A study of the reasons for the failure of Green Lawns in the gardens of the College of Agriculture / Al-Qasim Green University

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Abstract
This study was conducted during year 2025-2026 to determine the reasons for the failure of green lawns in the gardens of the College of Agriculture. Green lawns are considered the main plant element in the garden, where they are a source of its beauty in addition to their climatic importance. In addition to the theoretical study, the study included a systematic field study of some of the college's gardens, particularly those near the Horticulture and Landscape Engineering Department. Soil samples were taken from various locations to the right and left of the Horticulture Department, dried, and sifted. The required quantity was then weighed and extracted for analysis. Soil texture was tested, ranging from sandy loam at locations L1, R1, and R2, while the texture at location L2 was silty loam. Soil pH values ranged from 7.38 to 7.85, with the highest value in the sample at location R2 and the lowest in the sample at location L2. Electrical conductivity values ranged from 6.44 to 8.04 $dS.m^{-1}$ at both locations R1 and R2, with the highest value in the sample at location R1 and the lowest in the sample at location R2. Electrical conductivity values ranged from 5.85 to 6.35 $dS.m^{-1}$ at both locations. (L1, L2) The highest value was found in the sample at location L2, and the lowest value in the sample at location L1.
The variation in soil separation ratios is attributed to the different locations from which the soil was transported during the establishment of the gardens. The variation in salinity values and their elevation could be due to differences in water movement. The lower salinity values may be attributed to the fact that the gardens and green lawns are irrigated with more water than their field capacity allows, resulting in increased leaching of salts that could otherwise accumulate in the soil.
The results indicate that the water used for irrigation is safe for various uses, with a pH of 1.260 $dS.m^{-1}$. A decrease in the sodium adsorption ratio (SAR), a decrease in salinity, and low concentrations of positive and negative ions were also observed, confirming its suitability for irrigation in this type of facility. The study recommended excavating the soil to a depth of more than 30 cm and then adding a layer of river loam soil at least 50 cm thick to make it suitable for cultivation at all study locations. In the event of increased soil salinity in the future, irrigation water exceeding the field capacity can be used at intervals, as the light soil texture facilitates the vertical movement of salts, thus removing them periodically if they accumulate.

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Keywords: Green Lawns, University Gardens, Warm-Season Grasses, Cool-Season Grasses

Introduction

Green Lawns constitute the most important part of the garden, as they comprise at least 70% of the garden area. They also serve as a venue for various recreational activities and are important for maintaining a healthy climate (Hiba, 2025) [8].
Green Lawns were first introduced to England in the 13th century, and since then they have become a key element in landscaping. Most Green Lawn plants belong to the grass family (Poaceae), while a few belong to other families. These plants vary in shape and characteristics, and may be perennial or annual, creeping or upright. Some prefer shade, while others prefer sun (Al-Taher & Al-Hassan, 2019) [4].

Shouri (2016) [3] indicated that green lawns are the connecting space between the various landscaping elements of a garden. They define the different aspects of the garden, highlight its pathways and routes, and showcase its beauty.
Despite the importance of green lawns, their scientific and well-planned establishment involves a series of sequential stages. These begin with studying the chemical and physical properties of the soil, identifying problems, and taking appropriate measures to overcome them. This is followed by laying the irrigation network, precise soil leveling, and planting. After planting, a crucial maintenance stage is essential, which must be carried out according to a comprehensive program of fertilization, pest control, weed removal, and regular irrigation.

Research Significance

1. The research is significant due to the garden's location, as it belongs to the Department of Horticulture and Landscape Engineering at the College of Agriculture. It is expected to be one of the university's most beautiful gardens, given the presence of specialized faculty members in this field.
2. Green Lawns are the primary plant element in the garden, constituting at least 70% of its area, and the garden's overall aesthetic appeal depends on the beauty of the green lawns
3. Green Lawns serve as the venue for recreational, scientific, and extracurricular activities.
4. Green Lawns are of paramount importance, particularly in influencing climatic factors such as temperature and humidity.
5. There is a lack of prior studies to identify the causes of damage to green lawns in the gardens of the Horticulture Department.

Research Problem

The damage to green lawns and the transformation of the garden into dirt land are due to the following reasons:

1. The soil is unsuitable for planting green lawns.
2. Maintenance operations are inadequate and outdated, both technically and practically. There is a shortage of workers, and the college has numerous gardens. Furthermore, there is no specialized supervisor to guide workers in carrying out proper maintenance.
3. There is no suitable irrigation system for the Green Lawns
4. There is no dedicated funding for garden maintenance and upkeep, and the gardens are relied upon for extracurricular student contributions.
5. Misguided efforts and haphazard planting have transformed the garden into a quasi-farm by planting various trees, such as palms, olives, and some annual plants, within the green lawns, in addition to Conocarpus trees.
6. Weeds, including esparto grass, are proliferating and dominating the green lawns.

