Comparing Traditional Turfgrass Lawns with Native Lawns:

An Ecological and Economic Perspective

Project Report

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Agriculture and Life Sciences Field of Public Garden Leadership Concentration

By

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ABSTRACT

Urban landscapes across the United States have long been dominated by traditional turfgrass lawns, which are resource-intensive and offer limited ecological value (Milesi et al., 2005; Robbins & Birkenholtz, 2003). In contrast, native lawns—composed of regionally adapted, low-growing plant species—are gaining attention for their potential to enhance urban sustainability through improved biodiversity, water conservation, and ecosystem services (Tallamy, 2009; Nassauer et al., 2014). This project compares the ecological and economic impacts of traditional turfgrass lawns with native lawns, focusing on establishment and maintenance costs, biodiversity support, water use efficiency, carbon sequestration, and overall ecosystem health. A comparative analysis methodology was employed, integrating secondary data collection, cost comparison, and environmental impact assessment. Data were gathered from industry reports, environmental organizations, and a case study of the Cornell Botanic Gardens Native Lawn Demonstration Project to evaluate key indicators such as chemical inputs, maintenance requirements, and ecosystem services. While turfgrass lawns are often preferred for their aesthetic appeal and cultural familiarity, they are increasingly recognized as ecologically and economically unsustainable in many regions (Polsky et al., 2014). Results indicate that native lawns offer substantial long-term cost savings, greater biodiversity support, and reduced environmental harm due to lower chemical and water input requirements. By evaluating and comparing both systems, this study supports sustainable landscape design and urban planning and promote wider adoption of native lawns in residential and public spaces.

BIOGRAPHICAL SKETCH

Maia Tsignadze is originally from Telavi, Georgia, a country nestled in the Caucasus region where ancient traditions and ecological diversity intersect. From a young age, Maia was drawn to the natural world and the power of storytelling to spark change. Her early experiences exploring Georgia's mountainous landscapes and participating in civic youth programs laid the foundation for a lifelong commitment to community development and environmental justice.

Over the past 15 years, Maia has led more than thirty research and development initiatives across nine countries. She is the founder of the Georgian Ranger Association, an organization that fosters cross-border collaboration and conservation leadership. Through this and other roles, Maia has worked at the intersection of scientific research and traditional ecological knowledge, particularly in post-conflict and marginalized communities.

Maia holds a Master's degree in Management and completed a Master's program in Social and Political Sciences on full scholarships. Her research on municipal waste management in Georgia, Greece, and Azerbaijan earned her a top distinction and a financial award from the International Hellenic University. She has also been a Humphrey Fellow, further expanding her global policy and leadership skills.

At Cornell University, Maia is completing a Master of Professional Studies (MPS) in Public Garden Leadership. Her research focuses on ecological and economic comparisons of native lawns and traditional turfgrass, contributing to more sustainable urban landscaping practices. She has also contributed to projects like the Salamanca City Inventory and urban biodiversity initiatives through Cornell Botanic Gardens and Cornell Cooperative Extension.

Her field experience includes collaborations with Indigenous communities, such as the Seneca Nation, and comparative park research through Cornell's PACT Program. Maia's interdisciplinary approach integrates political economy, ethnographic fieldwork, and environmental governance to explore sustainable development from a decolonial lens.

In addition to her academic and professional pursuits, Maia is a writer and poet whose creative work highlights themes of environmental and social justice. She has received several national and international awards for her advocacy and writing.

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INTRODUCTION

Lawns are a widespread and iconic feature of urban and suburban landscapes across the United States, often seen as symbols of beauty, order, and care. However, traditional turfgrass lawns—typically composed of non-native grass species—require intensive maintenance, including frequent mowing, irrigation, and the use of fertilizers and pesticides, all in service of preserving a uniform, lush green grass monoculture appearance. These practices contribute to environmental challenges such as water overuse, pollution, greenhouse gas emissions, and biodiversity loss (Milesi et al., 2005; Robbins & Birkenholtz, 2003).

In response to growing concerns about climate change, ecological degradation, and unsustainable resource use, alternative lawn models are gaining momentum. One such approach is the native lawn—a designed plant community composed of regionally adapted, low-growing plant species that offer both functional and ecological benefits. Native lawns reduce the need for irrigation and chemical inputs, enhance habitat for pollinators and other wildlife, and improve the resilience of urban ecosystems (Tallamy, 2009; Native Plant Trust; T. Bittner, February 5, 2025).

This project compares the ecological and economic impacts of traditional turfgrass lawns and native lawns, focusing on key areas such as establishment and maintenance costs, biodiversity support, water use efficiency, carbon sequestration, and overall ecosystem health. By analyzing these factors, the study aims to support more sustainable landscaping decisions and encourage the integration of native lawns into urban planning and green infrastructure design.

KEY CONCEPTS

Definitions of Lawn Types

Lawns are an iconic feature of urban and suburban landscapes across the United States, reflecting cultural values of order, beauty, and responsible property care. Traditional turfgrass lawns—typically composed of a few non-native species such as Kentucky bluegrass or fescue in the Northeast, or Bermuda grass in southern states like Florida—have long been the standard for residential and public green spaces. However, these lawns come at a significant environmental cost, requiring frequent mowing, irrigation, fertilizer applications, and chemical treatments to maintain their aesthetic appeal (Milesi et al., 2005).

This study focuses primarily on lawn practices in the northeastern United States, where traditional cool-season turfgrasses are most common. Southern regions with warm-season grasses like Bermuda grass (e.g., Florida and Texas) are excluded from the analysis to allow for more consistent ecological comparisons.

As environmental awareness grows, and as people—both individually and collectively—confront the challenges of climate change, water scarcity, and biodiversity loss, alternative approaches to lawn design are gaining traction. These include native lawns, which prioritize regionally appropriate, low-maintenance species that support ecological health and reduce resource use.

One promising alternative is a native lawn—an ecologically grounded approach that incorporates regionally adapted native plant species into low-growing lawn settings. Unlike turfgrass, native lawns require minimal mowing, eliminate the need for fertilizers and pesticides, and provide essential habitat for pollinators and other wildlife (Tallamy, 2009; Native Plant Trust; T. Bittner, February 5, 2025). Native lawns also offer economic benefits by reducing long-term maintenance costs and water usage. This section introduces the defining characteristics of both traditional turfgrass lawns and native lawns, setting the stage for a deeper comparison of their ecological and economic implications.

Traditional Turfgrass Lawn

A traditional turfgrass lawn is a managed, uniform landscape primarily composed of non-native grass species such as Kentucky bluegrass (Poa pratensis), perennial ryegrass (Lolium perenne), or tall fescue (Festuca arundinacea). In the northeastern and midwestern United States, cool-season grasses are commonly used, while warm-season species, such as Bermuda grass, are often found in southern regions like Florida and Texas. These lawns require regular maintenance to retain their aesthetic appearance, including frequent mowing, irrigation, and treatment with fertilizers and pesticides (Beard & Green, 1994).

Turfgrass lawns are widely used not only in residential yards but also in parks, school grounds, corporate campuses, and golf courses (Milesi et al., 2005; Robbins & Birkenholtz, 2003). While they are culturally ingrained and aesthetically pleasing in many American communities, turfgrass lawns provide limited ecological value. They often result in habitat conversion, particularly in areas of new suburban development, where native vegetation is replaced by monoculture lawns (Smith & Fellowes, 2014). As a result, turfgrass lawns displace native plant communities and offer little habitat or food for local wildlife. These lawns are resource-intensive, requiring significant inputs of water, energy, and chemicals to maintain their lush green appearance (Polsky et al., 2014). Because of these factors, turfgrass contributes to biodiversity loss, water overuse, and chemical runoff into surrounding ecosystems (Milesi et al., 2005; Robbins & Birkenholtz, 2003).

Native Lawn

A native lawn is a low-maintenance, ecologically beneficial alternative composed of low-growing plant species native to a particular region. Designed to function similarly to a conventional lawn in appearance and usability, native lawns require significantly less water, eliminate the need for fertilizers and chemical pesticides, and require mowing only once or twice a year (T. Bittner, February 5, 2025; Prairie Moon Nursery, 2023). In addition to reducing maintenance costs and emissions, native lawns support pollinators and native wildlife, enhance soil health, and increase resilience to climate extremes. These native lawns align with sustainable design principles such as supporting local food webs, sequestering carbon, managing watersheds, and conserving native biodiversity. As outlined in Doug Tallamy's *Homegrown National Park* initiative, these principles provide a focused approach to ecological gardening that enhances ecosystem function and resilience, particularly in urban environments (Tallamy, n.d.) A native lawn is comprised of selectedplants but behaves like a natural plant community.

