



Creating Higher Diversity Native Grass Pastures

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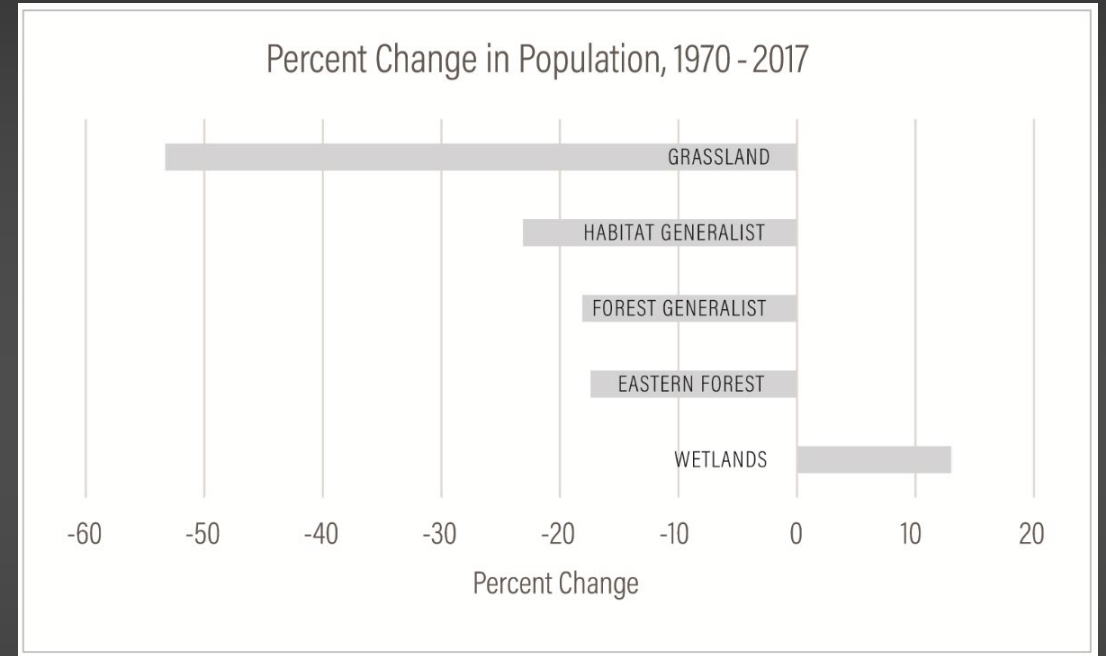
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Why More Diverse Native Grass Pastures?

Pollinator declines, bird declines, soil health, align with historical ecological norms

Interest from conservation groups, farm bill programs, but...

Lack of empirical evidence – where's the data? What works, what doesn't work? And what does it even mean to “work”?



Rosenberg, K.V. et al., 2019. *Science* 336:120-124

Why More Diverse Native Grass Pastures?

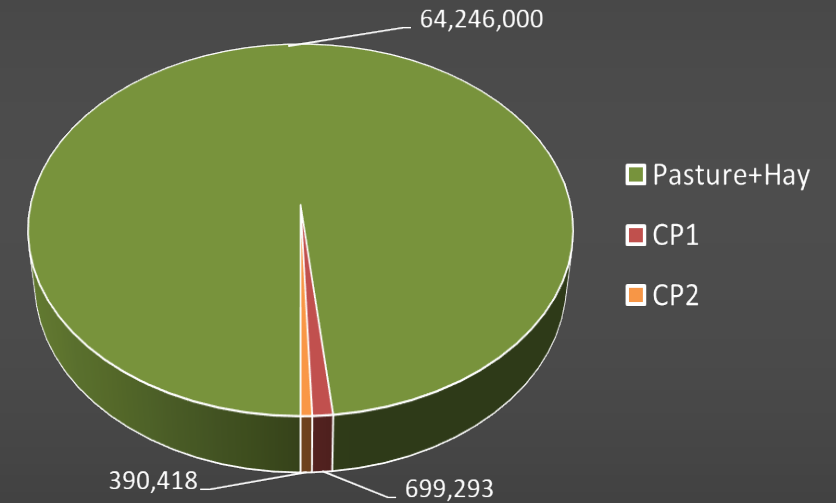
Why in pastures – why not just smaller “gardens” of these forbs and leave the pastures to the cattle?

Working Lands Concept

scale: 64 MM acres working grasslands in eastern U.S.
cost: Grazing pays landowner
disturbance: essential for a healthy grassland ecosystem



Land Use, Eastern U.S. (acres)



Keyser et al., 2019, Wildlife Society Bulletin 43:382–390.

How Do We Get More Diverse Native Grass Pastures?

- What species will *establish* in pastures?
- What species will *persist* in pastures?
- And won't become a *pest*?
- Does *grazing management* matter for all of this?
- Are any of these species *good forages*?
- Do they produce appreciable *yields* of forage?
- Do they contribute to improved *pasture productivity and/or cattle performance*?
- What are the *economics* of incorporating these into pastures?
- Do *pollinators* use these – are we providing improved habitat?

How Do We Get More Diverse Native Grass Pastures?

