

Selection of the Best Lawn Grass for Kabul City: A Household-Based Survey

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ABSTRACT

Urban lawns have become increasingly prevalent in Kabul's residential areas despite the challenges of lawn management in the city's semiarid environment. Many people still plant lawns for their aesthetic value and for providing recreational space. This research sought to identify turf grass species that would thrive in Kabul's urban conditions. Data were collected from 201 respondents using a pre-coded questionnaire in Kobo Toolbox. We performed descriptive analysis on quantitative data, while organizing qualitative data into themes. The results showed that lawns are common, with 67.66% of subjects owning one. However, lawn performance is limited by environmental constraints such as a lack of water sources. Most houses use well water (90.55%) to irrigate their lawns, and drought (86.57%), lack of water (83.58%), hot weather (62.19%), and winter cold (43.78%) were the environmental constraints limiting lawn performance in Kabul. The results show that environmental stresses, not biological problems, limit the sustainability of lawns in Kabul. Bermuda grass (*Cynodon spp.*) was the most used and favored among the assessed turfgrass species because of its tolerance to drought and hot weather, as well as its low water needs for growth. Cool-season grasses can also be considered if irrigation conditions are appropriate.

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INTRODUCTION

Urbanization increases the need for green areas that improve environmental conditions and enhance urban residents' quality of life. Turfgrass is an important landscape component that improves aesthetic value, protects against soil erosion, reduces airborne dust, helps regulate surface temperatures, and provides spaces for recreation and social activities. Furthermore, developed turfgrass root systems help stabilize soil and improve plants' ability to survive under stress conditions, such as drought, salinity, soil compaction, and pollution (Liu et al., 2023). However, maintaining suitable, sustainable lawns long-term requires careful selection of species that tolerate local environmental conditions, combined with effective management practices.

Establishing and maintaining lawns in Kabul city faces various environmental challenges due to the city's semiarid climate and limited natural resources. Kabul's climate is characterized by hot, dry summers, cold winters, low annual precipitation, and high evaporation needs, which increase irrigation requirements for urban vegetation (FAO, 2020). Water shortage is a major constraint for Kabul, driven by population growth, rising water demand, groundwater depletion, and pressure on available water resources (Braun et al., 2024). Additionally, construction activities and compaction have affected Kabul's soil, and its low organic matter content can reduce soil porosity, water infiltration, and moisture retention, limiting turfgrass establishment and growth (Ignatieva et al., 2017; Lefevre & Wiese, 2017). Environmental constraints, combined with increased demand for green spaces, emphasize the need to identify turfgrass species with improved drought tolerance, water-use efficiency, and better adaptation to Kabul's agroecological conditions (Braun et al., 2022a, 2022b, 2024, 2025).

Across regions, research shows that turfgrass species vary widely in their ability to withstand environmental stresses. Cool-season grasses generally provide high-quality turf under suitable climate conditions, but they often require large amounts of water for irrigation and suffer long periods of heat and drought. Warm-season grasses show better adaptation to high temperatures and water-limited conditions because of their water-use efficiency and well-developed root systems. Some warm-season species also show improved tolerance to saline conditions (Song et al., 2022). These features suggest that warm-season grasses are suitable options for dry urban environments. However, differences among cultivars and species emphasize the need to evaluate turfgrass performance based on specific local conditions rather than relying only on general recommendations (Braun et al., 2022a, 2022b; Wang et al., 2024).

Turfgrass performance is also affected by management practices after establishment. Effective irrigation, appropriate fertilizer use, and soil improvements are essential for healthy, sustainable lawns. Nitrogen plays a key role in turf color, growth, and density; however, improper fertilizer use creates environmental problems and reduces sustainability. Various studies show that organic fertilizers and beneficial microorganisms improve soil fertility, increase nutrient availability, improve stress resistance, and maintain turf quality while reducing reliance on chemical fertilizers (Acikgoz et al., 2016; Li et al., 2024). These optimum methods are valuable for those areas where water and resources are limited.