Alternative Terminology of Native Lawn in Media and Literature

While the term "native lawn" is becoming more commonly used in sustainability and landscape design conversations, similar or overlapping concepts appear in academic literature and popular media under a variety of names. These alternatives often reflect differences in regional emphasis, ecological function, or aesthetic goals, yet they share core values: reducing environmental impact, conserving water, and supporting biodiversity.

Native Turfgrass

The term native turfgrass refers to grass species native to a specific region that are suitable for use in lawn-like settings. Species such as Buffalo grass**,** Zoysia grass**,** and Fine fescue are valued for their high tolerance to environmental stressors such as drought and temperature extremes. These grasses require significantly less irrigation and fertilization once established, making them a practical solution for lawn managers aiming to reduce mowing frequency and minimize the ecological footprint of turf maintenance. "Native turfgrasses are highly important and valuable due to their higher tolerance to environmental stresses and the need for low maintenance." These lawns have been receiving more attention from lawn managers today. (Mirzaei & Esmaeili, 2024, p.157).

Wildflower Meadow

In some contexts, particularly where aesthetic diversity and pollinator support are prioritized, the concept of a wildflower meadow replaces that of a traditional lawn entirely. These landscapes require minimal mowing, no fertilization, and significantly increase biodiversity and ecosystem services such as carbon sequestration and air purification.

"Sustainable and nature-based wildflower meadow solutions exclude fertilization, weeding, and watering… and result in an increase in biodiversity in terms of plant and animal species…" (Bretzel et al., 2024, p. 1)

Native Grasslands

Unlike lawns, which are designed for recreational or ornamental use, native grasslands represent a functional and often conservation-focused land use. These ecosystems are dominated by indigenous grasses and forbs and serve as vital habitats for pollinators and grassland birds, especially in areas where development has fragmented natural landscapes. (Wildlife Habitat Council, 2018; U.S. Forest Service, n.d.; Modern Conservationist, 2019)

This landscape unit is comprised with the 'grasslands' where >50% of the vegetative ground cover is composed of indigenous species of grasses, grass like plants and/or forbs…" Are they functionally different? Do they look different than lawns (e.g. taller species); where are they used? (Alberta Environment and Parks, 2018) Native grasslands typically exhibit a more diverse and taller vegetation structure compared to manicured lawns. They consist of a variety of grasses and flowering plants, resulting in a natural, meadow-like appearance. This diversity not only enhances visual interest but also supports a wider range of wildlife. (USDA Farm Service Agency, 2011; Garden for Wildlife, 2023; Beautiful Hays County, 2023).

Native grasslands are utilized in various conservation and land management practices, including ecological restoration projects, urban green spaces, and roadside plantings. Their ability to support biodiversity and require less maintenance makes them a sustainable alternative to traditional landscaping. (Haddad et al., 2023; Land, 2022; Federal Highway Administration, 2007)

Native Grasses

The term native grasses refers to specific species such as Danthonia spicata, Danthonia compressa and Penstemon hirsutus rather than landscape systems. However, their use in restoration and landscaping has major implications for biodiversity. In some cases, their aggressive growth may lead to monocultures, highlighting the need for thoughtful management in native lawn design.

A study by Denton, Dumbeck, and Nash (2008) in wetland restoration contexts found that “the native grasses… were able to dominate plots in less than a decade,” warning that “without active management, our wetlands will lose species.” This suggests that even well-intentioned plantings of native species can lead to unintended monocultures, reinforcing the importance of ongoing care in native lawn design. “The native grasses… were able to dominate plots in less than a decade… This evidence suggests that, without active management, our wetlands will lose species…”*(Denton, Dumbeck, & Nash, 2008, Journal of Applied Ecology)*

Low-Growing Native Plants for Lawns

Definition:

Low-growing native plants suitable for lawns are indigenous grasses and forbs that naturally exhibit short growth habits or can tolerate regular mowing. These species are selected for their ability to create dense, turf-like ground cover, offering ecological benefits such as supporting local biodiversity, requiring minimal irrigation, and reducing the need for chemical inputs (Cornell Botanic Gardens, n.d.; Wild Seed Project, n.d.).

Regional Examples:

- Northeast & Midwest:
  - Fine Fescue (Festuca spp.) – Native grass known for shade tolerance and low maintenance. (University of Minnesota Extension, n.d.)
  - Common Blue Violet *(*Viola sororia*)* – Native forb that thrives in moist, shaded areas (Prairie Moon Nursery, n.d.)
- Great Plains:
  - Buffalograss (Bouteloua dactyloides) – Native warm-season grass, drought-tolerant, and forms a dense sod.
  - Blue Grama (Bouteloua gracilis) – Native grass with fine texture, suitable for low-maintenance lawns (High Country Gardens, n.d.).
- Pacific Northwest:
  - Tufted Hairgrass (Deschampsia cespitosa) – Native grass that tolerates moist conditions and partial shade.
  - Selfheal (Prunella vulgaris var. lanceolata) – Native forb with low-growing habit and purple flowers (Wild Seed Project, n.d.).
- Southwest:
  - Blue Grama (Bouteloua gracilis) – Also native to this region, suitable for arid conditions.
  - Frogfruit (Phyla nodiflora) – Native forb/groundcover that spreads rapidly and attracts pollinators (High Country Gardens, n.d.).

- Southeast:
  - Florida Gamagrass (Tripsacum floridanum) – Native grass adapted to the humid climate.
  - Frogfruit (Phyla nodiflora) – Also prevalent in this region, serving as a resilient groundcover (New York State DEC, n.d.).

Additional Terms

Several other labels are used interchangeably or in overlapping ways to refer to ecologically oriented lawn alternatives:

- Xeriscape Lawn – Designed to minimize water use, particularly in arid climates.
- Natural Lawn – Emphasizes a more organic, unmanaged aesthetic and ecological balance.
- Low-Maintenance Lawn – Focuses on reducing inputs like mowing, fertilization, and irrigation.
- Sustainable Lawn – A broad term capturing environmentally conscious lawn practices, often overlapping with native or natural lawns.
- Eco-Grass- A blend of fine-leaved fescue grasses that is the responsible alternative to an energy-intensive conventional turf lawn.
- prairie grasses- deep-rooted, drought-tolerant native grasses support biodiversity, soil health, and carbon storage (USDA NRCS, 2022).

ANALYSIS

Understanding public interest in native lawns is crucial to gauge the increasing demand for native species in landscape management, especially considering their ecological benefits, such as enhancing biodiversity, reducing water usage, and supporting carbon sequestration. As environmental awareness grows, the shift from traditional turfgrass to native lawns may be influenced by various factors, including increased concerns over climate change, water conservation, and sustainable land management. Analyzing trends across scholarly databases such as Google Scholar, Scopus, and Science Direct provided insight into how public and academic interest in native lawns has evolved in recent years (2019-2025).

In reviewing the number of articles and documents published over time, fluctuating interest in the topic was observed. From 2019 to 2024, Google Scholar results for "native lawn" articles have consistently been high, with 12,300 results in 2019, dipping slightly to 9,210 results in 2024. Scopus results, which indicate a more specific focus on scholarly publications, show a smaller increase, with 16 articles in 2019 and 17 in 2024. Similarly, Science Direct, which houses many academic journals, reflects an upward trend in the number of studies related to native lawns, with 393 results in 2019 and 643 in 2024. (Author's search, December 17 2024; see Appendix A for search terms and databases used).

In addition to scholarly databases, public media sources offer valuable insight into how native lawns are being discussed in broader society. A search conducted on National Public Radio (NPR)—a widely trusted American public broadcasting organization—provides a compelling lens into public interest and discourse. As of May 7, 2025, a search for the term "native lawn" yielded 12,582 results, while "native grasses" produced 1,004 results. These numbers reflect not only sustained media coverage but also a growing engagement with topics related to sustainable landscaping and ecological restoration. The significant number of mentions indicates that native lawns are gaining traction in public conversations, likely driven by increasing concerns about water conservation, climate resilience, and biodiversity loss. Public broadcasting platforms like NPR serve as intermediaries between academic research and public understanding, suggesting that the topic of native lawns is reaching a wider audience and contributing to a cultural shift in landscaping values (Author's search, May 2025).

