

# Evaluation of Flowering Forbs to Enhance Pollinator Resources in Turfgrass of the Southeastern United States



I. G. P. Souza, C. J. Wang, E. B. de Castro, G. M. Henry, D. W. Held, J. G. Hill, J. D. McCurdy

Mississippi State University, Starkville, MS



## Introduction

Urban and peri-urban areas serve as important forage sites for pollinating insects. However, these areas may be degraded due to lack of forage habitat or plant floral diversity, and they are often fragmented by transportation infrastructure, buildings, and landscapes lacking in diverse plant material. The Partnership for Pollinator-Friendly Lawns in the Southeastern United States (known as the "Refuge Lawn" project) seeks to evaluate actions that increase pollinator forage resources in urban areas of the Southeastern U.S.

## Objectives

- 1) Determine bloom periodicity of native and natural forbs common to lawn and amenity turfgrass settings in the Southeastern U.S. and quantify pollinating insect visitors.
- 2) Characterize effects of warm-season turfgrass species selection and cultural practices on forb establishment and persistence, as well as effects upon pollinator visits.
- 3) Gauge stakeholder preference for pollinator habitat within maintained turfgrass systems and leverage the team's regional expertise and stakeholder connections within each respective state to create best management practices (BMPs) and a comprehensive Extension program that delivers research-based knowledge to various levels of turfgrass managers (including homeowners and professional practitioners) throughout the Southeastern U.S.

## Hypotheses

- 1) Plant species will bloom in response to seasons (summer/spring/fall). These plants will be attractive to insects when blooming. Native plants will be more attractive to native pollinators, whereas introduced plants, such as *Taraxacum officinale*, will be attractive to pollinators in general.
- 2) At MSU, experiments will principally be conducted in bermudagrass, and not all plants from the candidate list (Table 1) will be able to overcome turfgrass competition. Established plots will be as attractive to pollinators as spontaneous areas.
- 3) A large number of stakeholders will be educated about the importance of pollinator conservation and BMPs. Educated stakeholders will be more accepting of biodiverse turfgrass lawns.

## Material and Methods

Experiments will take place in Starkville, MS, Athens, GA, and Auburn, AL. Selected plants from the candidate list (Table 1) will be prioritized; other forbs may be included.

- To meet objective 1 requirements, ten sites per state will be selected for evaluating each plant species listed. Blooming periodicity will be measured during weekly visits. Measurements will be made using common phenological endpoints (early, middle, and end bloom) by recognizing the different reproductive structures and what each stage looks like for all key species listed.
- Diversity of floral visitors will be sampled three times during bloom period of each forb species. Pollinating insects visiting flowers will be collected by selectively netting the first 50 flower-visiting pollinators within each experimental unit. Sampling will take place from 8:00 to 14:00 on sunny and clear days, in accordance with pollinator activity. Netted pollinators will be transferred to a killing jar and then to the lab for identification.
- Results will be used to determine the plants that will be tested for plant establishment in later studies. Plants will be transplanted according to their life cycle and will require approximately two years to establish.
- A stakeholder advisory panel has been formed. Stakeholder preference and receptiveness to the idea of biodiverse turfgrass and forb lawns will be measured.