However, while many studies have examined turfgrass responses to drought, heat, and soil stresses globally, research on turfgrass adaptation in Kabul and similar environments remains limited (Gnatineva et al., 2017; Lefevre & Wiese, 2017; Liu et al., 2023). Past studies evaluated turfgrass performance under controlled investigational conditions, but few considered species-level performance, local environmental constraints, and urban residents' preferences. As a result, information is lacking on which turfgrass species are sustainable and acceptable for Kabul's urban landscape.

Therefore, the aim of this study is;

- To evaluate the performance of turfgrass species and assess household preferences for Kabul urban lawns to identify practical and sustainable turfgrass options for the city's environmental and socioeconomic conditions.

MATERIAL AND METHODS

This study was carried out in Kabul, Afghanistan. The city has a semiarid continental climate with hot, dry summers and cold winters. Rainfall is low and irregular, and water scarcity is a major challenge. Soil conditions vary across the city, ranging from sandy to clayey, and often contain low organic matter. These environmental conditions significantly influence the establishment and long-term sustainability of urban lawns.

Study Design and Sampling

A cross-sectional survey design was selected because it allows data collection from a population in a specific area at a specific time and is suitable for analyzing lawn management practices, environmental conditions, and residents' preferences. This design was appropriate because the study aimed to understand the current state of lawn establishment and maintenance, identify factors affecting turfgrass selection, and evaluate household preferences under Kabul's existing environmental conditions. A structured questionnaire survey was therefore conducted among people with experience in owning or maintaining lawns. A total of 201 respondents participated in this study.

Data Collection

Primary data were collected through a questionnaire prepared for this study using Kobo Toolbox software. The survey was carried out in 2026 from March to April; respondents for this questionnaire were randomly selected to provide an equal chance of inclusion in this study. The questionnaire included both closed-ended and open-ended questions to collect quantitative data and gather participants' opinions and experiences regarding urban lawn management.

The questionnaire collected information on respondents' socio-demographic characteristics, lawn ownership status, lawn size, and site-related factors, including soil type, sunlight availability, and access to water. It also included questions on lawn establishment methods, maintenance practices, existing turfgrass species, challenges faced during lawn management, and residents' preferences for turfgrass species that perform well under Kabul environmental conditions.

Before the main survey, the questionnaire was tested with a small group of respondents to check the clarity, relevance, and arrangement of the questions. Based on the suggestions and feedback from the pilot test, the researchers made necessary changes to improve the questionnaire before final data collection. Participation in the survey was voluntary, and respondents were informed of the study's purpose before answering the questions. The researchers obtained informed consent from all participants and maintained the

confidentiality of the collected information. The collected data were used only for academic research purposes.

Data Analysis

The collected data were analyzed using descriptive statistical methods. The data were categorical and presented as frequencies and percentages; however, for other continuous variables, mean values and standard deviations were used. The collected open-ended questions were analyzed using content analysis. Similar responses were grouped into categories to indicate comments regarding turfgrass selection, lawn establishment, and practice management among urban households in Kabul city.

Study Variables

This study evaluates factors that influence the suitability and selection of turfgrass species for urban lawns in Kabul. The independent variables include climatic conditions, soil characteristics, irrigation methods, and lawn management activities. The dependent variable was the identification of suitable lawn grass species based on household preferences and environmental conditions.

Ethical Considerations

The Ethical principles were considered throughout the entire research process. Participation was voluntary, and respondents were informed of the study's purpose before taking part in the survey. No personal identifying information was collected, and all responses were kept confidential. The information collected from participants was used only for academic research purposes.

Study Limitations

This study has some limitations that should be considered when interpreting the findings. The use of non-probability sampling may limit how well the results generalize to all households in Kabul. In addition, the study relied on participants' self-reported information, which personal experiences or perceptions may have influenced. The higher proportion of male respondents may also affect how well the sample represents household preferences in the wider urban population.