To further explore public engagement with native lawns, searches were conducted across both hobbyist media and social media platforms. Fine Gardening, a magazine aimed at gardening enthusiasts and professionals, reflects a growing interest in native landscaping. As of May 7, 2025, the magazine's website returned 333 results for "native lawn", 681 results for "native grass", and 1,006 results for "native grasses". This suggests that native planting practices are gaining popularity not only among environmental advocates but also within the gardening community.

In addition, social media activity—particularly on Instagram—demonstrates a visual and participatory interest in native lawn practices. The hashtag #nativelawn yielded over 100 posts, while #nativelawnmanagement had over 500 posts. Broader terms such as #nativegrass and #nativegrasses were even more widely used, with over 5,000 and 13,600 posts respectively. These figures indicate that native lawns are not just an academic or policy issue but also a subject of growing grassroots enthusiasm and peer-to-peer knowledge sharing, especially in visually driven platforms like Instagram (Author's search, May 2025).

This growing number of publications suggests that there is an increasing interest in native lawns, indicating that both public and academic awareness is expanding. It is essential to track these trends to better understand the factors driving this shift, including the potential rise in demand for native species in landscaping, and the evolving relationship between sustainability and land management practices. By examining these trends, we can gain insights into the current state of native lawn adoption and its future trajectory, which is critical for making informed decisions in environmental policy and landscape management.

METHODOLOGY

This project employs a comparative analysis methodology to evaluate traditional turfgrass lawns versus native lawns from both ecological and economic perspectives. The study integrates secondary data analysis, cost comparison, and environmental impact assessment, structured as follows:

1. Data Collection

Data was sourced from reputable industry and environmental organizations, including Fixr (n.d.) and Angi (2025), for cost estimates of lawn fertilization and pest control. Search terms such as "cost of lawn fertilization," "pest control for lawns," and "traditional lawn care expenses" were used to locate relevant data. Environmental impact data was obtained from the National Wildlife Federation (2024), using search terms such as "synthetic lawn chemicals impact," "effects of pesticides on wildlife," and "lawn chemical runoff." These terms were essential in identifying sources that address both the economic and environmental dimensions of lawn care.

2. Cost Comparison Analysis

Cost data was collected for both traditional and native lawn care practices, focusing on:

- Fertilizer types and application costs (liquid vs. dry)
- Lawn care service pricing by area
- Pest control expenses by species and treatment type

This analysis compared the initial establishment and long-term maintenance costs of both lawn types to determine overall affordability and economic sustainability.

3. Environmental Impact Assessment

Environmental data were used to assess the ecological consequences of lawn fertilizers and pesticides commonly applied in traditional turfgrass maintenance. Impacts were analyzed across several categories:

- Insects' health (e.g., bees, butterflies)
- Aquatic ecosystems (due to runoff)
- Bird and mammal populations (including pets and humans)
- Long-term ecological effects, such as bioaccumulation and biodiversity loss

For native lawns, the reduced need for synthetic inputs was used as a baseline to model lowered environmental impact.

Comparative Evaluation Framework

To better understand the environmental and economic implications of different lawn types, a comparative matrix was developed to evaluate key characteristics of traditional turfgrass lawns versus native lawns. This framework provides a structured overview of the trade-offs and benefits associated with each approach and supports evidence-based recommendations for sustainable landscape management. The matrix includes the following evaluation criteria:

- Chemical Input and Toxicity (e.g., fertilizers, herbicides, pesticides)
- Maintenance Requirements (labor intensity, mowing frequency)
- Cost Over Time (installation, irrigation, maintenance)
- Biodiversity Support (habitat value for pollinators and other fauna)
- Water Usage and Runoff (irrigation needs, stormwater management)
- Ecosystem Services (e.g., pollination, carbon sequestration, soil health)

This comparative approach allows for a holistic assessment that highlights the long-term environmental and economic advantages of native lawns over conventional turfgrass systems.

Case Study Integration

The methodology includes a case study on Cornell Botanic Gardens Native Lawn Demonstration Project, which provides a practical example of native lawn implementation. Collected and observational data along with interpretive materials from the project were used to support the analysis and highlight educational and outreach components.

Ecological and Economic Impacts

Lawns are not just aesthetic features of the landscape—they play a significant role in shaping local ecology. The environmental costs and benefits of different lawn systems vary widely, especially when comparing traditional turfgrass lawns to native alternatives. This section outlines the ecological impacts of native lawns, focusing on biodiversity, water conservation, carbon sequestration, and real-world insights from the Cornell Botanic Gardens Native Lawn Demonstration Project.

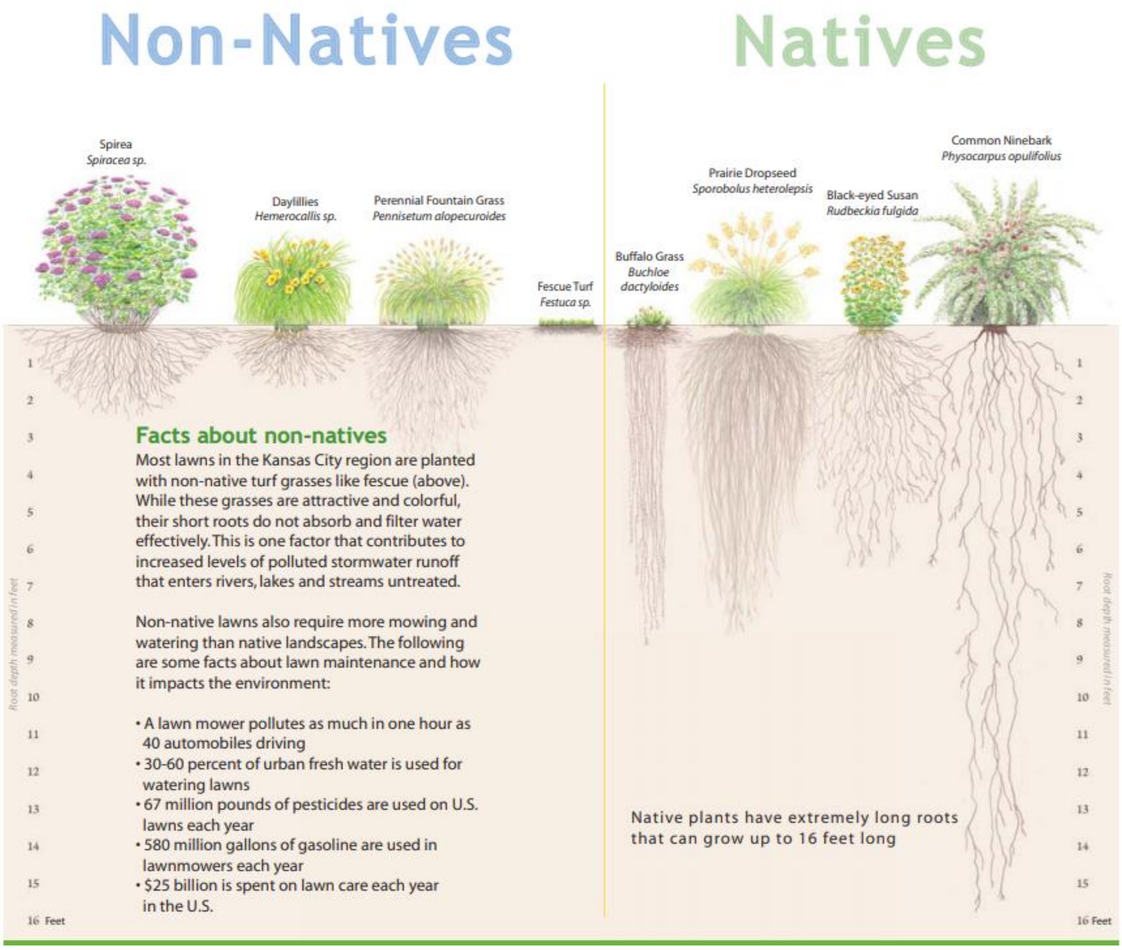
Biodiversity and Ecosystem Complexity

Native lawns, composed of regionally adapted plant species, offer a powerful and sustainable approach to enhancing biodiversity in urban and suburban landscapes. Unlike traditional turfgrass systems—typically composed of a single species and maintained through frequent mowing, watering, and chemical inputs—native lawns support species richness, diversity, and functional complexity, resulting in more resilient and self-sustaining ecosystems.

