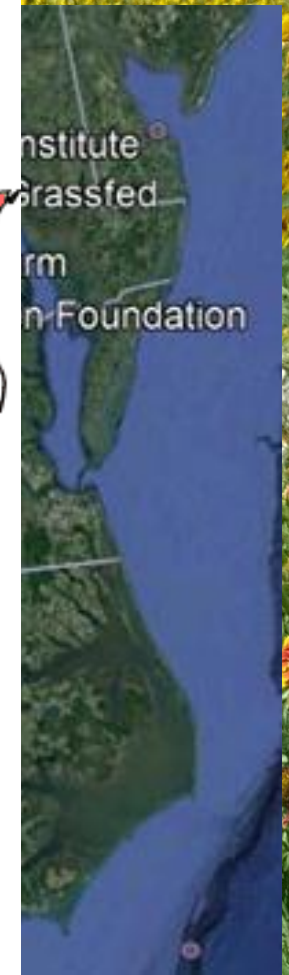
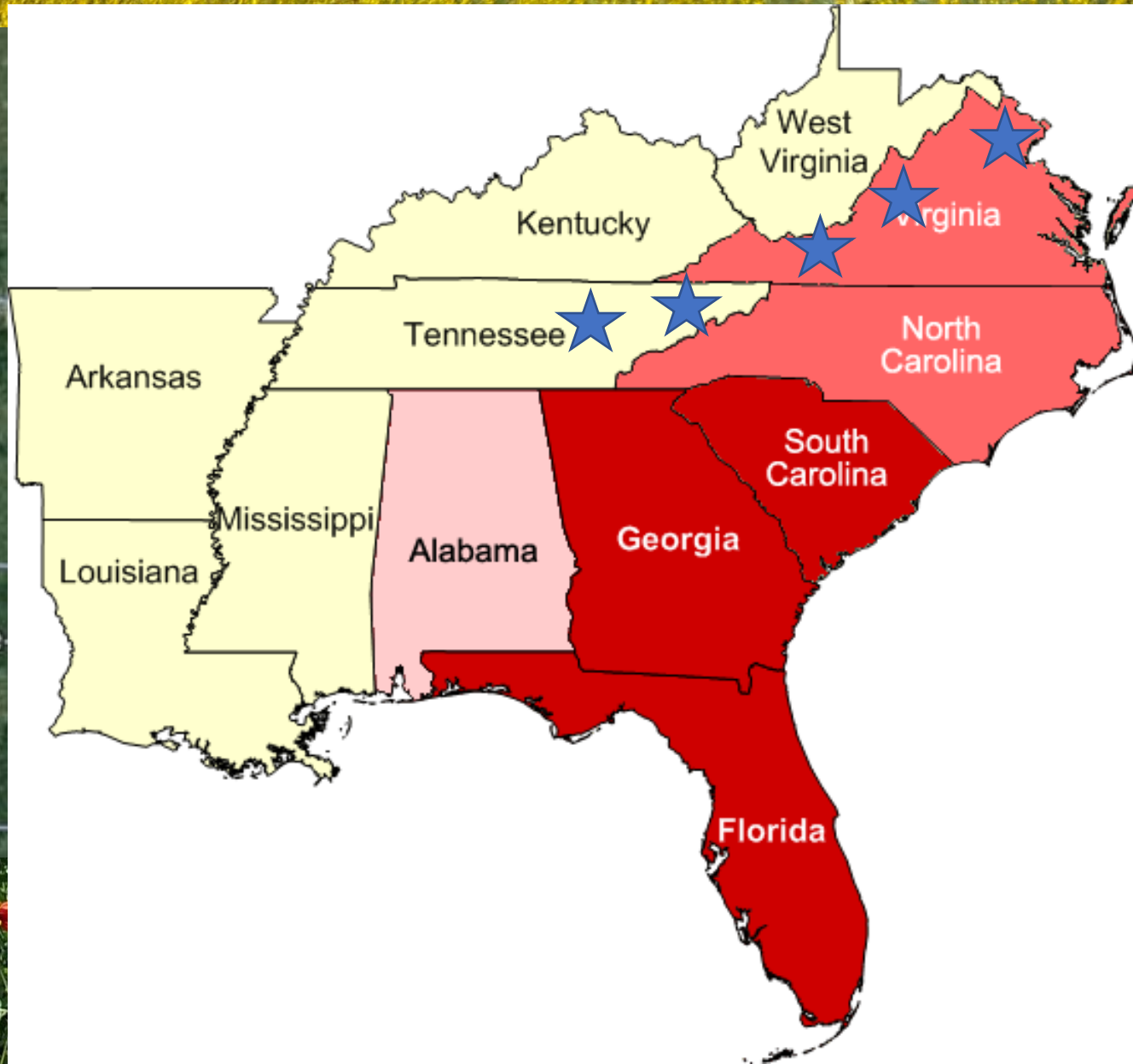
- April 2020- March 2025

A photograph of a field filled with yellow wildflowers, likely Gaillardia, in the foreground and middle ground. In the background, a white house with a dark roof is visible on a grassy hill. The sky is not clearly visible.