Research Objectives

1. To identify the most significant problems that have led to the current deterioration of the green lawns.
2. To propose scientific solutions to overcome any problems that have contributed to the poor condition of the green lawns.

Study Methodology: Field Experimental Method

Study Location: The gardens located in front of the Horticulture and Landscape Architecture Department. The garden on the right of the department covers an area of 240 m², while the garden on the left covers an area of 220 m². These gardens were established in 2013 and redeveloped in 2015 due to problems with the Green Lawns and plants.

Literature Review:

Green lawns are defined as areas of land planted with adjacent herbaceous plants characterized by their rapid growth, vigor, density, and tolerance to mowing and foot traffic. They are cultivated and managed skillfully to create a uniform green surface, aiming to improve the environment, beautify the location, and provide spaces for rest, recreation, and various activities (Jorgensen, 2023).while, Fakhoury (2023) [5] defined them as the single plant element in the garden that acts as a green frame, highlighting the beauty and splendor of other plant groups and all the different structures within the garden, connecting them.From a design perspective, green lawns are a horizontal landscaping element, creating contrast or dissonance with vertical landscaping elements (shrubs, trees, statues, vases, etc.). This increases the attraction for garden visitors and gives them a sense of comfort, as well as a feeling of apparent spaciousness (Al-Sharifat, 2024; Hiba, 2025) [2, 8].

Classification of Green Lawns:

First: Classification by Growing Season:

1. Warm-Season Grasses: Such as Bermuda grass, hybrid Bermuda grass, Paspalum, French grass, and Zoizia grass.
2. Cool-Season Grasses: Such as bluegrass, visco grass, and crooked grass (Turgeon & Kaminski, 2019) [19].

Second: Classification by Life Cycle: These are divided into:

1. Annual Green Lawns: These use annual plants and must be renewed annually.
2. Perennial Green Lawns: These use perennial plants.
3. Mixed Green Lawns: These use a mixture of seeds from several different plant species with varying dormancy stages to maintain the lawn's greenery throughout the year (Al-Sharifat, 2024) [2].

Good Green Lawn Specifications: Green lawn plants should possess the following characteristics:

1. Slow-growing to reduce the frequency of mowing, facilitate propagation, and ease of maintenance.
2. Adaptability to the location's light and shade requirements.
3. Dense growth to completely cover the soil surface.
4. Perennial and evergreen to ensure the lawn remains green throughout autumn and winter.
5. Suitability to the location's soil and prevailing climatic conditions.
6. Tolerance to mowing during spring and summer as much as possible.
7. Resistance to diseases and insect infestations (Al-Sharifat, 2024) [2].

Importance of Green Lawns: Green lawns offer numerous benefits and have various effects on their surroundings. These effects include (Al-Zaght *et al.*, 2024) [1]:

1. Environmental Effects: These include fluctuations in temperature, increased atmospheric oxygen levels, and their impact on atmospheric humidity.
2. Air Pollution Reduction Effects: This is achieved through their impact on noise pollution and their effect on the atmospheric content of dust and microbes.
3. Psychological Impact of Green Lawns : This is achieved by providing comfort and spreading joy simply by seeing the color green.

Uses of Green Lawns: Green Lawns have many uses, including:
1. Landscaping.
2. Sports Fields.
3. Horse Racing Tracks.
4. Airports. (Lindsey *et al.*, 2025) [14]

Major Problems of Green Lawns: Green lawns face several problems that affect their growth and efficiency, requiring the study of these problems and the development of appropriate solutions. Among the most prominent of these problems are:
First: Climatic Factors: These include high or low temperatures, wind, and drought.
Second: Soil problems: These include poor soil fertility, soil compaction, poor drainage, and high salinity and alkalinity, which are among the most prominent problems affecting the growth of green lawns.
Third: Lighting problems: Insufficient sunlight leads to stunted growth and yellowing of plants.
Fourth: Irrigation problems: These include over-irrigation, under-irrigation, irregular irrigation, and poor water quality.
Fifth: Mowing and Maintenance Problems: Over-mowing, irregular mowing, and the use of unsuitable tools are among the most prominent maintenance problems.
Sixth: Pests and Diseases: Green lawns are susceptible to fungal diseases, insects, and weeds that affect their growth.
Seventh: Poor Management and Planning: Choosing the wrong type of grass and the absence of a maintenance program are among the most prominent causes of the deterioration of green lawns (Saleem & Batool, 2025) [18].