These diverse plant communities provide essential habitat for pollinators, herbivores, predators, and decomposers. Many native plants produce nectar, pollen, and seeds that serve as food for native birds, butterflies, bees, and other wildlife. In contrast, many horticultural varieties used in traditional landscaping offer limited ecological benefits and often require pest control to survive (Minnesota Department of Natural Resources, n.d.)

Native plants are well-adapted to local climate and soil conditions, with deep root systems that often extend up to 16 feet into the ground (see figure 1). These roots access groundwater during dry periods, enhancing drought resilience, and they also contribute to soil health by supporting beneficial microbial communities (Forsyth, 2024). Deep roots help improve soil structure and reduce erosion, especially on slopes and in areas prone to runoff.

Figure 1. Illustration by the U.S. Environmental Protection Agency (U.S. Environmental Protection Agency, n.d.) compares non-native and native plants highlighting the difference in root depth and environmental impact.



Moreover, native lawns encourage ecological complexity above and below ground. The upright growth of native grasses create microhabitats for insects to hide from predators and nest. Bunch grasses also provide essential nesting space for ground-nesting bees (U.S. Department of Agriculture Natural Resources Conservation Service, 2024) . Such structural diversity fosters natural pest control by attracting predatory insects and birds, reducing the need for chemical inputs (Garden Botany, 2024).

The biodiversity of native lawns also promotes ecosystem services such as pollination, nutrient cycling, and pest regulation. In the Native Lawn Demonstration Project at Cornell Botanic Gardens, for instance, researchers recorded an impressive diversity of life: 46 different insect species and families, including bees (*Anthophila*), aphids (*Aphididae*), ladybugs (*Coccinellidae*), leaf beetles (*Chrysomelidae*), grasshoppers (*Acrididae*), damselflies (*Coenagrionidae*), parasitic wasps (*Braconidae*), and various treehoppers and leafhoppers (Revised Gardens, Cornell Botanic Gardens, 2023) This richness of insects reflects the functional complexity of the habitat—pollinators, herbivores, decomposers, and predators interact within a balanced ecological web, creating a landscape that is ecologically sound and low-maintenance.

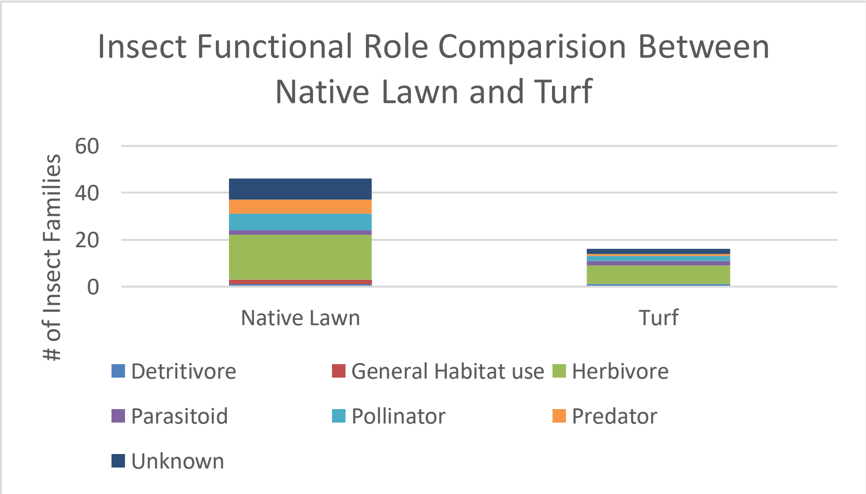
Studies and observations suggest that native lawns can host two to three times more insect species compared to conventional turfgrass, and that this diversity directly correlates with ecological resilience (Revised Gardens, Cornell Botanic Gardens, 2023) More diverse plantings support more complex insect communities, which in turn foster healthier food webs and greater resistance to environmental stresses.

Insect Survey Methods and Findings

The entomology survey was conducted by Cornell Botanic Gardens on July 25 and 26, 2023, to assess insect biodiversity in native versus conventional turfgrass lawns. Several undergraduate and graduate entomology students participated in sweep sampling using standard insect nets across both lawn types. Sampling occurred intermittently over several hours across the two days. Collected insects were euthanized using potassium cyanide kill jars and subsequently pinned or pointed for later identification. Specimens were initially identified to the family level before being submitted to the Cornell Insect Collection for further documentation. (F. R. Wesley, personal communication, May 5, 2025)

The results revealed a clear ecological advantage of native lawns over conventional turfgrass. Native lawns supported a much greater diversity and number of insects across nearly all functional roles—especially herbivores, pollinators, and predators. For example, native lawns hosted 19 herbivorous insect types compared to just 8 in turfgrass, and 7 pollinator types versus only 2 for turfgrass lawns (Figure 2). This functional richness reflects a more complex and resilient ecosystem, where multiple species contribute to pollination, pest control, and nutrient cycling. In contrast, turfgrass lawns provide minimal ecological value, often lacking the diversity needed to sustain healthy, balanced food webs. (Revised Gardens, Cornell Botanic Gardens, 2023) .

Figure 2. This figure summarizes the number of insect families observed in native lawn and conventional turfgrass plots, categorized by functional role. (Revised Gardens, Cornell Botanic Gardens, 2023)



By supporting a broad range of ecological functions and providing habitats for a wide variety of organisms, native lawns do more than beautify a landscape—they actively restore ecological integrity and foster sustainability in human-managed spaces.

In addition to root depth, leaf morphology—particularly leaf width—plays a crucial role in a plant's drought tolerance and water use efficiency**.** Native plants often feature narrow or finely divided leaves**,** which reduce surface area and transpiration, helping the plant conserve water in arid or variable climates. This trait makes them better suited to withstand climate extremes and prolonged dry periods, especially in regions increasingly affected by climate change (Sanderson et al., 2020; United States Department of Agriculture [USDA], 2018).

In contrast, many non-native turfgrasses and ornamental plants have broader, more luxuriant leaves that lose more moisture through transpiration. These plants often evolved in cooler, wetter environments and require more irrigation to remain healthy in drier or hotter climates (Smith & Dukes, 2013). Selecting drought-adapted plants with narrower leaves—often native to the region—can significantly reduce overall water consumption and maintenance needs**,** supporting climate-resilient landscaping (EPA, 2021).

Thus, leaf structure, in conjunction with root systems, is a critical component in sustainable landscape design, especially in the face of increasing climate variability.

Case Study: Cornell Botanic Gardens Native Lawn Demonstration Project

In 2009, Cornell Botanic Gardens initiated a transformative project to convert a standard non-native lawn into a sustainable, ecologically rich native lawn. The Native Lawn Demonstration Project created a low-maintenance, biodiverse alternative to conventional turf, while maintaining the usability and beauty expected of a lawn.

The planting design included 10 species of forbs and 11 species of grasses and sedges, chosen for their adaptability to various conditions (e.g., full sun to shade, mesic to dry soils). Over time, an additional 29 native species colonized the site naturally from the surrounding seed bank, highlighting the self-regenerative potential of native systems. Some standout species for dry, rocky, and poor soils, making them excellent choices for dry lawns with full sun or partial shade, include:

- Danthonia spicata (Poverty Oatgrass): This hardy grass thrives in dry, rocky, and nutrient-poor soils, making it perfect for areas with limited resources. Its drought tolerance and ability to stabilize soil with its fibrous root system help prevent erosion, especially in harsh environments. Poverty oatgrass is a low-maintenance option that performs well in both full sun and partial shade, offering environmental benefits while supporting wildlife (New Moon Nursery, n.d.; Nature Habitats, n.d.).
- Penstemon hirsutus (Hairy Beardtongue): Known for its striking purple flowers, this perennial is ideal for dry, well-drained soils like those found in rocky or sloped areas. It thrives in full sun or partial shade and is a valuable addition to landscapes because it attracts pollinators, particularly bees and hummingbirds. Its adaptability to poor soils and minimal water needs make it an excellent choice for sustainable, low-maintenance gardening (Gardenia.net, n.d.; New Moon Nursery, n.d.).
- Lobelia siphilitica (Great Blue Lobelia): Great Blue Lobelia is a versatile perennial that tolerates both dry and slightly moister conditions once established. Its vibrant blue flowers create a stunning visual display and provide vital nectar to pollinators like bees and butterflies. Preferring full sun to partial shade, it's a great option for adding color and biodiversity to dry lawns and areas with varying moisture levels (Growers Outlet, n.d.; Plant Care Today, n.d.).