Objectives

- 1) Document the establishment and persistence of wildflowers in grazing systems**
- 2) Assess the benefits of wildflower-enhanced grazing systems for cattle and pollinators**
- 3) Evaluate socio-economic aspects of wildflower-enhanced grazing systems**
- 4) Create educational materials and provide outreach about wildflower-enhanced grazing systems**

Study Locations



Study 1: Evacuating different methods to establishment wildflowers into fescue swards (Summer, Fall 2020)



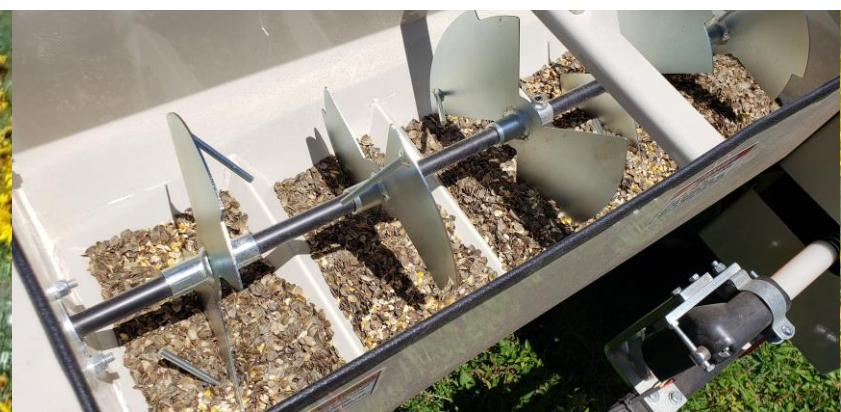
Experimental Design

Fence	
2D Ctrl seeding	6A Roundup Strip
4D Pastora	2A Ctrl seeding
2D Ctrl seeding	1A Cimarron
9D Strip till	3A Outrider
7D Roundup weaken	2A Ctrl seeding
5D Plateau	4A Pastora
8D Select max	8A Select max
3D Outrider	5A Plateau
1D Cimarron	7A Roundup weaken
6D Roundup strip	9A Strip till
2C Ctrl seeding	5B Plateau
5C Plateau	3B Outrider
3C Outrider	2B Ctrl seeding
7C Roundup weaken	7B Roundup weaken
2C Ctrl seeding	8B Select max
6C Roundup strip	2B Ctrl seeding
1C Cimarron	6B Roundup Strip
9C Strip till	4B Pastora
4C Pastora	9B Strip till
8C Select max	1B Cimarron

10 x 60 ft plots, 4 Blocks A, B,C, D, 30 ft buffer

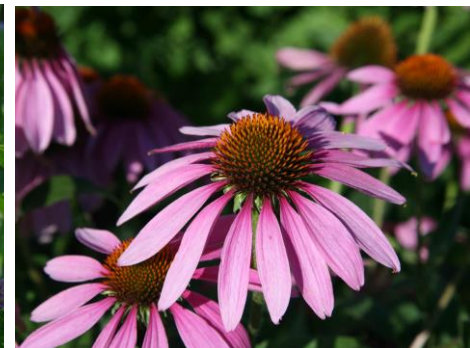
Treatments (Herbicide, Active Ingredient)
Control
Pastora (Nicosulfuron & Metsulfuron methyl)
Roundup Half Rate (Glyphosate)
Roundup Standard Rate (Glyphosate)
Plateau (Imazapic)
Cimarron (Metsulfuron methyl & Chlorsulfuron)
Select Max (Clethodim)
Strip till (disk plowed twice)