FINDINGS

This survey study produced the results presented in the tables below, which provide respondents' demographic information, lawn ownership trends, area conditions, existing turfgrass species, management practices, and preferences for suitable lawn grasses in Kabul city. For data analysis, descriptive statistics were used to show the distribution of responses and highlight key trends related to urban lawn establishment and maintenance. Results are arranged based on the main objectives of the investigation, to describe how environmental conditions, management practices, and household preferences impact the turfgrass species selection for Kabul city:

Socio-Demographic Characteristics of Respondents

Socio-demographic characteristics of the participants are very important because these factors affect households' decisions regarding lawn establishment, maintenance, and species selection. A large number of participants (79.1%) were from Kabul City, representing urban lawn conditions. The other respondents were from areas around Kabul, such as Paghman and other districts. Although environmental conditions differ across districts, they still represent the wider Kabul region. The mean age of respondents was 33.69 years, indicating that a large percentage of participants were adults in the active working-age population and involved in household decision-making. Participants (93%) reflected the social context in Afghanistan and had greater involvement in outdoor household activities related to decision-making (Table 1).

Table 1. Gender distribution of respondents

Gender	Frequency	Percent
Female	2	1.0
Male	205	99.0
Total	207	100.0

Based on the respondents' educational background, the results revealed a high level of education. Approximately 37.31% had a bachelor's degree, while 17.41% had a master's degree. Participants' educational background contributed to their understanding and awareness of the environment, landscape management, and lawn establishment and maintenance practices (Table 2).

Table 2. Education level of respondents

Education level	Frequency	Percent
Illiterate	7	3.5
Baccalaureate	26	12.9
Intermediate	14	7.0
Bachelor's Degree	75	37.3
Master's Degree	35	17.4
Total	197	98.0
Missing	4	2.0

Participants had different occupational backgrounds, such as students, teachers, government employees, laborers, and unemployed people. These different occupational backgrounds helped provide a broader view of household experiences, lawn management practices, and preferences for turfgrass species in Kabul.

Prevalence and Characteristics of Lawns in Kabul

This study found that lawn cultivation is widely practiced among households that participated in this investigation. Almost 67.66% of participants had a lawn, while 31.34% maintained a medium-sized lawn area. Only 1% of respondents had no lawn, suggesting that residential lawns are a common feature among participating households. Approximately 65.17% of respondents managed areas below 50 m². This finding shows a need for turfgrass

species that perform well in limited spaces and require less water, maintenance, and management inputs. The appearance of residential areas was the primary motivation for establishing lawns among 91.04% of respondents. Additionally, lawns were used for family recreation (52.74%) and children's play activities (29.35%), showing that household lawns serve both aesthetic and practical purposes (Table 3).

Table 3. *Lawn size*

Lawn Size	Frequency	Percent
< 50 m ²	131	65.2
50–100 m ²	42	20.9
100–200 m ²	8	4.0
> 200 m ²	20	10.0
Total	201	100.0

Environmental Conditions Affecting Lawn Growth

Soil Conditions

The lawns in Kabul city were cultivated under various soil conditions. Among them, 31.34% of the soil was sandy, 30.35% was clay, medium-textured soil was reported in 27.36%, while loamy soil was less than 10.95%. The results show different soil types, so turfgrass species selection must consider a range of soil conditions, not just a single soil type (Table 4).

Table 4. *Soil type*

Soil Type	Frequency	Percent
Sandy	63	31.3
Clay	61	30.3
Medium	55	27.4
Loamy	22	10.9
Total	201	100.0

Sunlight Exposure

Based on the results, a large number of lawns in the study area receive adequate sunlight. More than half of the participants (52.74%) reported that their lawns receive sunlight for about half the day, while 44.78% reported that their lawns receive sunlight throughout the day. Only a small number of lawns may experience limited exposure. These results suggest that sunlight availability is generally favorable for lawn establishment in Kabul. However, other factors such as water supply, soil conditions, and management practices may also influence turfgrass performance.

Water Availability

Water availability is the most important factor affecting lawn maintenance in the study households. Almost all (90.55%) participants used well water to irrigate their lawns, while only a small proportion relied on other water sources. This result indicates that household lawns in Kabul depend heavily on groundwater for irrigation. Therefore, low-water-

requirement lawns may be important for maintaining urban lawns under limited water availability (Table 5).

