

# Benefits of Biodiverse Pastures to Pollinators

**Summary:** Tall fescue pasturelands dominate much of the Southeastern United States, including Virginia, providing critical forage for millions of cattle. However, these landscapes often act as food deserts for pollinating insects due to a lack of native wildflowers. Pollinator populations have declined significantly in recent decades, driven in part by changing land use and reduced floral resources. This study explores a “bee-friendly beef” approach by integrating a native seed mix—composed of nontoxic wildflowers and warm-season grasses—into traditional livestock pastures. Experimental plots at Virginia Tech and working farms in Northern Virginia were used to assess the persistence of these plantings, their suitability for grazing livestock, and resulting impacts to pollinator communities. By creating biodiversity-enhanced grazing systems, producers can simultaneously support cattle operations and pollinator conservation, strengthening the resilience of working landscapes across the Southeastern fescue belt in the face of a changing climate.



*Cattle grazing in a wildflower enhanced pasture in Southwest Virginia. Photo by Parry Kietzman.*

## **Project Objectives:**

- Establish mixed native warm season grasses and native flowering plants in tall fescue-dominated, actively grazed Virginia livestock pastures.
- Survey pollinator diversity and abundance in experimental pastures.
- Compare findings from the biodiversity-enhanced pastures with unenhanced control pastures and make planting recommendations for producers.

## **Farmer Takeaways:**

- Integrating nontoxic, native wildflowers and warm season grasses into tall fescue-dominated pastures can diversify forage by maintaining availability of both pasture grasses for livestock and floral resources for pollinators.
- These findings complement results from our project partners that have indicated that enhancing pasture biodiversity does not negatively impact cattle production and provides forage of equal or greater nutritional value compared to traditional pastures.
- On-farm trials demonstrate that creating more biodiverse pasture systems is both beneficial to pollinator conservation efforts while being feasible for producers to meet their individual livestock operation goals.

## **Methods:**

- Wildflower-enhanced pastures were established on university experimental plots and on six working farms in Northern Virginia through the interseeding of a native wildflower mixture.
- Two 100' transects were established within each treatment pasture, avoiding the edges of the fields, for a total of four transects per site. For each data collection period, the transects were walked for 7.5 minutes each by an observer.
- The number and type of pollinating insects seen in the transects were recorded. Because the insects were not captured and most insects could not be identified to species in the field, they were binned into the following broad categories: bumble bees, small native bees, large native bees, honey bees, flies, wasps, beetles, and butterflies and moths.
- In a tandem Virginia Tech study conducted in Southwestern Virginia, the preferences of different pollinator types for flowering plant species were also determined. In biodiversity-enhanced pastures, pollinators were counted and identified on different flower species to determine which species were most commonly visited by insects.