Summer 2020 Establishment Experiments

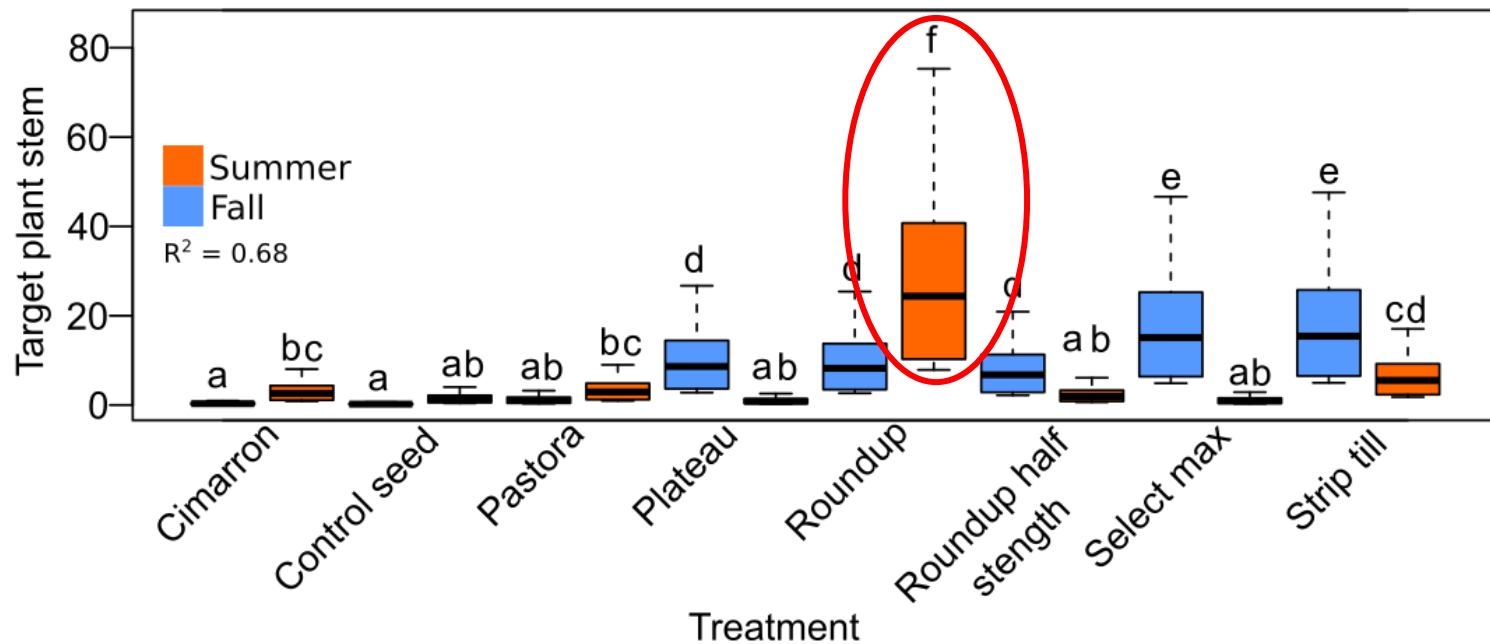


Species list for Site Preparation Experiment

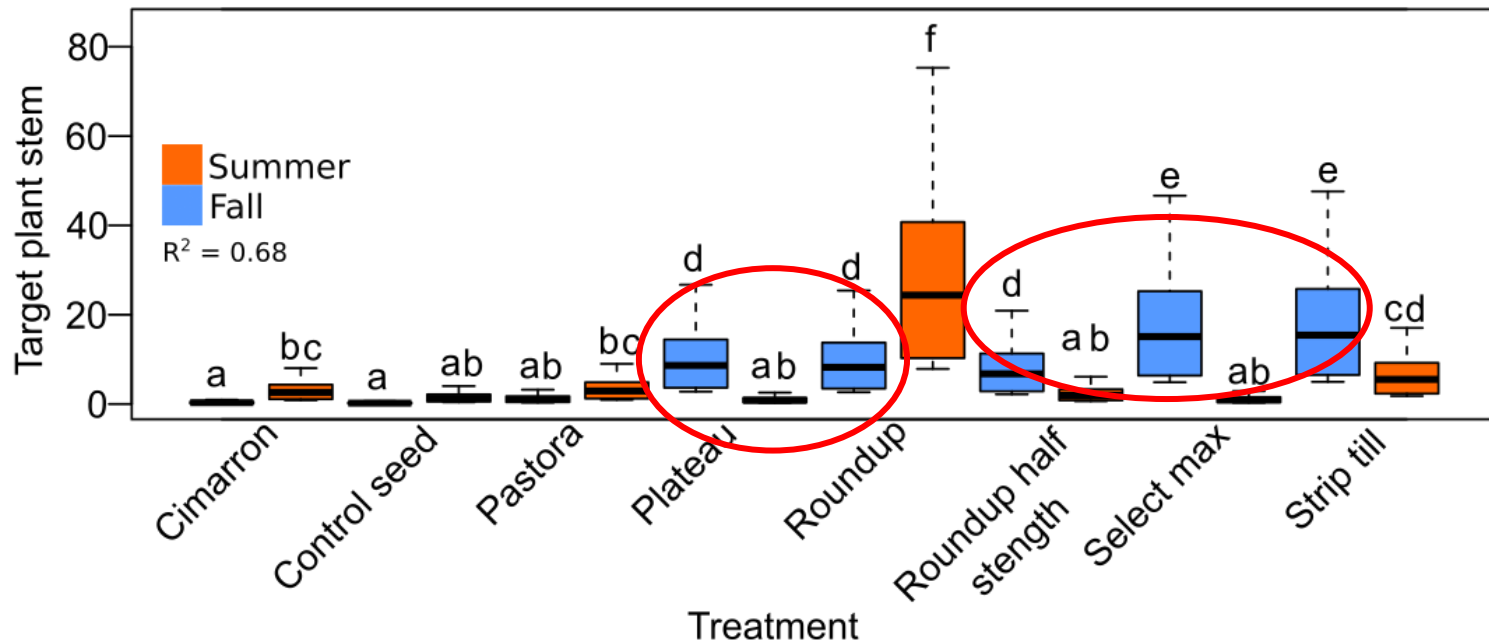
- *Coreopsis lanceolata*
- *Echinacea purpurea*
- *Gaillardia pulchella*
- *Helianthus maximiliani*
- *Heliopsis helianthoides*
- *Ratibida columnifera*
- *Ratibida pinnata*
- *Rudbeckia hirta*
- *Silphium perfoliatum*