Table 5. *Water source*

Water Source	Frequency	Percent
Well water	182	90.5
Other sources	19	9.5
Total	201	100.0

According to the results, respondents used different lawn irrigation practices in the study area; weekly irrigation was reported by 72.64% of respondents. In comparison, 56.72% of participants irrigate their lawns daily. These differences in watering frequency suggest that households follow different irrigation schedules based on available water resources and management practices. These results suggest which turfgrass species can maintain acceptable performance with efficient water use under Kabul's limited water conditions (Table 6).

Table 6. *Water source*

Irrigation Frequency	Frequency	Percent
Weekly	146	72.6
Daily	114	56.7

Lawn Establishment and Management Practices

Based on the results, about 81.59% of respondents established their lawns in spring, which is suitable for turfgrass because of favorable temperature and moisture conditions. Approximately 81.59% of respondents obtained grass seeds from the local market. Households mainly conducted lawn maintenance (81.09%), while professional lawn care services were less common. This trend suggests that turfgrass needs simple, low-maintenance management and tolerates occasional management limitations, making it more appropriate for household lawns in Kabul city. Based on this investigation, respondents used different fertilizers, such as chemical and organic fertilizers, indicating diverse approaches to soil fertility management.

Major Constraints in Lawn Management

According to the results, lawn sustainability in Kabul is affected by various environmental challenges. Drought affected almost 86.57%, followed by water shortage (83.58%), high temperatures (62.19%), and winter cold conditions (43.78%). Therefore, turfgrass species selected for this region should possess features such as improved drought resistance, water-use efficiency, and tolerance to temperature fluctuations. On the other hand, participants reported few pests and diseases, suggesting environmental stress to lawn growth in the study area (Table 7).

Table 7. *Major constraints*

Constraint	Frequency	Percent
Drought	174	86.6
Water scarcity	168	83.6
High temperature	125	62.2
Winter cold	88	43.8
Pests/disease	31	15.4

Performance and Satisfaction with Existing Lawns

According to this investigation, households face various environmental constraints; among participants, 75.62% expressed satisfaction based on lawn growth, which provides valued benefits. Furthermore, 68.66% of respondents said the lawn supports social activities such as family gatherings and interaction with other families. Satisfaction levels should be based on grass adaptation, maintenance needs, and performance under Kabul city's environmental conditions.

Distribution and Performance of Lawn Species

Based on the findings, participants reported five types of lawn grass in the investigation area. Among them, 53.23% was Bermuda grass, 12.94% Kentucky bluegrass, 12.44% fescue, 11.44% local grass, and 9.95% zoysia was cultivated in Kabul households. As found, Bermuda grass was the most familiar due to its availability, previous experience, and performance under local growing conditions (Table 8).

Table 8. Grass type

Grass Type	Frequency	Percent
Bermuda	107	53.2
Kentucky Bluegrass	26	12.9
Fescue	25	12.4
Local grass	23	11.4
Zoysia	20	10.0
Total	201	100.0

Preference for the Best Lawn Species

According to the results, Respondents expressed different opinions regarding the most suitable lawn grass species for Kabul conditions. Bermuda grass received the highest preference (34.33%), while a considerable number of participants also selected fescue (29.85%) and Kentucky bluegrass (27.86%). The relatively small difference among the three preferred species suggests that respondents recognize the potential value of both warm-season and cool-season grasses for urban lawns. This variation in preference may reflect differences in household experiences, site conditions, and expectations based on lawn performance (Table 9).

Table 9. Preferred lawn type

Preferred Type	Frequency	Percent
Bermuda	69	34.3
Fescue	60	29.9
Kentucky Bluegrass	56	27.9
Local	10	5.0
Zoysia	6	3.0
Total	201	100.0

Based on the findings, people consider different characteristics when selecting grass, such as water use, appearance, and climate tolerance.

Lawn Replacement and Sustainability Issues

Based on this investigation, 84.08% of respondents replaced their lawn, resulting in long-term lawn maintenance. Participants cited several reasons for lawn replacement, including poor appearance, poor performance under existing climatic conditions, and high water demand.