Green Lawn Cultivation: Green lawns can be cultivated in one of two ways: either by vegetative propagation or by seeds:
First: Vegetative Propagation: Most warm-season grasses are propagated vegetatively. Therefore, vegetative parts are taken to propagate from a healthy, established lawn of the desired type that is strong and disease-free.
Second: Sexual Propagation (by Seed): This includes sowing seeds by broadcasting and sowing seeds by sown-in. Sowing from seed is used when seeds of the desired grass variety are available. The seeds must be of good quality and have high viability (Al-Qai'i & Noah, 2004) [6].

Suitable Soil Specifications for Green Lawns: For successful green lawn cultivation, soil is the most important factor because it directly affects root growth and vegetation density. The following are the most important specifications for ideal soil (Beard & Green, 2021; Guertal, 2023; Qian & Follett, 2021) [9, 12, 16].
First: Soil Texture: A loamy (sandy loam) soil is preferred and should contain:
50–70% sand (to improve drainage)
20–30% silt
10–20% clay. This balance between these components ensures good aeration and adequate water retention. Second: **Drainage:** The soil must be well-drained. Avoid heavy (clay) soils as they retain excess water and cause root rot. Drainage can be improved by adding sand or organic matter.
Third: Aeration: Good soil should be loose and not compacted, as this helps oxygen reach the roots and promotes healthy root growth. Aeration can be improved by tilling and adding compost.
Fourth: Ideal pH: 6.0–7.5 (neutral to slightly acidic).
Fifth: Fertility: The soil should be rich in nutrients, especially:
- Nitrogen (N): for vegetative growth
- Phosphorus (P): for strong roots
- Potassium (K): for resilience. It is also recommended to add well-decomposed organic fertilizer before planting. Sixth: Salinity: The soil should have low salinity, with an EC of less than 4 dS/m³, as high salinity leads to stunted growth and yellowing of green lawns.

Seventh: Organic Matter: This is the foundation of soil fertility, and the ideal percentage is between 3–5%. Its importance is demonstrated through:
- Improving soil structure
- Increasing water retention
- Supporting microbial activity and providing nutrients

Eighth: Soil Depth: The ideal depth should be at least 20–30 cm of good quality soil to ensure natural root spread.
In conclusion, the ideal soil for lawns is a well-drained, slightly acidic, sandy loamy soil that is rich in organic matter, low in salinity, and loosely aerated. Studies confirm that the ideal soil for lawns should have a balance of minerals, air, water, and organic matter. Furthermore, the physical quality of the soil (aeration and texture) directly affects root spread and the efficiency of water and nutrient absorption.

Green Lawns Maintenance: In order to maintain a good and beautiful green lawn, it must be cared for from time to time, especially when the heat intensifies in the summer or the cold increases in the winter, and thus we maintain a blooming lawn for the longest possible period of the year. The most important basics of lawn care are the following (Christians *et al.*, 2019):
1. Visual inspection
2. Patching
3. Leveling out uneven areas
4. Aeration
5. Irrigation
6. Mowing
7. Fertilization
8. Weeding
9. Pest and disease control

Materials and Methods
Study Location: A field study was conducted in the area in front of the Horticulture Department of the College of Agriculture at Al-Qasim Green University, within the coordinates (longitude 32°48′ and latitude 44°32′), to study soil properties and their suitability for green lawn cultivation. Four locations were selected: two to the right of the section (R1, R2) and two to the left (L1, L2). Soil samples were taken from these locations at depths of 0–10 cm and 10–20 cm. The

soil sampling area was used, where the samples to be analyzed were air-dried for three days. The soil was then sieved to remove impurities, and the samples were weighed to determine the required quantity for the following tests:

Laboratory Soil Analyses, including

1. Soil Particles and Texture: Soil particles were estimated using the pipette method described by Kilmer and Alexander, and soil texture was calculated using the texture triangle as described in Black *et al*. (1965) [10].
2. Soil pH: The pH of the saturated paste extract was measured using a pH meter, model PW4 ⁄ 8pm, as described in Page *et al*. (1982).
3. Soil Electrical Conductivity (ECe): A saturated soil paste extract was prepared as described by Page *et al*. (1982). The E.C. of the extract was measured using a WTW LF-530 electrical conductivity meter.
4. Soluble Anions and Sodium Adsorbance (SAR): Potassium and sodium ions in the irrigation water were measured using a flame photometer according to Richards (1954) [17]. Calcium and magnesium in the irrigation water were measured using the EDTA-Na_2 method, also according to Richards (1954) [17]. The sodium adsorption ratio was calculated using the following equation: SAR = Na / √(Ca + Mg) / 2. Further testing of the soil to a depth of less than 20 cm revealed that the surface soil consisted of soil added over a layer of accumulated waste and small pieces of gravel and bricks resulting from projects implemented in the area.