## Expected Products

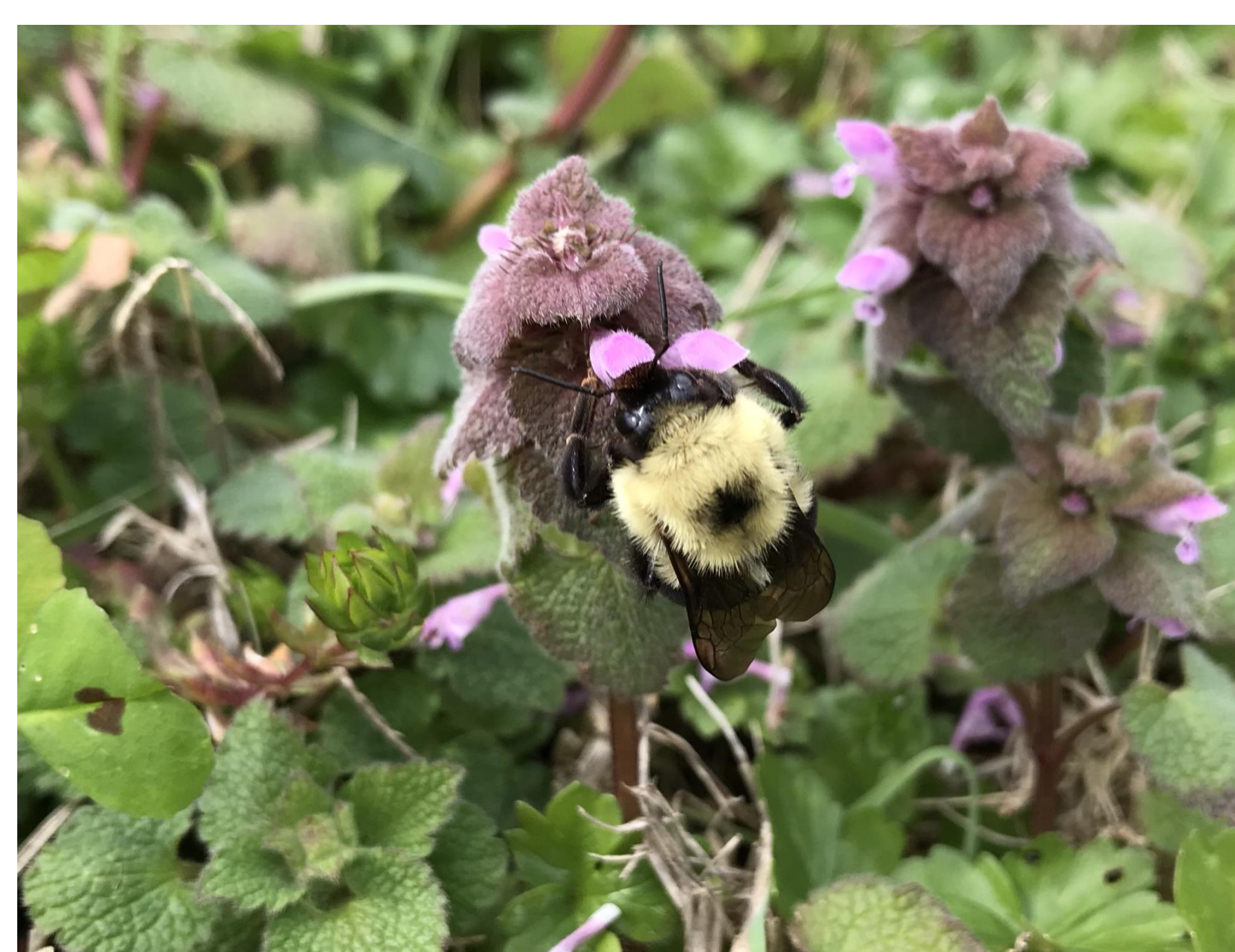
We expect to publish several research papers, generate best management practices (BMP) materials, organize field days, and develop meetings with stakeholders.