Beyond the plant palette, the lawn has become a habitat for over 46 insect species, including:

- Bees (*Anthophila*)
- Grasshoppers (*Acrididae*)
- Ladybugs (*Coccinellidae*)
- Parasitic wasps (*Braconidae*)
- Leafhoppers (*Cicadellidae*)

These species fulfill various ecological roles—pollination, herbivory, predation, and decomposition—contributing to a complex and resilient food web. Compared to turfgrass systems, the native lawn demonstrated roughly three times greater insect species richness and ecological complexity.

Estimated Water Use for Native Lawn at Cornell Botanic Gardens (Summer 2024)

Water use for Native Lawn 2.0 was estimated using irrigation duration, hose flow rate, and watering frequency for an area of 5000 square feet.. The system operated for a potential span of 107 days (from approximately May 15th to August 30th), with a scheduled watering duration of 20 minutes per day. Accounting for days skipped due to rainfall, the effective watering frequency is estimated at 75%. Hose pressure was estimated to range between 9 and 17 gallons per minute, with the higher end likely due to a connection to a fire hydrant. Based on these variables, total water use is estimated between 14,445 gallons (low-end) and 36,380 gallons (high-end). These figures (Table 1) offer a basis for comparison with traditional lawn irrigation practices.(A. Bowe, May 12, 2025).

Table.1. The table shows estimated water usage for Native Lawn irrigation at Cornell Botanic Gardens. (A. Bowe, May 12, 2025)

Estimate type	Watering frequency	Hose pressure (GPM)	Duration (minutes/day)	Total days	Estimated gallons used
High-end	100% daily	17	20	107	36,380
Low-end	7% of days	9	20	80	14,445

Water Conservation

Traditional turfgrass lawns require high volumes of water, especially in summer, due to their shallow root systems and non-native species composition. In contrast, native lawns are designed for low water input. Their deep roots reduce evaporation, enhance soil water retention, and often eliminate the need for irrigation after establishment. (Northern Water, n.d.; Cornell Botanic Gardens, n.d.)

This not only conserves a critical resource but also reduces the environmental costs of lawn maintenance (e.g., energy for pumping, chemical runoff from overwatering).

Native Lawns

Native grasses are adapted to local climate and soil conditions, which makes them significantly more water-efficient than non-native turfgrass varieties. These grasses are drought-tolerant and can thrive with minimal watering once established, making them ideal for sustainable landscaping.

Key Benefits of native plants:

- Drought Tolerance: Native plants are naturally suited to local weather patterns and soil, requiring far less irrigation to survive and thrive (EPA, 2024a).
- Lower Water Needs**:** After the establishment phase (typically 1–2 years), native lawns require no water (EPA, 2024a; Cornell CALS, 2024).
- Reduced Maintenance**:** Native lawns often require less mowing, fertilization, and irrigation, which reduces total water use and runoff pollution (Cornell CALS, 2024).

Examples of Drought-Tolerant Native Grasses:

- Buffalo grass (*Buchloë dactyloides*) – Great Plains region
- Blue grama (*Bouteloua gracilis*) – Western and Southwestern U.S.
- Fine fescues (*Festuca spp.*) – Northeastern U.S.
- Zoysia (*Zoysia spp.*) – Southeast and transition zones

Turfgrass Lawns

Conventional turfgrass lawns—particularly those composed of Kentucky bluegrass, ryegrass, or tall fescue—were selected for visual appeal, not water efficiency. These lawns typically require frequent irrigation, especially in hot or dry climates.

Key Concerns of turfgrass:

- High Water Demand: Turfgrass generally needs 1 to 1.5 inches of water (including rainfall) per week during the growing season—roughly 27,000 to 40,000 gallons per year for a 1,000-square-foot lawn (EPA, 2024a).
- Climate Sensitivity: Water usage increases dramatically in arid or drought-prone areas, especially for high-maintenance species like Kentucky bluegrass (EPA, 2024b).
- Nutrient and Pesticide Dependence: These lawns often require fertilizers and pesticides, which further increase the water footprint due to runoff and soil chemical cycling (FAO, 2017).

Estimating Water Usage

For Native Lawns**:**

- Estimated first year water usage**:** ~5,000 to 10,000 gallons per 1,000 square feet (EPA, 2024a; Cornell CALS, 2024; Lipford & Perry, 2025)

For Turfgrass Lawns**:**

- Estimated annual water usage**:** ~27,000 to 40,000 gallons per 1,000 square feet under average temperate conditions (EPA, 2024a; EPA, 2024b).
- In hot/dry regions, this could increase significantly depending on turf type and irrigation system.

Additional Considerations

- Irrigation Method: Sprinklers can lose 30–50% of water to evaporation, especially in hot climates. Drip irrigation or manual watering is more efficient (EPA, 2024a).
- Maintenance Practices: Over-fertilization and mowing increase water demand and runoff. Native lawns typically need less of both, conserving water and reducing pollution (FAO, 2017).

Tools for Estimation

- EPA WaterSense Tools: Offers water budget calculators and landscaping guidelines (EPA, 2024a).
- Local Utility Tools: Some water utilities provide online calculators to estimate irrigation needs by location and lawn type.
- University Guidelines: Many land-grant universities provide region-specific lawn care and water management guidance.

Summary:

Choosing native grasses can cut water usage by more than half and reduce maintenance burdens. This makes native lawns a crucial tool in sustainable urban design, especially in drought-prone areas (Table 2).

Table 2. Summary of lawn type, estimated water use, maintenance and climate resilience.

Lawn Type	Estimated Water Use (1,000 sq ft/year)	Maintenance & Climate Resilience
Native Lawns	~5,000–10,000 gallons	Low input, drought-tolerant
Turfgrass Lawns	~27,000–40,000+ gallons	High input, sensitive to drought

Carbon Sequestration

Native lawns outperform traditional turfgrass in sequestering carbon, thanks to their deep-rooted and dense vegetation structure. Through photosynthesis, native plants absorb atmospheric CO_2, convert it into biomass, and deposit a significant portion into the soil via their roots. This process feeds microbial communities and enhances soil structure and carbon storage. (Minnesota Board of Water and Soil Resources, n.d.; Natural Communities, n.d.)

In contrast, turfgrass lawns—mown frequently and reliant on synthetic inputs—store less carbon and can even contribute to emissions due to the use of gas-powered mowers, fertilizer production, and irrigation, which requires energy for water extraction, treatment, and distribution, often powered by fossil fuels. (Trumbore et al., 2007; American University Kogod School of Business, 2023; U.S. Environmental Protection Agency [EPA], 2021).

Native plants, particularly prairie grasses, are highly effective at capturing and storing carbon in both their root systems and surrounding soils. Research shows that 43,560 sq ft (one acre)of restored prairie can sequester approximately 1 ton of carbon per year**,** primarily through deep root systems that continually grow and die, converting atmospheric carbon into stable organic matter (University of Minnesota, n.d.; Jungers, n.d.). In more actively managed systems, such as restored prairies under adaptive multi-paddock grazing (define what this is), carbon storage can increase to 3–5 tons per 43, 560 sq. ft annually (Apfelbaum, n.d.). How do native lawn species compare to prarie grasses – do you have any citations about their ability to sequester carbon at near or similar rates?

Native lawns, particularly those composed of deep-rooted prairie grasses, demonstrate a notable capacity for carbon sequestration, though their rates may vary compared to restored prairie systems. While specific data on native lawn carbon sequestration rates are limited, studies on turfgrass and prairie systems provide insight into their potential. Research indicates that turfgrass lawns can sequester between 200 and 1,800 pounds of carbon per acre annually, depending on management practices and environmental conditions (The Lawn Institute, n.d.). In contrast, restored prairie ecosystems have been shown to sequester approximately 0.3 to 1.7 metric tons of carbon per acre per year (Tallgrass Ontario, n.d.). The higher sequestration rates in prairies are largely attributed to the extensive root systems of native grasses, which can extend up to 15 feet deep, depositing carbon into deeper soil layers and contributing to more stable carbon pools (Minnesota Board of Water and Soil Resources, n.d.). Therefore, while native lawns may not match the carbon sequestration rates of fully restored prairies, they still offer a significant improvement over traditional turfgrass lawns, especially when composed of diverse, deep-rooted native species. Incorporating such species into lawn design can enhance carbon storage, support biodiversity, and contribute to climate change mitigation efforts.