Source: Prepared by the researcher, Department of Horticulture and Landscape Engineering, College of Agriculture, Al-Qasim Green University

Fig 1: Sampling

Source: Prepared by the researcher, Department of Horticulture and Landscape Engineering, College of Agriculture, Al-Qasim Green University

Fig 2: Drying the samples

Source: Prepared by the researcher, Department of Horticulture and Landscape Engineering, College of Agriculture, Al-Qasim Green University

Fig 3: Sifting the samples

Source: Research by the researcher, Department of Horticulture and Landscape Engineering, College of Agriculture, Al-Qasim Green University

Fig 4: Sample Weight Image **Fig 5:** Extraction Process

Source: Research by the researcher, Department of Horticulture and Landscape Engineering, College of Agriculture, Al-Qasim Green University

Fig 6: texture Measurement

Maintenance: Through my personal interview with the maintenance supervisor and workers at the College of Agriculture, the following became clear:

Maintenance work is limited to mowing lawns irregularly, as is irrigation. This is in addition to the spread of weeds, including dense sedge, which requires a control program lasting several months or soil replacement. Furthermore, the maintenance department suffers from a shortage of workers and the lack of a specialized supervisor to guide the workers in carrying out proper maintenance work. There is also a shortage of machinery and tools, such as lawn mowers and sprayers. One of the most important maintenance tasks that needs to be carried out is patching and fertilization, as lawn maintenance is not limited to irrigation and mowing.

Results and Discussion

Soil and Water Characteristics

The results in Table (1) indicate that the soil texture in the four locations upstream and downstream of the section ranged from sandy loam in locations (L1, R1, R2), while the soil texture in location L2 was silty loam. The sand fraction ranged from 210 to 760 g/kg^{-1}, with the highest value in the sample from location R2 and the lowest in the sample from location L2. Silt fraction ranged from 165 to 570 g/kg^{-1}, with the highest value in the sample from location L2 and the lowest in the sample from location R2. Clay fraction ranged from 45 to 220 g/kg^{-1}, with the highest value in the sample from location L2 and the lowest in the sample from location R1. The soil reaction degree values ranged from 7.38 to 7.85, with the highest value in the sample from location R2 and the lowest in the sample from location L2. Electrical conductivity values ranged between the electrical conductivity values ranged from 6.44 to 8.04 dS/m-1 on the right side of the soil in section R1 and R2, with the highest value in the sample from location R1 and the lowest value in the sample from location R2. The electrical conductivity values ranged from 5.85 to 6.35 dS/m-1 on the left side of the soil in section L1 and L2, with the highest value in the sample from location L2 and the lowest value in the sample from location L1. The variation in soil fractions can be attributed to the different locations from which the soil was transported during the establishment of the gardens. Similarly, variations in salinity levels and their elevation can be attributed to differences in vertical water movement resulting from variations in soil fractions (sand, silt, and clay). Generally, we observe a higher sand fraction, leading to salt leaching. Conversely, lower salinity levels may be due to the gardens and green lawns being irrigated with more water than their field capacity allows, resulting in increased leaching of salts that may accumulate in the soil (Yang *et al*., 2023) [20].

Table (1) indicates that the water used for irrigation is safe for various uses, with a concentration of 1.260 dS.m^{-1}, classified as C1S1 according to the modern American classification (Page 1982). A decrease in the sodium adsorption ratio (SAR), a decrease in salinity, and low concentrations of positive and negative ions were also observed, confirming its suitability for irrigation in such facilities (Al-Nasseri, 2019).

Table 1: shows the soil composition and some chemical properties of the soil and irrigation water.

