

Beyond Croplands: *Amaranthus palmeri* in Residential Lawns of Lubbock, Texas.

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Introduction

Amaranthus palmeri is considered one of the most aggressive and adaptable weed species affecting agricultural production in the United States (Webster, 2001; Webster & Nichols, 2012). Its rapid growth rate, high fecundity, and ability to evolve resistance to multiple herbicide modes of action have contributed to substantial yield losses in crops such as cotton, soybean, corn, and sorghum, with reductions reported to range from 70% to 90% under severe infestations (Webster & Nichols, 2012; Norsworthy et al., 2014; Rowland et al., 1999; Klingaman, 1994; Massinga, 2001). The species is particularly well adapted to high temperatures and low rainfall (Rowland *et al.*, 1999), conditions characteristic of the Southern High Plains of Texas (Chen *et al.*, 2020).

Research on *A. palmeri* has focused predominantly on agricultural fields, where its economic and agronomic impacts are most apparent. In contrast, its occurrence in non-agricultural environments—such as roadside habitats, urban landscapes, public spaces, and residential lawns—has received comparatively little attention (Korres et al., 2015; Bagavathiannan & Norsworthy, 2016). These environments may nevertheless support persistent weed populations and contribute to regional dynamics through mechanisms distinct from those operating in managed cropping systems.

The South Plains region of Texas represents a critical agricultural area due to its role in global cotton production (USDA-NASS, 2023). A comprehensive understanding of weed occurrence in this region, therefore, benefits from consideration of both agricultural and non-agricultural habitats. In this study, we report field observations and morphological identification of *A. palmeri* in public and residential lawns across Lubbock, Texas, based on surveys conducted in two consecutive years. The objective is to document its repeated urban occurrence and provide preliminary data that complement existing agricultural-focused studies of this species.

Materials and Methods

Study Area and Survey Design

Field surveys were conducted within the city of Lubbock, Texas, encompassing all six city council districts to ensure broad geographic coverage (City of Lubbock, Texas,

2018). Surveys were performed during two consecutive growing seasons (2024 and 2025). Public spaces and residential lawns were specifically targeted to assess the presence of *Amaranthus palmeri* outside of agricultural fields. In each survey year, visual assessments were conducted to identify *Amaranthus* populations at multiple sites within each district.

Sampling and Identification Criteria

At least ten distinct locations containing *Amaranthus* spp. were identified per council district in each survey year. Plants were examined *in situ*, and representative specimens were documented photographically. Morphological identification of *A. palmeri* was based on established diagnostic characteristics, including hairless stems and leaves, oval to diamond-shaped leaf morphology, petioles equal to or exceeding leaf length, rapid vegetative growth, and the presence of a small, sharp spine at the leaf tip.

Results

Distribution of *A. palmeri* in Urban and Residential Areas

Amaranthus palmeri populations were observed in public and residential lawns across all six council districts of Lubbock, Texas during both the 2024 and 2025 survey periods (Figure 1). In each year, the species was identified at a minimum of 10 distinct locations per district. The repeated detection of *A. palmeri* across consecutive years indicates persistent urban presence rather than transient or isolated occurrences.

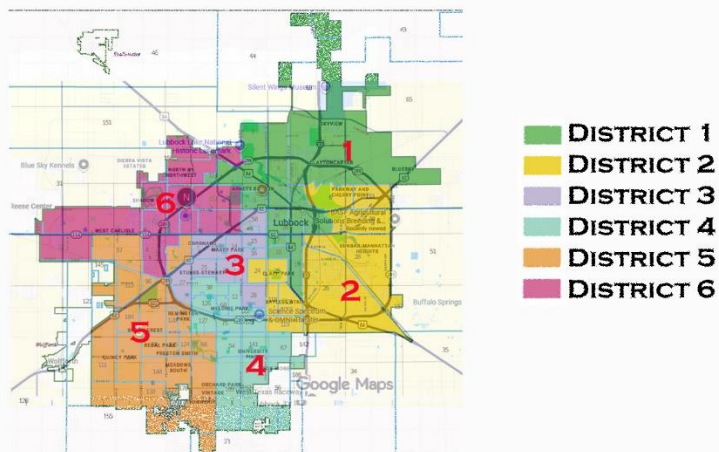


Figure 1. *Amaranthus palmeri* observed in public and residential lawns. *Up:* *Amaranthus palmeri* at various locations within urban areas of Lubbock, Texas. *Down:* Map of the districts within Lubbock, Texas (City of Lubbock, Texas, 2018). *Red arrow* shows putative *Amaranthus palmeri*.

Morphological Characterization

Morphological analysis of observed plants revealed consistent traits characteristic of *A. palmeri* across both survey years. Specimens displayed oval to diamond-shaped leaves, smooth and hairless stems and leaves, and petioles equal to or longer than the corresponding leaf blades (Figure 2). A small, sharp spine was observed at the leaf tip in examined individuals. Rapid growth was noted in both years, with visible increases in plant size occurring within 72-hour periods.

Collectively, these morphological features support the identification of the observed plants as *Amaranthus palmeri* and confirm their repeated presence in non-agricultural urban environments within the South Plains region.