*Claytonia virginica*



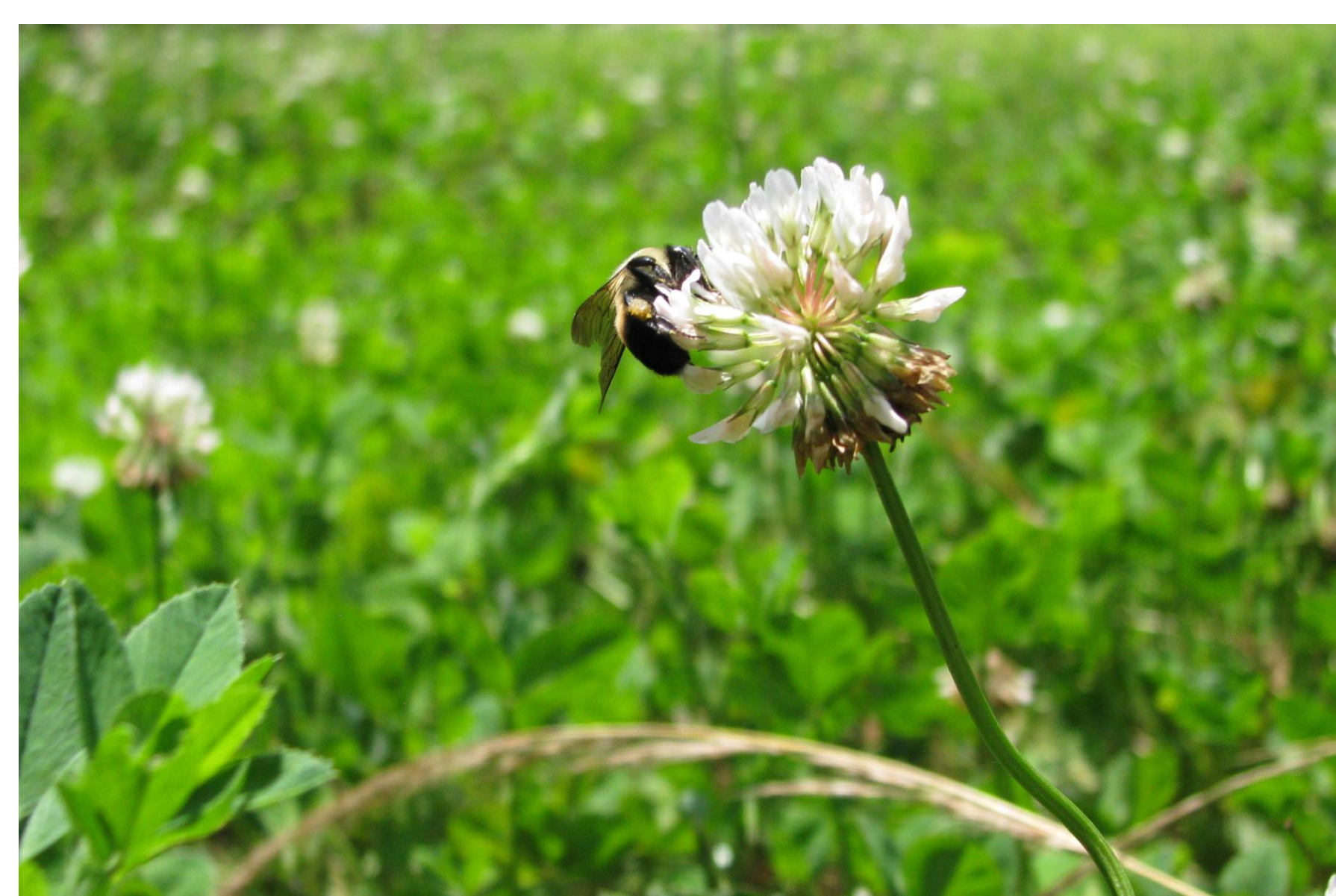
*Diodia virginiana*



*Lamium purpureum*



*Sisyrinchium rosulatum*



*Trifolium repens*

**Table 1. List of candidate non-traditional forbs commonly found in Mississippi, Georgia, and Alabama. Origin and naming conventions are based upon the United States Department of Agriculture Plants Database (USDA, 2021).**