Sample location	Separated sand	Separated silt	Separated clay	unit	texture
L1	530	290	180	g.kg^{-1}	Sandy loam deposits
L2	210	570	220		silt loam deposits
R1	665	290	45		Sandy loam deposits
R2	760	165	75		Sandy loam deposits
Sample location	soil salinity	unit	pH	SAR	
L1	5,85	DS.m^{-1}	7,52	4,82	
L2	6,35		,38 7	3,76	
R1	6,44		7,71	4,08	
R2	8,04		7,85	4,86	
Irrigation water salinity	1,260	DS.m^{-1}			

Conclusions

1. Morphological observations and laboratory analysis revealed that the surface soil is the type of Green Lawns soil studied, while the 0-20 cm depth is topsoil added to an existing surface that was formerly a landfill containing waste and debris from various projects, such as gravel and bricks. This has resulted in increased soil compaction and reduced permeability, preventing irrigation water from penetrating to the depths. Consequently, the added surface layer has a high salinity level.
2. The irrigation water is of good quality and classified as excellent type C1S1. It has a low sodium content, which disperses soil components, and a high concentration of positive ions such as calcium and magnesium, which contribute to the cohesion of soil components. This is confirmed by the exchangeable sodium ratio (SAR) values.

Recommendations

The study recommends the following:

1. Excavate the soil to a depth greater than 30 cm and remove it from the study area. Then, add a layer of river loam soil at least 50 cm thick to make it suitable for cultivation at all study locations. 2. Plant green lawns, considering the current irrigation water, as it is free of salts and has high levels of positive ions.
2. Add mineral and organic fertilizers as needed to increase the availability of nutrients necessary for the growth of trees and ornamental plants.
3. In the event of increased soil salinity in the future, irrigation water exceeding the soil's leaching requirements (using more water than the field capacity) can be used at intervals. This is because the light soil texture facilitates the vertical movement of salts, thus removing them periodically if they accumulate.

References

1. Al-Zaght MF, Al-Mana' FBA, Sa'dawi FM. Green lawns – King Saud University. 2024. p. 230.
2. Al-Sharifat NJM. Evaluating the performance of some outdoor spaces at Al-Mustaqbal Private University and preparing proposed designs. Master's Thesis. College of Agriculture, Al-Qasim Green University; 2024.
3. Shouri G. Garden design and engineering. Damascus University Publications; 2016.
4. Al-Taher AA, Al-Hassan SAZ. Standards for public recreational green lawns. Doctoral Dissertation. Sudan University of Science and Technology; 2019.
5. Fakhoury TYI. Landscape design and green lawns. Arab Soc Sci Stud J (JASPSS). 2023;(9):13-15.
6. Al-Qai'i T, Noah AA. Green lawns and sports fields. Faculty of Agriculture, Alexandria University; 2004.
7. Al-Nasiri HAK. Modeling available soil water and its relationship to the physical soil quality index. PhD Dissertation. College of Agriculture, University of Baghdad; 2019.
8. Hiba AIA. A study of the current state of Al-Khasrawiya Park (Babylon) and the impact of design characteristics on the preparation of design proposals. Master's Thesis. College of Agriculture, Al-Qasim Green University; 2025.
9. Beard JB, Green RL. The role of turfgrasses in environmental protection. J Environ Qual. 2021;50(1):1-15.
10. Black CA, editor. Methods of soil analysis. Part 1. Physical and microbiological properties. Madison, WI: American Society of Agronomy; 1965.
11. Christians NE, Patton AJ, Law QD. Fundamentals of turfgrass management. 5th ed. Hoboken, NJ: John Wiley & Sons; 2016.
12. Guertal EA. Nutrient cycling in turfgrass systems. Crop Sci. 2023;63(4):1500-12.
13. Jorgenson A. Evaluating the benefits of urban green space. 2010.
14. Lindsey AJ, Schiavon M, Unruh JB, Kenworthy K. Urban landscapes: turfgrass benefits. Grasses. 2025;4(1):3. doi: 10.3390/grasses4010003.
15. Page AL, editor. Methods of soil analysis. Part 2. Chemical and microbiological properties. Madison, WI: American Society of Agronomy; 1982.
16. Qian YL, Follett RF. Assessing soil quality in turfgrass ecosystems. Soil Sci Soc Am J. 2021;85(2):345-56.
17. Richards LA. Diagnosis and improvement of saline and alkali soils. Agriculture Handbook No. 60. Washington, DC: U.S. Department of Agriculture; 1954.
18. Saleem A, Batool I. Sustainable turfgrass management: strategies for reducing emissions and inputs. J Emerg Technol Innov Res. 2025;12(8).
19. Turgeon AJ, Kaminski JE. Turfgrass management. 1st ed. Turfpath LLC; 2019.
20. Yang T, Setrag C, Xinmin L, Hossein SH, Minghao M, Jirka S, *et al*. Effect of water application methods on salinity leaching efficiency in different textured soils based on laboratory measurements and model simulations. Agric Water Manag. 2023;281:108250.

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