To answer key questions, we implemented a series of research projects over the past 7 years, some still ongoing:

- *Interseeding Native Forbs into Native Grass Pastures*
- *Improved Establishment of Native Forages*
- *Blooming and Forage Characteristics of Twelve Native Forbs and Legumes*
- *Bee-friendly Beef: Integrating Native Wildflowers into Southeastern Grazing Systems*
- *Herbicide Tolerance of Native Forbs and Legumes*

How Do We Get More Diverse Native Grass Pastures?

Partners:

- University of Tennessee Foundation
- USDA-NRCS – Conservation Innovation Grant
- USDA-AFRI
- University of Tennessee AgResearch
- University of Tennessee School of Natural Resources
- Ernst Conservation Seeds



What Works, What Persists, and Does Rest Have Anything to Do with it?

Northeast Tennessee AgResearch and Education Center, 2017-2022

- No-till drilled, spring 2017 into existing SG and BB/IG pastures
- 11 Spp, rest treatments (no rest, early rest, middle rest, late rest, no grazing), 2018-2022

Common Name	Latin Name	Total lbs/ac	A/B/P
Partridge pea	<i>Chamaecrista fasciculata</i>	0.50	A
Purple prairie clover	<i>Dalea purpurea</i>	0.50	P
Illinois bundleflower, Midwestern U.S. Eco	<i>Desmanthus illinoensis</i>	1.125	P
Dixie ticktrefoil, AL Eco	<i>Desmodium tortuosum</i>	0.50	P
Lanceleaf coreopsis	<i>Coreopsis lanceolata</i>	1.00	P
Plains coreopsis	<i>Coreopsis tinctoria</i>	0.50	A
Eastern purple coneflower	<i>Echinacea purpurea</i>	0.625	P
Maximilian sunflower	<i>Helianthus maximiliani</i>	0.50	P
Oxeye sunflower	<i>Heliopsis helianthoides</i>	0.25	P
Upright prairie coneflower	<i>Ratibida columnifera</i>	0.25	P
Black-eyed Susan, AL Eco	<i>Rudbeckia hirta</i>	0.50	A/B/P
	Total	6.25	

Establish Forbs with or After the Grass?

Private farm, Buncombe County, NC, planted May 2019 and March 2021
Drill grass and forbs together – or grass then forbs?

- weed suppression prior to introducing forbs?
- forbs overwhelming grass seedlings in year one?
- grass too thick for the forbs where grass is already established?

And does this matter whether we do it conventional (2019 only) or no-till?



But Are Forbs Good Forage?

East TN AgResearch and Education Center

- established 12 species (6 x 25' plots, 4 reps), July 2018
- harvested 2020-2022
- nutritive values, yields, persistence under repeated defoliations



Common Name	Latin name	Seeding rate (PLS lbs/ac)
Maximilian sunflower	<i>Helianthus maximilianii</i>	3.7
Black-eyed Susan	<i>Rudbeckia hirta</i>	2.0
Oxeye sunflower	<i>Heliopsis helianthoides</i>	7.9
Lanceleaf coreopsis	<i>Coreopsis lanceolata</i>	3.6
Upright prairie coneflower	<i>Ratibida columnifera</i>	1.6
Purple coneflower	<i>Echinacea purpurea</i>	6.9
Canada goldenrod	<i>Solidago canadensis</i>	0.5
Cup plant	<i>Silphium perfoliatum</i>	7.9
Illinois bundleflower	<i>Desmanthus illinoensis</i>	6.6
Partridge pea	<i>Chamaecrista fasciculata</i>	9.5
Purple prairie clover	<i>Dalea purpurea</i>	2.6
Showy ticktrefoil	<i>Desmodium canadensis</i>	4.7

And Does it Matter to Cattle?

East TN AgResearch and Education Center – Holston Unit

- interseeded 18 forbs into existing BB/IG/LB pasture, June 2020/April 2021
- four ~3 ac pastures interseeded, four left as controls (grass only)

How does animal performance and pasture productivity compare?

What about animal preference – will they graze this stuff, any preference?

Canada goldenrod

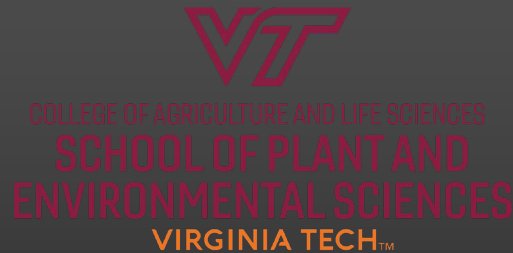
Prairie dock

Purple prairie clover

White prairie clover

Roundhead bushclover

Slender bushclover



Cleaning Up the Mess – Weed Control in Diverse Native Grass Pastures

Northeast Tennessee and East Tennessee AgResearch and Education Centers, 2023

Can we control undesirable weeds in native grass pastures forbs – without killing all the (expensive!) native forbs?

Herbicide	Active Ingredient	Rate (product), per acre	
		Low	High
DuraCor	aminopyralid, florpyrauxifen	12 fl oz	16 fl oz
2-4DB	2,4-D butyric	32 fl oz	64 fl oz
Plateau	imazapic	6 fl oz	10 fl oz
Cimarron Plus	metsulfuron methyl, chlorsulfuron	0.5 oz	1 oz
PastureGard	triclopyr, fluroxypyr	24 fl oz	48 fl oz



Questions?