- *Silphium terebinthinaceum*
- *Solidago canadensis*
- *Chamaecrista fasciculata*
- *Dalea candida*
- *Dalea purpurea*
- *Desmanthus illinoensis*
- *Desmodium canadensis*
- *Desmodium paniculatum*
- *Lespedeza capitata*
- *Lespedeza virginica*
- *Agastache foeniculum*



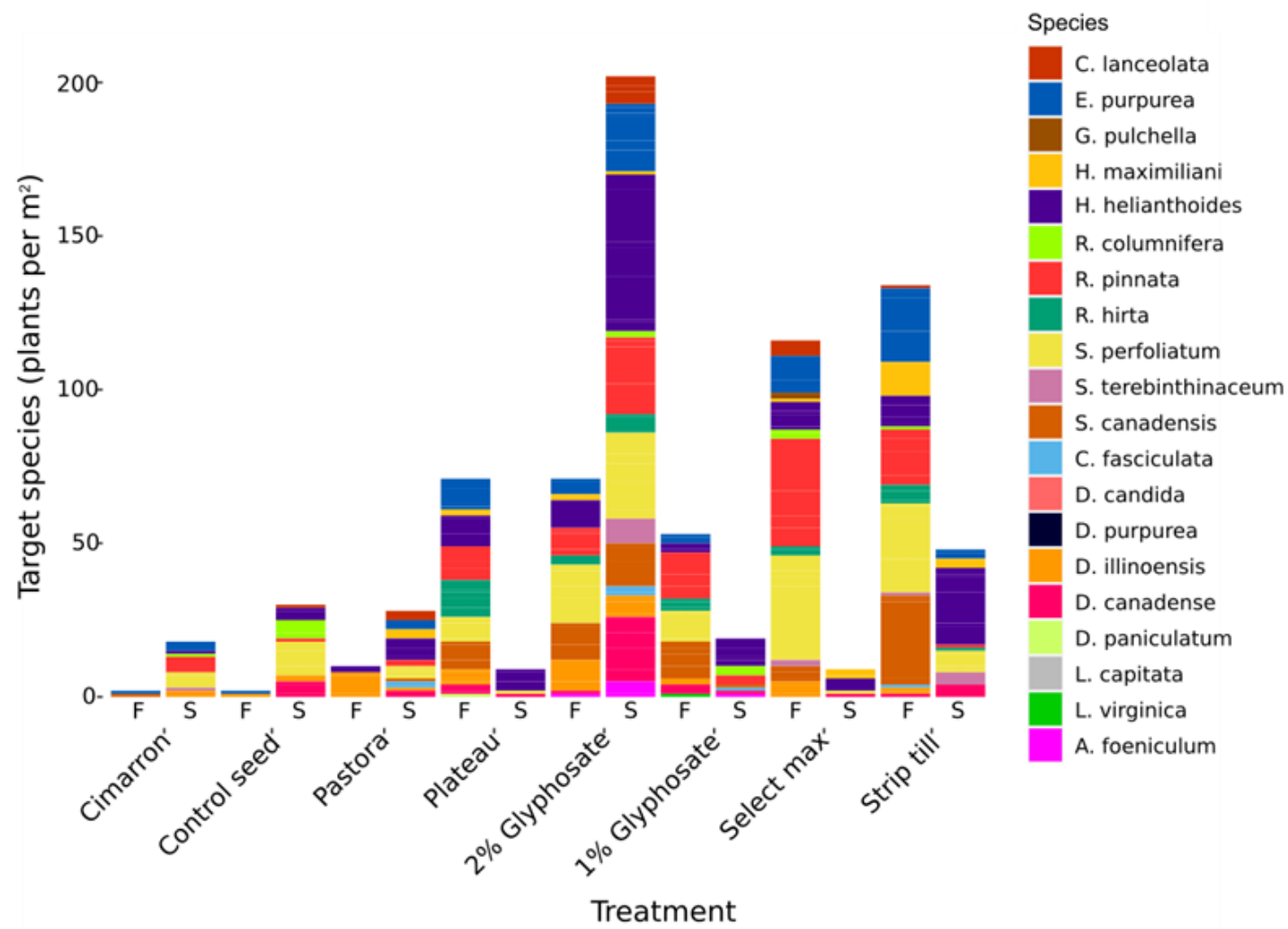
Summer sown 2% Roundup had highest average target plant richness and abundance