In contrast, non-native plants, including many turfgrasses and trees planted outside their natural range, typically have shallow root systems and lower resilience to local soil and climate conditions. These traits limit their ability to sequester carbon effectively and, in some cases, can even lead to soil carbon loss—especially when afforestation occurs in ecosystems historically dominated by grasslands (Apfelbaum, n.d.). Additionally, non-native turfgrass lawns often require soil disturbance for maintenance, which can release stored carbon into the atmosphere.

The structure and diversity of native plant communities, such as prairies, allow them to maintain productivity under a range of climate extremes, making them a more resilient and long-term solution for carbon storage. Scientific evidence increasingly supports restoring native grasslands and wetlands as one of the most cost-effective and scalable strategies for mitigating climate change (Apfelbaum, n.d.; Jungers, n.d.).

Maintenance costs

When comparing the maintenance costs of turfgrass lawns to native lawns, one significant difference is the frequency of mowing. Turfgrass lawns, particularly those planted with non-native grasses like Kentucky bluegrass, often require regular mowing throughout the growing season to maintain their lush appearance. On average, homeowners mow their lawns approximately 30 times per year, depending on climate, growth rates, and the type of grass. This frequent mowing adds up, with professional services typically costing between $50 and $205 per visit (Hoffman, 2024, Noel, 2023).

In contrast, native lawns—composed of regionally adapted grasses—require far less maintenance. Many native species, such as Buffalo grass and blue grama, grow slower and naturally stay shorter, often needing only one or two mowings per year. This reduction in mowing frequency significantly lowers ongoing maintenance costs.

- Turfgrass Lawn Mowing: $50–$205 per visit (typically 30 mowings per year) - $1500 - $6150/year
- Native Lawn Mowing: $50–$150 for occasional mowing (1–2 times per year) -$100-$300/year

This reduced need for mowing and other intensive maintenance tasks underscores one of the many ecological and financial benefits of native lawns, making them an appealing option for homeowners looking to minimize both costs and negative environmental impact.

Environmental Impact and Cost of Gasoline Lawn Mowers

Gasoline-powered lawn mowers significantly contribute to air pollution and environmental degradation. These mowers emit pollutants such as carbon monoxide, volatile organic compounds (VOCs), nitrogen oxides, and particulate matter, which can harm human health and the environment. (Banks & McConnell, 2015).

Air Pollution and Health Impacts

The U.S. Environmental Protection Agency (EPA) estimates that operating a new gasoline-powered lawn mower for one hour produces the same amount of volatile organic compounds and nitrogen oxides as driving a new car 45 miles. Collectively, garden equipment engines account for up to 5% of the nation's air pollution . (New Hampshire Department of Environmental Services [NHDES], 2020).

These emissions contribute to the formation of ground-level ozone, leading to smog and haze, which can cause respiratory diseases, cardiovascular issues, and other health problems. Additionally, over 17 million gallons of gasoline are spilled annually during refueling, posing risks to groundwater and ecosystems . (New Hampshire Department of Environmental Services [NHDES], 2020).

Increased Fuel Costs

Gasoline-powered lawn mowers require regular fuel purchases, adding to the cost of lawn maintenance. The price of gasoline fluctuates, and frequent refueling can lead to higher expenses over time.

Introduction to Fertilization and Pest Control Practices for Lawns

Every year, U.S. homeowners apply an estimated 80 million pounds of pesticide active ingredients (Pesticide Action & Agroecology Network)and 45 billion pounds of fertilizers (Statista, 2023) to their lawns and gardens.

Fertilization and pest control practices are considered vital in ensuring the proper growth and development of lawn. However, the approach varies significantly between native lawns and turfgrass lawns. While turfgrass lawns often require regular fertilization and pest management to thrive, native lawns, generally need less intervention.

This comparison highlights the differences between organic and synthetic fertilizers and pesticides, the cost analysis of maintaining native and turfgrass lawns, and the environmental impacts of these practices. Moreover, it sheds light on the sustainability of each approach, taking into account both the economic and ecological aspects of lawn care (University of Minnesota Extension, n.d.).

Native Lawns

Native lawns are designed to mimic local ecosystems, offering numerous benefits, including water conservation and habitat preservation. One of the most significant advantages of native lawns is that they require little to no fertilization or pesticide application. Native grass species are adapted to local soil conditions, reducing the need for external nutrient inputs (Cornell Botanic Gardens, n.d.). Furthermore, native lawns are resilient to pests, diseases, and drought, meaning they rarely require pesticides or synthetic fertilizers. This approach results in lower greenhouse gas emissions, reduced runoff, and minimal environmental impact. Unwanted or invasive plant species are typically removed by hand, eliminating the need for chemical herbicides and further supporting the lawn’s ecological sustainability.

Benefits of Native Lawns:

- No fertilizer needed
- No pesticides required

(Cornell Botanic Gardens, n.d.)

Turfgrass Lawns

Turfgrass lawns, while commonly found in residential and commercial properties, require regular fertilization and pest management to maintain healthy growth. Fertilizers can either be organic or synthetic, with each having its own set of benefits and drawbacks.

1. Organic Fertilizers

   Organic fertilizers, such as compost, compost tea, bone meal, and fish emulsion, offer a slow-release source of nutrients for turfgrass lawns (EPA, n.d.). These fertilizers are generally more environmentally friendly, improving soil structure and increasing microbial activity in the soil. Organic fertilizers also have a lower risk of water contamination due to nutrient runoff, which can be a significant issue with synthetic fertilizers. The primary drawback is that they often require more frequent application, generally once or twice a year, particularly in the spring and fall (University of California Agriculture and Natural Resources, n.d.).
2. Synthetic Fertilizers

   Synthetic fertilizers are commonly used for turfgrass lawns due to their fast-acting nature and ability to quickly address nutrient deficiencies. These fertilizers are typically applied based on soil test results and local guidelines, which recommend applying 1 to 2 pounds of nitrogen per 1,000 square feet annually (Penn State Extension, n.d.). Synthetic fertilizers are often balanced in their nitrogen-phosphorus-potassium (NPK) ratios, making them versatile for a variety of soil types. However, they are more prone to causing nutrient runoff, which can lead to water pollution and harm beneficial soil organisms if over-applied (University of Minnesota Extension, n.d.).

Fertilization Frequency for Turfgrass Lawns

- Organic fertilizers should be applied once or twice a year in spring and fall.

- Synthetic fertilizers should be used according to soil test results and local guidelines.

Pesticides

Pesticides are chemical constituents used to prevent or control pests, including insects, rodents, fungi, weeds, and other unwanted organisms (Ahmad et al., 2024).