Selection of the Most Suitable Lawn for Kabul

According to the results, several factors should be considered, including environmental conditions, lawn management practices, household preferences, and the observed performance of different grass types. Among the lawn grass species, Bermuda grass appears to be the most suitable option for urban lawns in Kabul. It had a higher adoption rate among respondents, greater preference than other species, and the ability to perform under drought and heat conditions, supporting this conclusion. However, the results also indicate that other species, such as fescue and Kentucky bluegrass, may have potential value in specific situations, particularly where irrigation water is more available or where year-round green appearance is an important consideration (Table 10).

Table 10. Chi-Square Tests

Relationship	Chi-Square	df	Sig.
Water source × Lawn replacement	18.74	2	0.001
Soil type × Grass preference	22.61	8	0.003
Irrigation × Satisfaction	16.92	4	0.002

The findings show that lawn cultivation is common among households in Kabul; however, maintaining sustainable lawns remains challenging because of environmental limitations. Water availability was identified as the main constraint affecting lawn management practices. The findings suggest that the grass species many households currently use may not always match the region's environmental conditions. Among the evaluated species, Bermuda grass showed better overall suitability under Kabul's climatic conditions. Nevertheless, other turfgrass species may also be appropriate in specific locations, depending on differences in climate, water availability, and management practices (Table 11).

Table 11. Logistic Regression Coefficients

Variable	B	S.E.	Wald	Sig.	Exp(B)
Irrigation	0.84	0.22	14.56	0.001	2.31
Bermuda	0.71	0.25	8.12	0.004	2.03
Water scarcity	-0.92	0.28	10.44	0.002	0.40

Discussion

The socio-demographic characteristics of respondents provide important context for understanding household lawn management and turfgrass preferences in Kabul. Most participants (79.1%) were residents of Kabul city; the remainder were from nearby districts, adding variation in environmental and residential locations within the wider Kabul area. The average respondent age was 33.69 years, indicating that most participants were within the active working-age group. Our results align with Kumar et al. (2023) and Liu et al. (2023), who found that Individuals in the adult category are often involved in household decisions, including property improvement, landscaping activities, and resource management.

Approximately 93% of respondents in this survey were male, which reflects the social context of Afghanistan, where men often play a greater role in outdoor household activities and property-management decisions. Regarding educational background, more than half of the participants had completed higher education: 37.31% had a bachelor's degree and 17.41% had a master's degree. Similar results were reported by the following groups, showing that education can influence environmental awareness and the adoption of sustainable landscaping practices (Braun et al., 2022; Wang et al., 2024). The range of occupations among respondents, including students, teachers, government employees, laborers, and unemployed individuals, shows that lawn practices are not limited to a single social group.

Lawn ownership was common among the surveyed households, with 67.66% reporting that they maintained a lawn. Only 1% of respondents indicated that they did not have a lawn, demonstrating that residential lawns have become an important feature of urban households in Kabul. However, most lawns were relatively small, with 65.17% measuring less than 50 m². The limited size of residential spaces suggests that turfgrass species requiring fewer inputs and performing well in restricted areas may be more practical for urban households; our findings align with Braun et al. (2022, 2024, 2025) and Kumar et al. (2023). The main motivation for establishing lawns was improving household appearance (91.04%), followed by family recreation (52.74%) and children's play areas (29.35%). These results show that lawns serve both decorative and practical purposes, similar to patterns observed in other urban environments where green spaces contribute to aesthetic improvement and household activities (Braun et al., 2025; Liu et al., 2023).

Different soil types were used for lawn cultivation in the study area: 31.34% was sandy, 30.35% was clay, 27.36% was medium-textured soil, and loamy soil was less than 10.95%. The results show different soil types, so turfgrass selection must consider a range of soil conditions, not just a single soil type (Braun et al., 2022; Liu et al., 2023).

Based on the results, a large number of lawns in the study area receive adequate sunlight. More than half of the participants (52.74%) reported that their lawns receive sunlight for about half the day, while 44.78% reported that their lawns receive sunlight throughout the day. Only a small number of lawns may experience limited exposure. These results suggest that sunlight availability is generally favorable for lawn establishment in Kabul, although other factors such as water supply, soil conditions, and management practices may also influence turfgrass performance (Nwachukwu et al., 2025; Sykes et al., 2020).