Next 5 best treatments were all fall sown



WF species composition did not vary greatly among treatments although Roundup application produced a more even distribution of species



Other establishment experiments – varying seeding rates, and cold treatments (stratification)

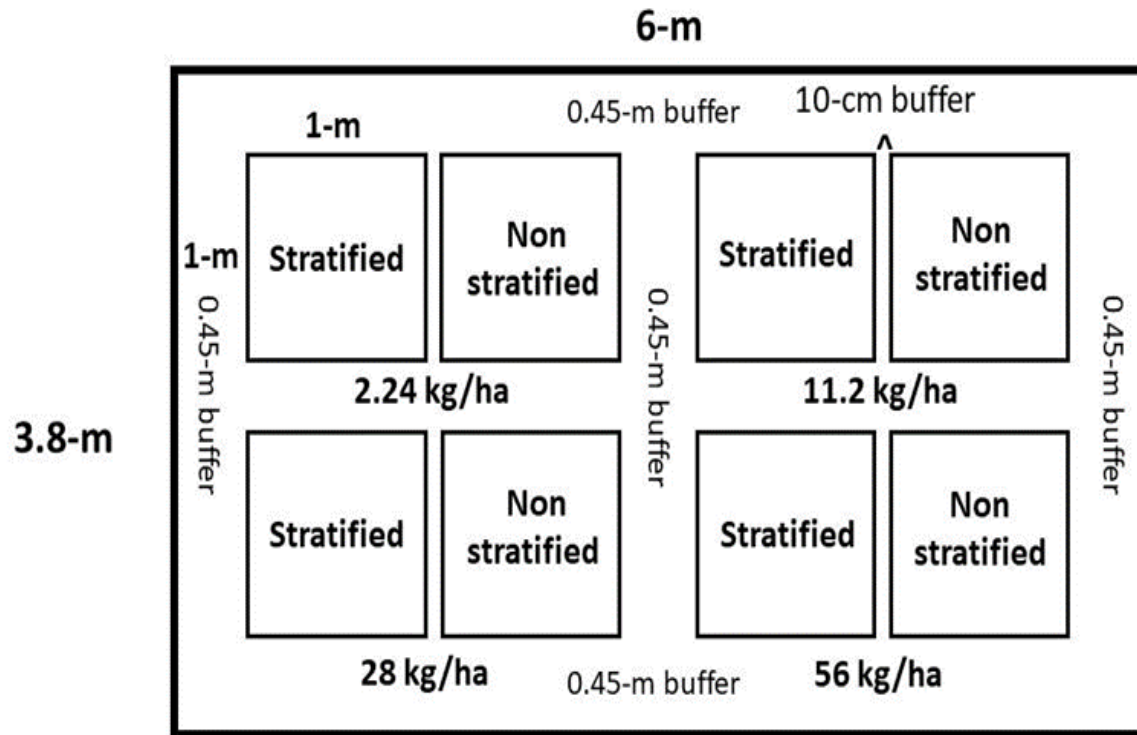


Figure 1. Experimental layout for one replication of the seed rate and stratification plot. Seeding rate plots split into m^2 plots with one half sown with stratified seed and the other half sown with non-stratified seed at indicated seeding rate and separated by a 10 cm buffer. A 0.45 m buffer surrounds the plots on all sides.