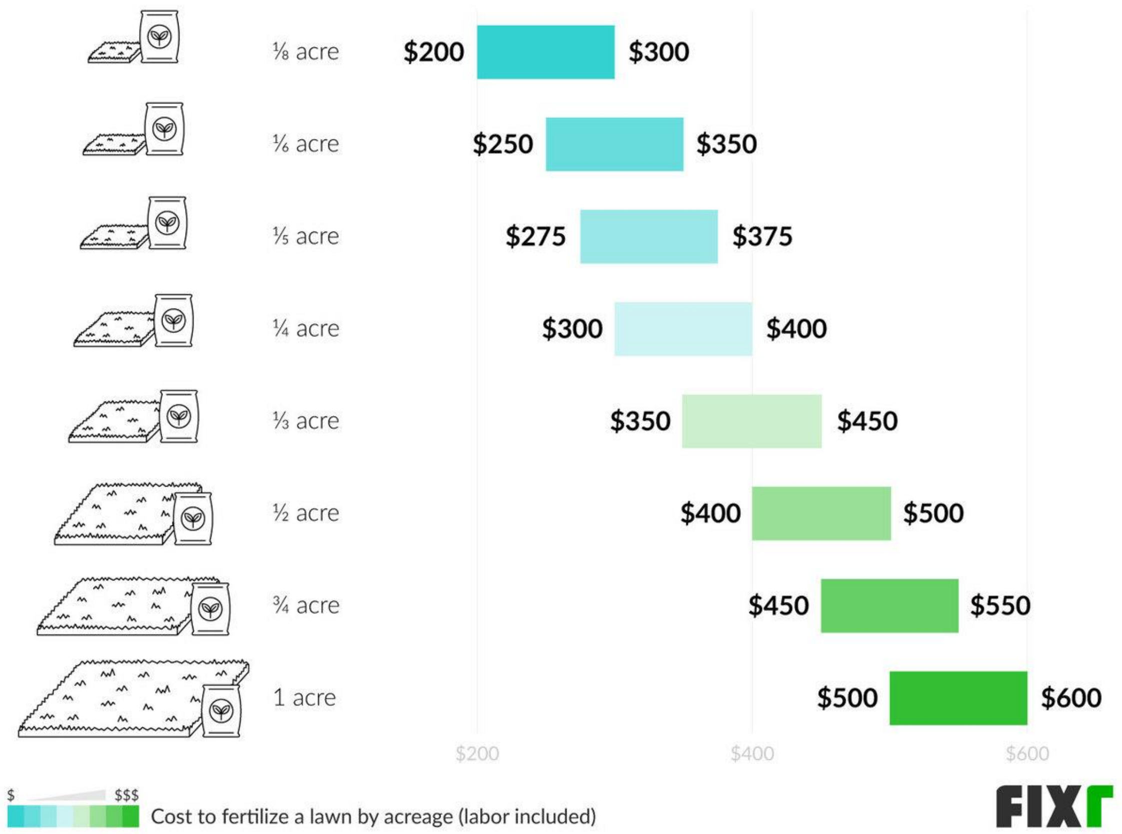
Pesticides are classified based on the types of pests they target. These classifications include herbicides, which control unwanted vegetation, and insecticides, which are used to prevent or kill insects. Rodenticides target rodents, while fungicides and bactericides help control harmful fungi and bacteria. Other types of pesticides include acaricides, which kill mites, and algaecides, used to prevent algae growth. Silvicides are applied to manage woody vegetation, and larvicides prevent the growth of larvae. Ovicides target eggs, and nematicides control plant-parasitic nematodes. Piscicides act against fish, and desiccants work by drying out plant tissues. Finally, termiticides are specifically designed to eliminate termites (Ahmad et al., 2024) .

Cost Analysis

Fertilizer has a wide range of costs depending on how many square feet it needs to cover, fertilizer type, what it is designed to do, and whether it is synthetic or organic.

According to the FIXRwebsite (Fixr, n.d.) that provides cost guides, pricing information, and estimates for various home improvement services, including lawn care, remodeling, and maintenance, many landscapers offer discounts if you sign up for regular services (Figure 3). This includes having your lawn fertilized up to 10 times a year at roughly $50 to $100 a visit for a total yearly price of $500 to $1,000. The discounts typically allow you to spend 10% to 25% less than you would with single fertilization services. Other annual packages are available as well through lawn care companies. In some cases, landscapers provide packages that include fertilization and other lawn care services, such as aeration, grub control, and dethatching.

Figure 3. This graph shows the cost to fertilize a lawn based on acreage, ranging from $200 to $600, with smaller lawns (1/8 acre= 5,445 square feet) costing around $200 and larger lawns (up to 1 acre=43,560 sq. Ft.reaching up to $600. The cost increases with lawn size due to the additional fertilizer, labor, and equipment required, and larger lawns are often more economical per acre. (Fixr, n.d.)



The cost of fertilizer even differs between liquid and dry options. On average, liquid fertilizers range from $150 to $600 to cover a 1/4 acre of lawn, while dry fertilizers typically cost between $100 and $400, including both the product and labor for application. Generally, liquid fertilizers tend to be more expensive than dry fertilizers, although the specific price can vary depending on the type of product. For example, a liquid synthetic fertilizer may cost less than a dry organic fertilizer due to differences in the materials used (Fixr, n.d.).

Lawn Treatment Costs by Company

The three leading companies offering lawn fertilization services typically charge between $300 and $800 for a lawn that measures 10,900 sq. ft., depending on factors like the size of the lawn and the materials used (Figure 4). While several well-established companies provide lawn fertilization, these are the most commonly chosen by homeowners for this type of work. Each company has its own unique materials or techniques, pricing structures, and other factors to consider. In the following table and sections, we'll examine the average costs of these services, what's included, and other key details to keep in mind.

Figure 4. This figure shows the cost of lawn treatment per application in three leading companies offering lawn fertilization services. Labor is included in price. (Fixr, n.d.).

Each type of pesky pest requires different labor and materials to help you bid them farewell, so each costs a different amount. For example, bed bugs can cost up to $6,000 (on the high end) to eliminate so you can sleep easy again, while eradicating ants typically costs $500 or less.

Here are some average ranges for pest control costs by critter type.

- Cost to exterminate ants: $100–$500
- Cost to exterminate fleas: $100–$400
- Cost to exterminate cockroaches: $100–$600

- Cost to exterminate rodents: $180–$600
- Cost to exterminate wasps: $300–$700
- Cost to remove mosquitoes: $350–$500
- Cost to eliminate termites: $250–$1,000
- Cost to exterminate spiders: $100–$500

  (Angi, 2025).

The Environmental Impact of Lawn Fertilizers and Pesticides vs. Not Using Lawn Fertilizers

Lawn fertilizers are widely used in residential and commercial landscaping to maintain lush, green, and healthy grass. However, their widespread use raises significant environmental concerns. Fertilizers are essential for promoting grass growth, but when misapplied or overused, they can lead to numerous ecological problems. This section explores the environmental impacts of using lawn fertilizers versus not using them, examining their effects on water quality, air quality, soil health, and broader ecosystem functioning.

Impacts on Insect Pollinators

Pollinators are among the most intensively affected by lawn chemicals, with bees being particularly vulnerable. This is because most insecticides are broad-spectrum, meaning they don't target a specific type of insect and instead affect any insect it comes in contact with. Chemicals such as neonicotinoids and pyrethroids commonly found in pesticides can disrupt bee learning and navigation and weaken their immune systems, causing death and reducing populations. In addition, growth-regulating herbicides such as aryl triazinones and acetolactate synthase inhibitors can destroy the plants that pollinators—especially caterpillars of butterflies and moths— need to feed on. This greatly diminishes the availability of host plants where adults can lay eggs, severely disrupting their life cycles. (National Wildlife Federation, 2024)

Consequences for Aquatic Wildlife

The impact of lawn care products extends beyond our gardens and into our waterways. Runoff from rainfall, which has been worsened by climate change in some areas, can carry herbicides and insecticides into streams, rivers, and lakes, contaminating them. Organophosphate insecticides, phenoxy and benzoic acid herbicides, and triazole fungicides are all highly toxic to fish and can degrade or even completely destroy aquatic ecosystem health. Similarly, pyrethroids, while less likely to leach into waterways, can still be found in significant quantities in many water bodies, where they are highly toxic to invertebrates. (National Wildlife Federation, 2024)

Effects on Birds

Birds have not been spared from the effects of these chemicals. Many birds are poisoned and killed by eating contaminated insects or plants treated with pesticides. Beyond acute poisoning, substances like historically used organochlorines (such as DDT) are known for causing long-term reproductive damage, including eggshell thinning, which can lead to population declines and possibly even extinction. Because 96% of terrestrial birds require insects to feel their young, both insecticides and herbicides can drastically reduce the amount of food available to birds in spring. (National Wildlife Federation, 2024)

Pets, Humans, and other Mammals

Mammals, including beloved cats and dogs, encounter similar risks from lawn chemical exposure. Rodenticides and herbicides are toxic if ingested. For instance, pets and wildlife roaming free on treated lawns can absorb chemicals through their paws or ingest them while grooming. Pyrethroids in particular can cause infertility, damage to immune systems, and cardiac disease in humans. Even some ‘mammal-safe’ pesticides, such as triazoles, can ultimately break down into compounds that become toxic to mammals. Pesticide exposure is linked to severe health issues including cancer—for wild mammals, pets, and humans alike. (National Wildlife Federation, 2024)

Long-term Ecological Impacts

On a larger scale, the widespread use of lawn chemicals significantly impacts local biodiversity. By eliminating crucial species within an ecosystem, these chemicals disrupt ecological balance and stability. The phenomenon of bioaccumulation and biomagnification—wherein chemicals are passed down from prey to predator and effects are worsened further along the food chain—means that these chemicals can remain active in the environment for decades. This has been the case for DDT, which was banned in the U.S. in 1972 and is still found in animal tissue over 50 years later. (National Wildlife Federation, 2024)

Toxicity of Common Lawn and Garden Chemicals

It's vital to understand the environmental impacts of the myriad of synthetic lawn care products available on the market. See Table 1 which summarizes some of the most commonly used products, highlighting their active ingredients and the non-target wildlife/systems they are toxic to. (National Wildlife Federation, 2024)

Table 2. National Wildlife Federation (2024) summary of commonly used products and their active ingredients and toxicity.