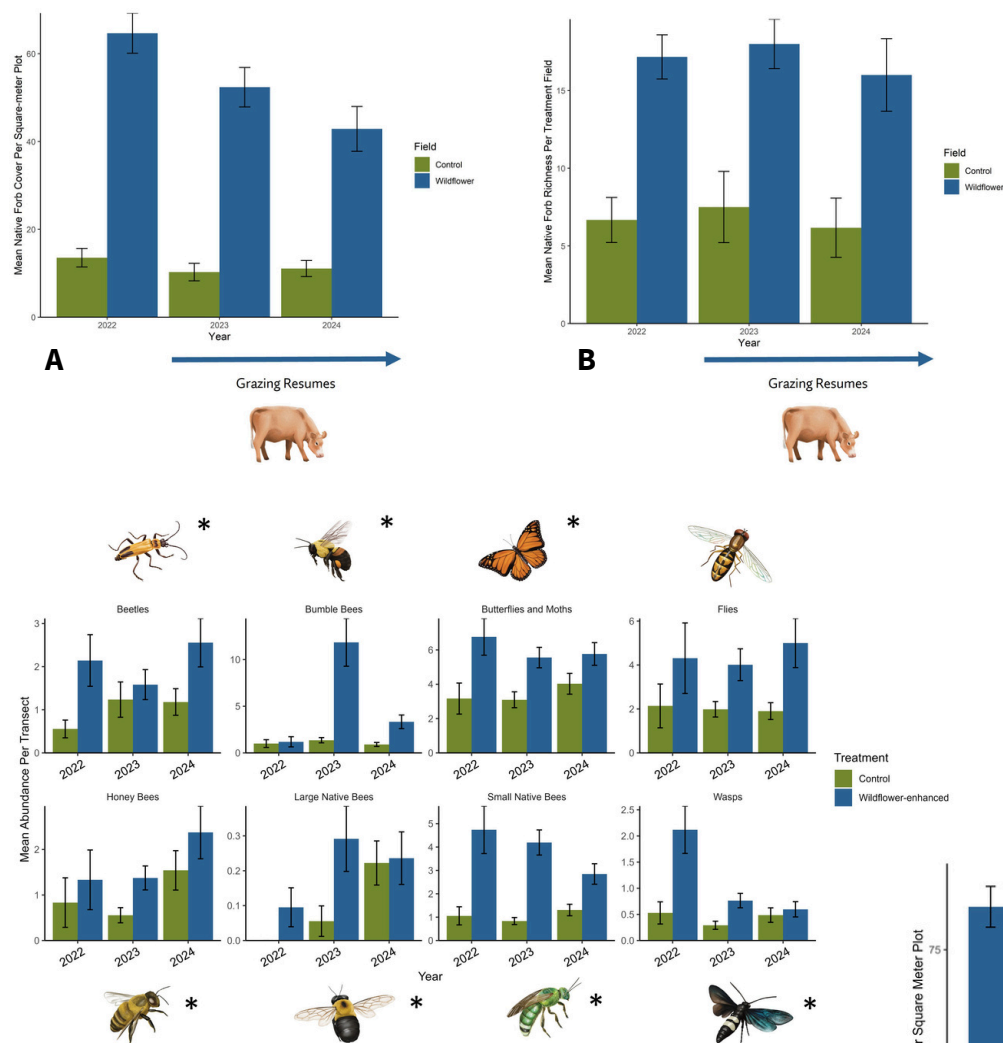


*Top: Green sweat bee (*Agapostemon* sp.) on purple coneflower in a wildflower-enhanced plot in Northern Virginia.*

*Bottom: A pollinator survey conducted in an unenhanced control pasture on a Northern Virginia cattle farm. Photos by Brooke McDonough.*

## Results: Technical Findings

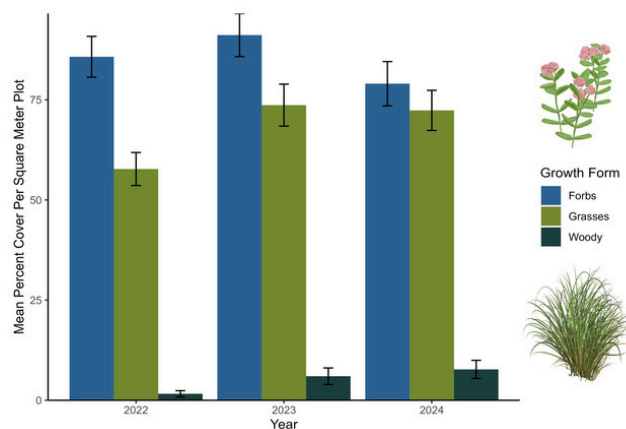
- Floral preferences varied by pollinator group.
- Some plant species were highly attractive to a single group of pollinators (e.g., bergamot was very commonly visited by bumble bees, but less frequently visited by other pollinators), while others, such as early goldenrod, were visited by many different groups of pollinators.
- An ideal seed mix will include species that are easy to establish, are attractive to many kinds of pollinators, and which have differing floral phenologies throughout the active season so that forage is continuously available to pollinators.
- Recommended species based on the observed preferences of pollinators in our study are: purple coneflower, lance leaved coreopsis, grey headed coneflower, black-eyed Susan, bergamot, blue flax, and early goldenrod.



**Fig. 1 (top).** (A) Mean percent cover of native forb species per square-meter plot in the wildflower-enhanced and control treatment fields from 2022-2024. (B) Mean total species richness of native forb species per treatment field from 2022-2024.

**Fig. 2 (bottom).** Mean abundance of the eight surveyed pollinator taxa per 100-ft. survey transect in the wildflower-enhanced and control treatment fields from 2022-2024. Significant taxa effects are indicated by an \*.

- Collectively, across all on-farm trial sites, wildflower establishment in the enhanced pastures resulted in greater native forb species richness and cover, even when grazing was resumed (Fig. 1), while maintaining cover of pasture grasses as forage (Fig. 3). Total pollinator community abundance was greater in the wildflower-enhanced pastures, and significant effects to individual taxa were observed among  $\frac{7}{8}$  studied functional groups (Fig. 2).
- These results demonstrate that integrating native seed mixes into tall fescue-dominated pastures can boost floral resources and associated pollinator communities while diversifying forage for livestock.



**Fig. 3 (above).** Mean percent cover of forbs, grasses, and woody plant species per square-meter survey plot in the wildflower-enhanced treatment fields from 2022-2024.

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