Common name	Scientific name	Blooming	Origin	Propagation
Annual Blue-Eyed Grass	<i>Sisyrinchium rosulatum</i>	Winter/Spring	Native	seeds
Blue Violet	<i>Viola papilionacea</i>	Spring/Summer	Native	rhizome
Broadleaf Plantain	<i>Plantago major</i>	Spring/Summer	Introduced	seeds
Carolina desert-chicory	<i>Pyrrhopappus carolinianus</i>	Summer/Fall	Native	seeds
Common Lespedeza	<i>Kummerowia striata</i>	Spring/Summer	Introduced	seeds
Common Selfheal	<i>Prunella vulgaris</i>	Summer/Fall	Native	seeds, stolon, division
Crow Poison	<i>Nothoscordum bivalve</i>	Winter/Spring	Native	seeds
Cutleaf Evening Primrose	<i>Oenothera laciniata</i>	Spring/Summer	Native	seeds and roots
Dandelion	<i>Taraxacum officinale</i>	Winter/Spring	Disputed	seeds
Deadnettle	<i>Lamium purpureum</i>	Winter/Spring	Introduced	seeds
Hairy Buttercup	<i>Ranunculus sardous</i>	Winter/Spring	Introduced	seeds and stolons
Henbit	<i>Lamium amplexicaule</i>	Winter/Spring	Native	seeds
Lyreleaf Sage, Cancer Weed	<i>Salvia lyrata</i>	Spring/Summer	Native	seeds and root division
Persian Clover	<i>Trifolium resupinatum</i>	Winter/Spring	Introduced	seeds
Bulbous Buttercup	<i>Ranunculus bulbosus</i>	Spring/Summer	Introduced	seeds and bulbs
Slender Aster	<i>Eurybia compacta</i>	Fall/Winter	Native	seeds
Yard Aster	<i>Symphotrichum divaricatum</i>	Fall	Native	seeds
Spring Beauty	<i>Claytonia virginica</i>	Winter/Spring	Native	seeds and bulbs
Strawberry Clover	<i>Trifolium fragiferum</i>	Summer/Fall	Introduced	seeds
Summer Snowflake	<i>Leucojum aestivum</i>	Spring	Introduced	bulbs
Verbena	<i>Verbena canadensis</i>	Spring/Summer	Native	cuttings
Virginia Buttonweed	<i>Diodia virginiana</i>	Win/Spr/Fall	Native	seeds and roots
White Clover	<i>Trifolium repens</i>	Whole Year	Introduced	seeds
Wild Blue Violet	<i>Viola sororia</i>	Spring	Native	rhizomes

## Future Research

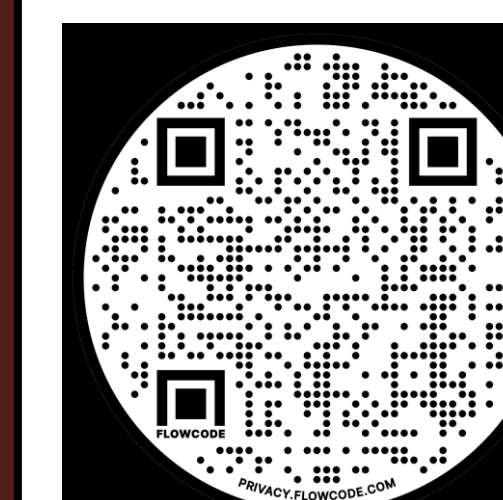
Homeowner acceptance of biodiverse lawns is a major challenge. Education regarding pollinator conservation and the importance of biodiversity are important components, but information regarding homeowner-friendly methods of lawn diversification is often lacking. Field-days, surveys, and educational material will be developed and delivered to the public. Future research should study the link between plant phenology and contributions to pollinators. Finally, there is a lack of research-based information regarding how non-traditional turfgrass composition could change as stands mature and whether populations are truly sustainable in the long term. The present work will provide references for further consideration of these questions.

## Literature Cited

- McCurdy, J. D., McElroy, J. S., Guertal, E. A., & Wood, C. W. (2014). White clover inclusion within a bermudagrass lawn: effects of supplemental nitrogen on botanical composition and nitrogen cycling. *Crop Science*, 54(4), 1796-1803.
- Smith, L. S., & Fellowes, M. D. (2015). The grass-free lawn: Floral performance and management implications. *Urban Forestry & Urban Greening*, 14(3), 490-499.
- USDA Plants Database. (2021). Available at: <https://plants.usda.gov/>.
- Wisdom, M. M., Richardson, M. D., Karcher, D. E., Steinkraus, D. C., & McDonald, G. V. (2019). Flowering persistence and pollinator attraction of early-spring bulbs in warm-season lawns. *HortScience*, 54(10), 1853-1859.

## For more information:

This work is supported by Agricultural and Food Research Initiative grant no. 2021-67013-34145 from the USDA National Institute of Food and Agriculture.



@RefugeLawn

refugelawn.com