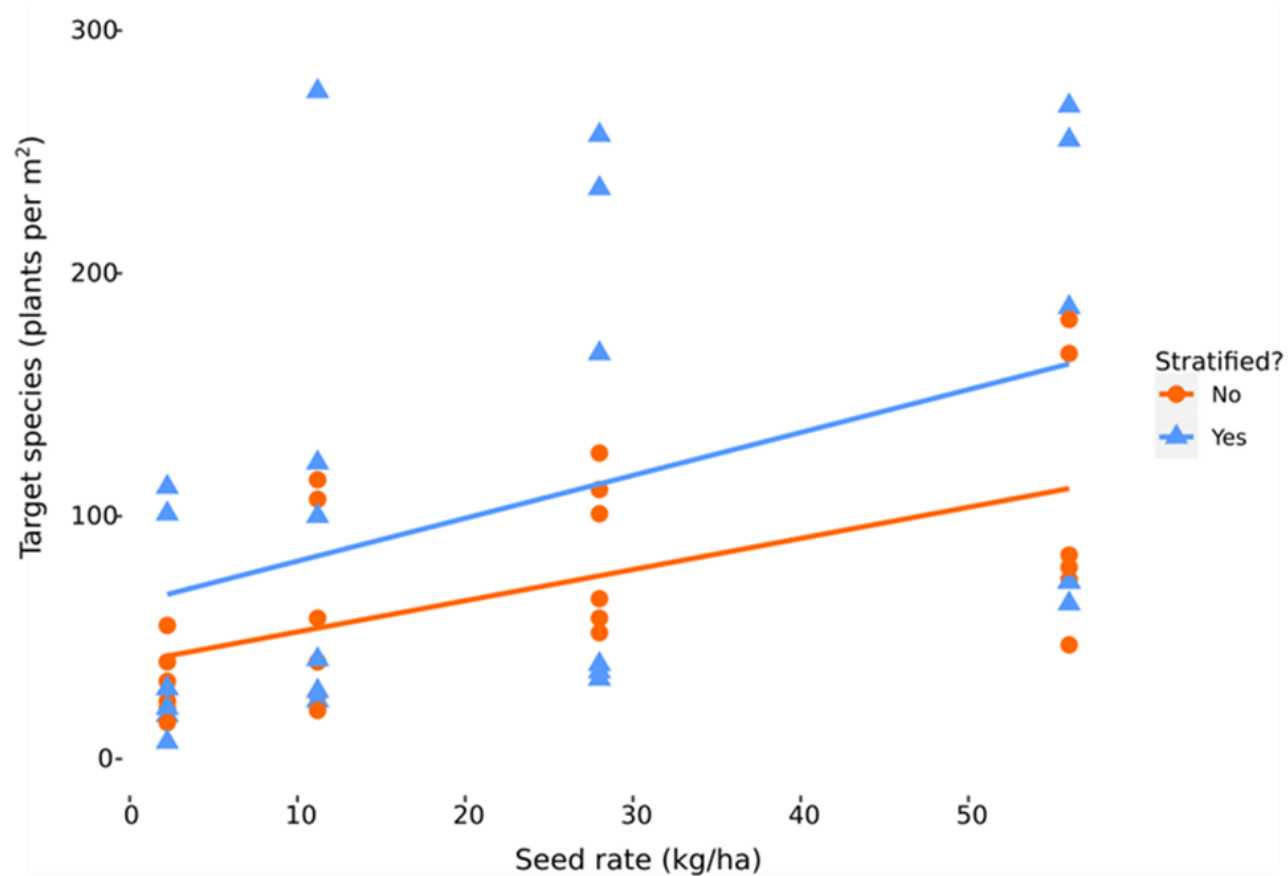
Other establishment experiments – varying seeding rates,
and cold treatments (stratification)