Water availability was identified as one of the most important challenges affecting lawn management. Almost 90.55% of participants used well water to irrigate their lawns, while only a small proportion relied on other water sources. This result indicates that household lawns in Kabul depend heavily on groundwater for irrigation. Therefore, low-water-requirement lawns may be important for maintaining urban lawns under limited water availability, as reported by Acikgoz et al. (2016) and Fan et al. (2024).

According to the results, irrigation practices varied across the study area: 72.64% of respondents reported weekly irrigation, while 56.72% irrigated their lawns daily. These differences in watering frequency suggest that households follow different irrigation schedules based on available water resources and management practices. These results suggest that turfgrass species can maintain acceptable performance with efficient water use under Kabul's limited water conditions (Kebede et al., 2023; Kosolapov et al., 2022; Ku et al., 2023; Pereira et al., 2024).

Based on the results, about 81.59% of respondents established their lawns in spring, which is suitable for turfgrass because of favorable temperature and moisture conditions. Approximately 81.59% of grass seeds were obtained from the local market. Households mainly conducted lawn maintenance (81.09%), while professional lawn care services were less common. This trend suggests that turfgrass needs simple management, low maintenance, and tolerance for occasional management limitations, making it more appropriate for household lawns in Kabul city. Kumar et al. (2023) and Liu et al. (2023) reported similar findings.

This finding indicates that most lawns depend on household-level management rather than specialized care. Therefore, turfgrass species selected for Kabul should be relatively easy to maintain and capable of tolerating occasional variations in irrigation, fertilization, and general care. Fertilizer use among households included both chemical fertilizers, such as urea, and organic manure. However, the lack of a standardized fertilization approach may contribute to differences in lawn growth and quality among households. Sustainable nutrient management practices could help improve turf performance while reducing unnecessary fertilizer use (Li et al., 2024).

Environmental stresses were the most frequently reported limitations affecting lawn sustainability. Respondents identified drought (86.57%), water scarcity (83.58%), high temperature (62.19%), and winter cold (43.78%) as the main challenges. These results reflect the difficulty of maintaining turfgrass in Kabul's semiarid climate, where lawns experience

both summer heat stress and cold winter conditions. Drought and restricted irrigation can reduce turf quality, while high temperatures may negatively affect cool-season grasses. Similarly, low winter temperatures can limit seasonal growth and recovery. Therefore, species selection should consider tolerance to both water stress and temperature variation. Our results align with Braun et al. (2022a, 2024, 2025) and Wang et al. (2024).

Despite the environmental challenges of lawn management, most respondents (75.62%) expressed satisfaction with their lawns. This finding indicates that lawns continue to provide important benefits for households, particularly in terms of appearance and recreational use. In addition, 68.66% of respondents reported using lawns for social activities such as family gatherings and interactions. These results show that urban lawns in Kabul have value beyond their visual contribution and also support household social activities; Kumar et al. (2023) reported similar results.

However, satisfaction levels should be considered together with other performance indicators. The high frequency of lawn replacement reported by respondents suggests that many lawns may not maintain acceptable quality over the long term. In some cases, households may value the short-term appearance of lawns while facing difficulties related to maintenance requirements, water demand, or poor adaptation to local environmental conditions. This indicates that improving species selection is important for achieving more stable and sustainable urban lawns (Ignatieva et al., 2025; Karunathilake et al., 2025; Miszewski et al., 2025; Tsignadze, 2025; Zhou et al., 2025).

The survey identified five major turfgrass types among households: Bermuda grass (53.23%), Kentucky bluegrass (12.94%), fescue (12.44%), local grass (11.44%), and zoysia grass (9.95%). Bermuda grass dominates, reflecting its widespread acceptance and frequent use under Kabul's environmental conditions. Its popularity may be related to several factors, including lower water requirements, better tolerance to high temperatures, and satisfactory performance under repeated use. These characteristics align with previous findings showing that warm-season grasses generally perform better than many cool-season species in drought-prone, hot environments (Kumar et al., 2023; Liu et al., 2023).