Pesticide Type	Common Brands	Active Ingredients	Classifications	Non-Targeted Organisms and Systems Affected
Insecticide	Spectracide Triazicide Insect Killer	Gamma-cyhalothrin	Pyrethroid	Highly toxic to mammals, bees, and aquatic organisms. Moderately toxic to birds.
Insecticide	Bonide Insect & Grub Control Granules	Imidacloprid, Lambda-cyhalothrin	Neonicotinoid, Pyrethroid	Birds, aquatic organisms, bees, and fish.
Insecticide	BioAdvanced Complete Insect Killer	Imidacloprid, Beta-cyfluthrin	Neonicotinoid, Pyrethroid	Birds, aquatic organisms, bees, and fish.
Insecticide	Ortho Bug B Gon	Bifenthrin	Pyrethroid	Fish, aquatic organisms, birds, and mammals
Herbicide	Roundup	Glyphosate, POEA surfactant	Glyphosate	Aquatic organisms and bees.
Herbicide	Roundup for Lawns (Northern version)	MCPA, Dicamba, Sulfentrazone, Quinclorac	Benzoic Acid, Aryl Trianone, Acetolactate Synthase Inhibitor	Birds, aquatic organisms, bees, and mammals. Leaches into groundwater.
Herbicide	Roundup for Lawns (Southern version)	Sulfentrazone, Dicamba, 2,4-D, Penoxsulam	Benzoic Acid, Aryl Trianone, Phenoxy Acid, Acetolactate Synthase Inhibitor	Birds, aquatic organisms, bees, and mammals. Slightly toxic to crustaceans
Herbicide	Ortho Weed B Gon	Dicamba, 2,4-D	Benzoic Acid, Phenoxy Acid	Birds, aquatic organisms, bees, and mammals. Leaches into groundwater
Herbicide	Bayer Advanced Weed Killer for Lawns	MCPA, Dicamba	Phenoxy Acid, Benzoic Acid	Birds, aquatic organisms, bees, and mammals. Leaches into groundwater
Herbicide	Bonide Weed Beater Plus	Dicamba, 2,4-D	Benzoic Acid, Phenoxy Acid	Birds, aquatic organisms, bees, and mammals. Leaches into groundwater
Fungicide	BioAdvanced Fungus Control	Propiconazole	Triazole	Fish. Has synergistic effects with neonicotinoids harming bees
Fungicide	Spectracide Immunox Multi-purpose Fungicide	Myclobutanil	Triazole	Toxic to aquatic organisms. Leaches into groundwater

CONCLUSION

In conclusion, the decision to switch from traditional turfgrass lawns to native lawns offers numerous ecological, financial, and environmental benefits. This shift represents a significant step towards sustainability, fostering an environment where biodiversity, water conservation, and chemical reduction are prioritized.

Environmental and Ecological Benefits:

Native lawns provide a much-needed refuge for local wildlife, especially pollinators like bees and butterflies. These ecosystems thrive because native plants support their life cycles and offer food sources that non-native species cannot. In contrast, traditional turfgrass lawns provide limited ecological value, often requiring harmful pesticides and fertilizers that contribute to the decline of local biodiversity. Furthermore, native lawns are a natural solution to the growing concerns over chemical runoff, which can pollute water bodies and disrupt aquatic ecosystems. By reducing the need for fertilizers and pesticides, native lawns reduce the toxicity of our waterways and soil.

Cost Efficiency:

Although the initial costs of establishing a native lawn may be higher, the long-term savings are substantial. Reduced watering needs, fewer chemical inputs, and less frequent mowing not only save homeowners money but also lessen their environmental footprint. The reduced need for lawn care services directly translates into lower overall maintenance costs. Over time, these financial savings, coupled with the environmental benefits, make native lawns an economically viable and sustainable choice for homeowners.

Water Conservation:

Water usage remains one of the most critical concerns in lawn care. Native lawns, once established, require significantly less water than traditional turfgrass. This is particularly important in areas experiencing water scarcity. Additionally, native lawns help improve stormwater retention and reduce runoff, which is a growing concern as climate change increases the frequency and intensity of rainfall. These ecological benefits contribute to mitigating the effects of climate change, further supporting the case for native lawn adoption.

Biodiversity and Ecosystem Support:

The importance of biodiversity cannot be overstated. By supporting a wide variety of plant and animal species, native lawns play an essential role in maintaining healthy ecosystems. In contrast, traditional turfgrass lawns are often monocultures, offering little to no support for a diverse range of species. The introduction of native plants into residential landscapes not only enhances aesthetic value but also contributes to the health of local ecosystems by supporting pollinators, insects, and other wildlife.

Table 3. Comparison of Traditional Turfgrass Lawn vs. Native Lawn based on ecological and maintenance criteria

Evaluation Criteria	**Traditional Turfgrass Lawn**	**Native Lawn**
Chemical Input and Toxicity	High to frequent fertilizer/pesticide use	No fertilizer/pesticide use
Maintenance Requirements	Frequent mowing, edging, and weeding	Minimal mowing, edging and weeding
Cost Over Time	High (irrigation, chemical inputs, mowing) year over year	Higher inicial cost, low maintenance cost after establishment (1 year)
Biodiversity Support	Low - 2 pollinator and 8 herbivorous species supported	High –7 pollinator and 19 herbivorous species supported
Water Usage and Runoff	High irrigation requirement, poor stormwater infiltration	Low irrigation requirement- No watering needed after 1 year; good stormwater infiltration
Ecosystem Services	Minimal	Significant (carbon storage, pollination)

The Future of Lawn Care:

As awareness grows about the environmental impact of traditional lawn care practices, native lawns are likely to become an increasingly popular choice for homeowners looking to reduce their environmental footprint. The potential for native lawns to transform residential landscapes into sustainable, ecologically rich environments is significant. Furthermore, as more individuals and communities adopt these practices, the cumulative impact on local ecosystems and water resources will be profound, contributing to long-term environmental health and sustainability.

In summary, transitioning to native lawns offers a compelling solution to the challenges posed by traditional turfgrass lawns. They provide significant environmental benefits, support local biodiversity, and offer cost savings over time. This shift aligns with the growing movement towards more sustainable landscaping practices, marking an important step in the direction of ecological responsibility. With continued education and support, native lawns can become a mainstream option, leading the way towards a greener, more sustainable future for our communities and ecosystems.

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APPENDIX A: Literature Search Methods

Date of Search: December 20, 2024

Databases Used:

- Google Scholar
- Scopus
- Science Direct

  Search Term:

- “native lawn”

  Filters Applied:

- Date Range: 2019 to 2024
- Language: English
- Document Type: Articles, Studies

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1. Google Scholar Results (Search Term: “native lawn”)

Year	Number of Results
2024	9,210
2023	12,000
2022	11,500
2021	11,600
2020	11,700

Year	Number of Results
2019	12,300

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2. Scopus Results (Search Term: “native lawn”; Filter: Article Type)

Year	Number of Documents
2024	17
2023	24
2022	24
2021	23
2020	21
2019	16

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3. Science Direct Results (Search Term: “native lawn”; Filter: Studies)

Year	Number of Documents
2024	643
2023	478
2022	447

Year	Number of Documents
2021	481
2020	449
2019	393

Date of Search: May 7, 2025

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1. National Public Radio (NPR)

Description: A leading American public broadcasting organization providing news and cultural programming.

Search Terms and Results:

- “native lawn” – 12,582 results
- “native grasses” – 1,004 results

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2. Fine Gardening (Magazine)

Description: A publication for gardeners of all skill levels, featuring expert advice on garden design and plant selection.

Search Terms and Results:

- “native lawn” – 333 results
- “native grass” – 681 results
- “native grasses” – 1,006 results

3. Instagram (Social Media Hashtags)

Description: A photo- and video-based social media platform used for sharing gardening practices and landscaping ideas.

Search Terms and Results:

- #nativelawn – 100+ posts
- #nativelawnmanagement – 500+ posts
- #nativegrass – 5,000+ posts
- #nativegrasses – 13,600+ posts