2022

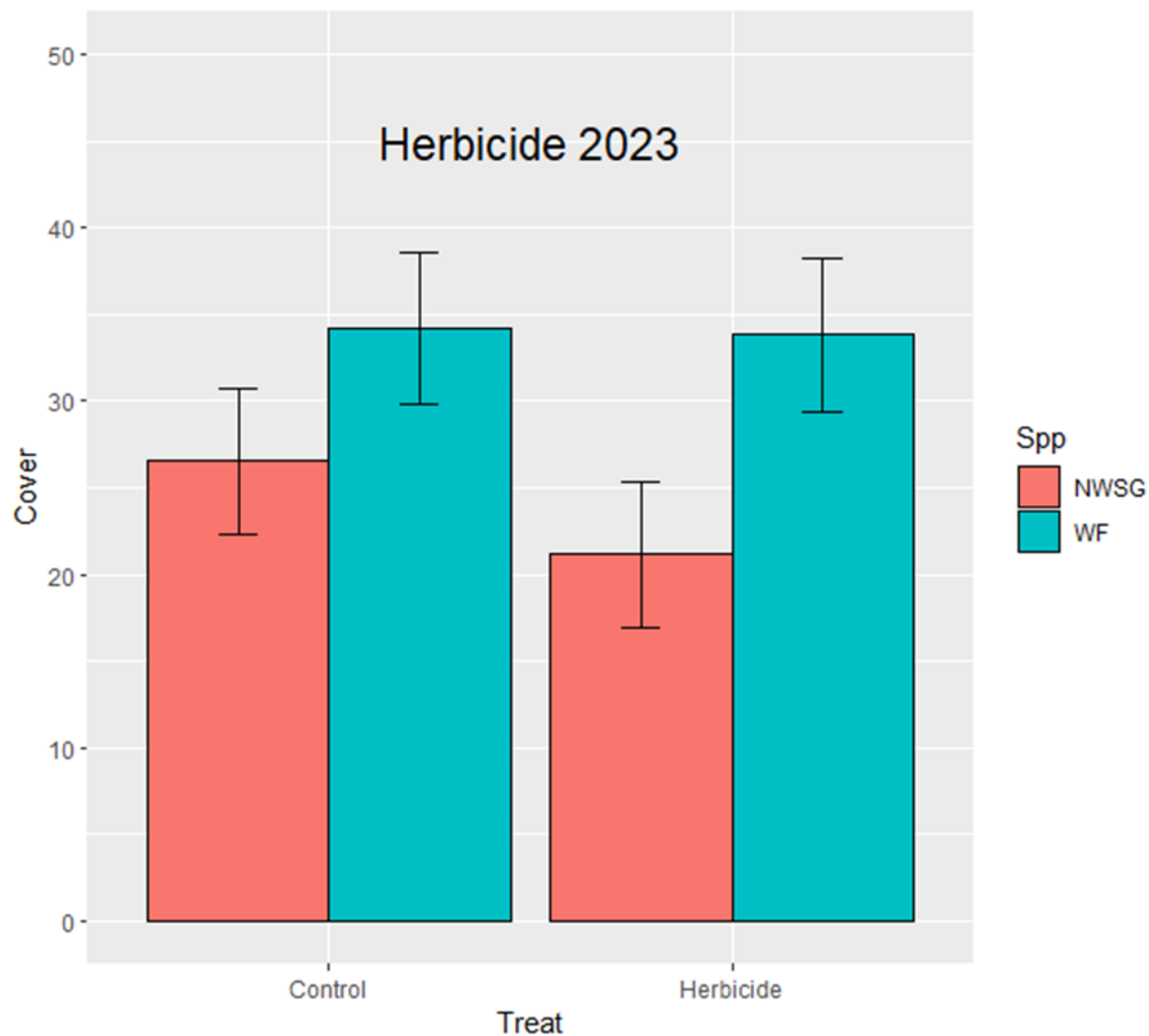
2021



Higher seeding rates increased target plant establishment especially for non cold-treated seed..



Some other establishment experiments...**dormant season** application of Roundup, varying seeding rates. PhD student Jonathan Kubesch





New tillage experiment to explore non-chemical methods for wildflower establishment. MS student Harry Stewart

Side-by-side Grazing Study Virginia Tech CIG study



Planted June 6, 2022



Common Name	Scientific Name	Type	target lbs/ac	% of mix by wt.
	Symphyotrichum			
Aster, Calico	lateriflorum	Wildflower	0.2	2.6
Bergamot, Wild	Monarda fistulosa	Wildflower	0.1	1.7
Goldenrod, Early	Solidago juncea	Wildflower	0.1	0.8
Goldentop, Flat-top	Euthamia graminifolia	Wildflower	0.0	0.4
Milkweed, Common	Asclepias syriaca	Wildflower	1.9	30.1
	Pycnanthemum			
Mountainmint, Narrow-leaf	tenuifolium	Wildflower	0.02	0.4
Pea, Partridge	Chamaecrista fasciculata	Legume	2.0	32.4
Sunflower, Ox Eye	Heliopsis helianthoides	Wildflower	1.2	20.1
Susan, Black-eyed	Rudbeckia hirta	Wildflower	0.1	1.3
Ticktrefoil, Panicleleaf	Desmodium paniculatum	Legume	0.7	10.5
Totals		10	6.2	100.4