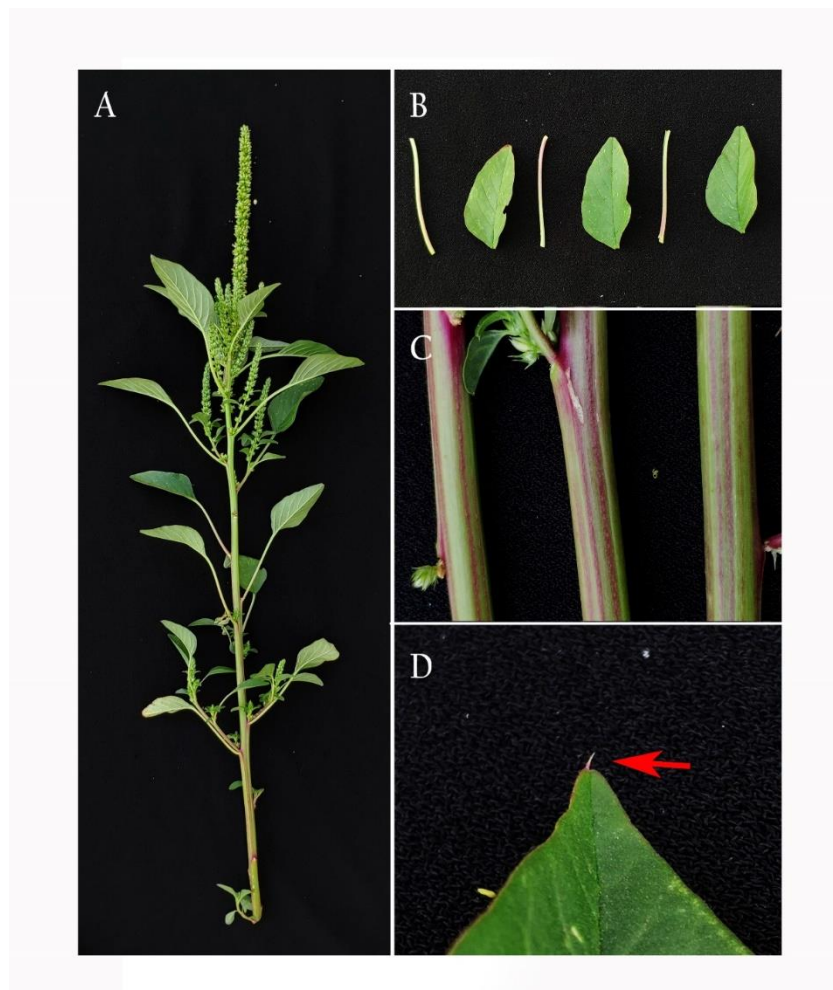


Figure 2. Characterization of *Amaranthus palmeri* from public and residential lawns. A) Weed morphology of *Amaranthus palmeri* from residential lawns. **B)** Petioles similar to or longer than the leaves. **C)** Hairless stem. **D)** Small, sharp spine at the leaf tip.

Discussion

The present study documents the occurrence and persistence of *Amaranthus palmeri* in public and residential lawns across all surveyed council districts in Lubbock, Texas, based on observations conducted over two consecutive years. While *A. palmeri* is well established as a dominant weed in agricultural systems of the Southern High Plains and is considered native to the southwestern United States, including Texas, its repeated detection in managed urban and residential environments indicates that these landscapes can support stable populations over time.

Urban and residential environments differ from agricultural fields in management intensity, disturbance regimes, irrigation patterns, and herbicide exposure. The consistent presence of *A. palmeri* across districts and years suggests that such environments may contribute to local persistence independently of annual crop cycles. Although the mechanisms underlying establishment and maintenance in these settings were not evaluated, potential factors include soil disturbance, landscaping activities, and human-mediated seed dispersal.

Morphological traits observed in urban populations were consistent with established diagnostic criteria for *A. palmeri* and remained stable across survey years. Additionally, rapid growth observed in urban settings mirrored growth patterns reported in agricultural contexts, suggesting that urban conditions do not substantially limit vegetative development. Together, these findings highlight the value of including non-agricultural habitats in assessments of *A. palmeri* distribution and ecology at the regional scale.

By providing multi-year observational data, this study contributes to a broader understanding of *A. palmeri* occurrence in the South Plains. These observations may serve as a foundation for future research integrating urban, peri-urban, and agricultural environments to examine genetic diversity, herbicide resistance traits, and landscape-level dispersal dynamics.

Limitations

This study has several limitations. Identification of *A. palmeri* was based solely on morphological characteristics, without molecular confirmation. Although the diagnostic traits used are well established, genetic analyzes would strengthen species-level identification, particularly in regions where closely related *Amaranthus* species may co-occur.

While surveys were conducted over two consecutive years, the study did not assess longer-term population trends, seasonal dynamics, or interannual variability beyond this period. Additionally, plant density, biomass, and reproductive output were not quantified, limiting inference about population size, viability, and contributions to regional seed banks. Incorporating these factors in future studies would enable a more detailed

evaluation of the conditions supporting *A. palmeri* persistence in urban and residential environments.

The author declare no conflict of interest.

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