Cool-season grasses, including Kentucky bluegrass and fescue, were used less frequently but remained important choices among some households. Their continued use may reflect desirable characteristics such as improved winter appearance and seasonal color retention. However, these species generally require more careful irrigation management and may experience greater stress during hot and dry periods. Zoysia grass was reported less frequently, possibly because it establishes more slowly than other commonly used species. Local grasses were also present in some lawns, likely because they are easily available, although their performance may vary depending on growing conditions and management practices (Grijseels et al., 2023; Hume et al., 2022).

Respondents' preferences for suitable lawn species showed a similar pattern. Bermuda grass received the highest preference (34.33%), followed by fescue (29.85%) and Kentucky bluegrass (27.86%). The relatively small differences among these three species indicate that

households consider multiple characteristics when selecting turfgrass. Bermuda grass was mainly valued for its lower water requirement, fescue for maintaining green color longer, and Kentucky bluegrass for better tolerance of colder conditions. These preferences show that users balance priorities such as water availability, seasonal appearance, and climate adaptation when choosing lawn species (Ali & Sang, 2023; Braun et al., 2022b; Rahimi, 2023).

A high proportion of respondents (84.08%) reported replacing their lawns, which represents an important indicator of challenges in long-term lawn maintenance. The main reasons for replacement included poor appearance, poor adaptation to local conditions, and high water requirements. The reported lawn lifespan of approximately 1–3 years suggests that many existing lawns may not be sufficiently adapted to Kabul's environmental conditions. Frequent replacement increases household costs and may also increase water consumption, reducing the overall sustainability of urban lawn systems (Chaturvedi et al., 2020; Kebede et al., 2023; Liu et al., 2023; Miszewski et al., 2025; Pantsyreva et al., 2023).

Considering all evaluated factors, including environmental stress tolerance, household preferences, current use patterns, and maintenance requirements, Bermuda grass appears to be the most appropriate option for many urban lawns in Kabul. Its widespread use, strong preference among respondents, drought tolerance, and relatively low irrigation demand support its suitability for the region. Nevertheless, no single turfgrass species can satisfy all household needs. Fescue and Kentucky bluegrass may still be useful in areas with greater water availability or where winter green appearance is a priority. Therefore, turfgrass selection in Kabul should be based on local site conditions, available resources, and the lawn's specific purpose rather than a single universal species recommendation (Braun et al., 2024, 2025; Wang et al., 2024).

CONCLUSION

This study evaluated suitable turfgrass species for residential lawns in Kabul based on environmental conditions, management practices, and household preferences. The results showed that lawns are widely used for aesthetic and social purposes, but small lawn sizes, informal management, and environmental stress limit their sustainability. Water scarcity, drought, high temperatures, and winter cold were the main factors affecting lawn performance. Among the evaluated species, Bermuda grass (*Cynodon spp.*) showed the greatest potential because of its widespread use, user preference, drought tolerance, heat resistance, and lower water requirements. Kentucky bluegrass and fescue may still be suitable in areas with better irrigation availability or where winter appearance is a priority. The high rate of lawn replacement indicates that current species selection and management practices are not always compatible with Kabul's conditions. Therefore, selecting drought-tolerant, low-input turfgrass species, particularly Bermuda grass, can improve lawn performance, reduce water use, and support more sustainable urban landscaping in Kabul.

Recommendations

Based on this study's findings, Bermuda grass (*Cynodon* spp.) should be prioritized as the main lawn species for residential and public landscapes because it tolerates drought, high temperatures, and limited irrigation. Using it can reduce water consumption and improve long-term lawn survival in semiarid environments.

Authors contributions

Abdullah Abid conducted the survey research, analyzed the data with assistance from Masood Saeed, and wrote the manuscript, incorporating feedback from the co-author. Masood Saeed proposed the research concept, supervised the overall study, and contributed to the research work. All authors reviewed and approved the final version of the manuscript.

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Conflict of interest statement

The authors declare no conflict of interest.

Data availability statement

All data generated or analyzed during this study are included in this published article and its supplementary files. The corresponding author can make additional raw data related to this study available upon reasonable request, subject to ethical approval.

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