Wildflower diversified section of fescue pasture

Finding ~5x more pollinators here



The problem (or maybe opportunity?) of thistles during establishment phase



Some conclusions about WF establishment

- Of herbicide options – roundup seems to work best, but tillage is promising too.
- Higher seeding rates may help but are cost prohibitive (our mixes were \$50-60/lbs., fescue seed is \$5-6/lbs. for comparison).
- WF establishment seems to benefit from cold stratification or fall planting but results inconsistent
- Wildflowers benefit pollinators can be added to pastures without negatively impacting cattle performance.
- Wildflowers are challenging to establish into tall fescue swards – patience is required!

A vast field of wildflowers, primarily yellow and red, stretches across the foreground and middle ground. The flowers are densely packed, with green foliage interspersed among them. In the far background, a white house with a dark roof is visible on a slight rise, surrounded by a fence and more greenery. The sky is not clearly visible, suggesting a bright, sunny day.

Thanks!

Side-by-side grazing trials

Summer 2022

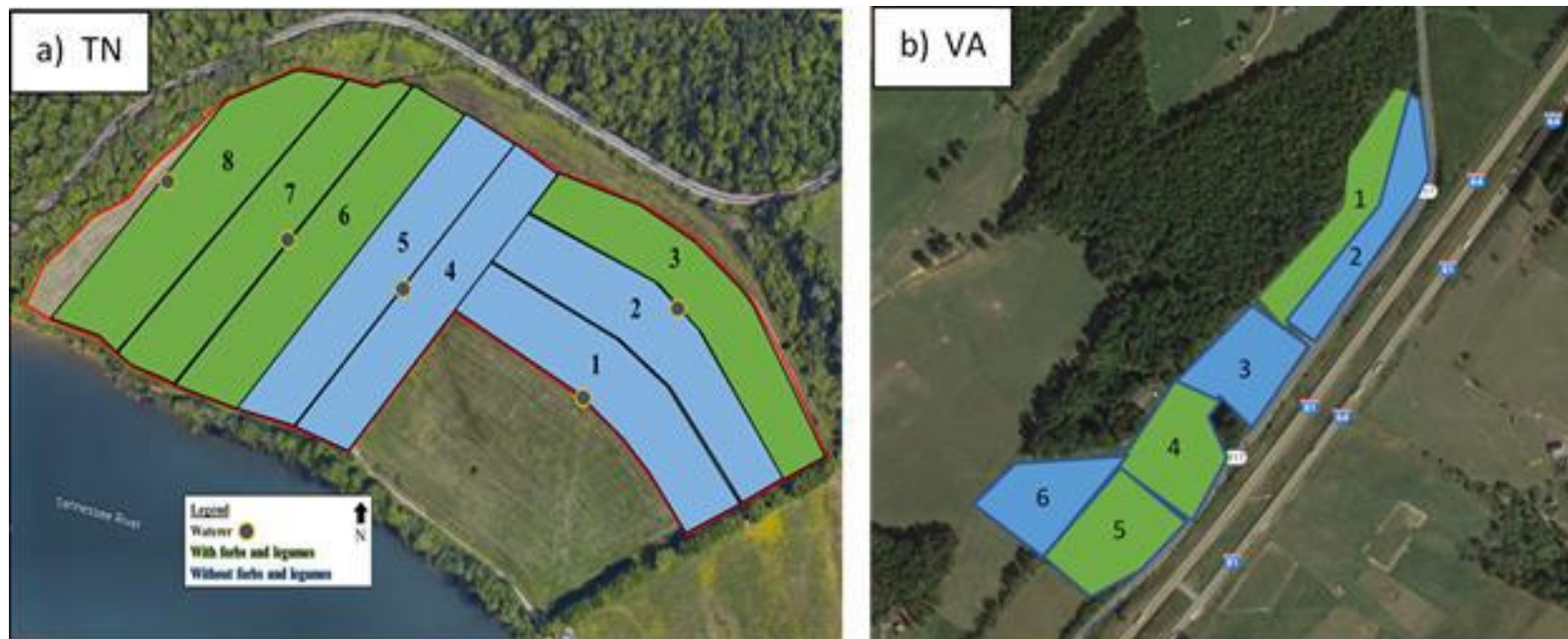


Figure 5: Plot layouts of the side-by-side grazing trials that will be established on the research stations at a) University of Tennessee and b) Virginia Tech. Green plots indicate paddocks that will be overseeded with wildflowers compared with the blue paddocks that will be conventional grass pastures