Plant Archives Vol. 25, Supplement 2, 2025 pp.2820-2828 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org

DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2025.v25.supplement-2.361

TURFGRASS IN URBAN AND RECREATIONAL SPACES: A GUIDE TO BENEFITS AND BEST PRACTICES

K. Ragini*, M. Raja Naik, T. Sumathi and N. Vinod Kumar

Department of Floriculture and Landscaping, College of Horticulture, Anantharajupeta, Dr. Y.S.R. Horticultural University, Andhra Pradesh-516105, India

*Corresponding author E-mail: raginikamsali118@gmail.com

(Date of Receiving : 09-05-2025; Date of Acceptance : 15-07-2025)

ABSTRACT

Turfgrasses are integral components of managed landscapes, offering a wide array of environmental, economic and health benefits. This article explores the multifaceted roles of turfgrasses, including their ability to reduce soil erosion, filter and purify water, mitigate urban heat island effects and sequester atmospheric carbon. Economically turfgrasses increases property value enhancement, provide employment in landscaping and turf management industries and play a pivotal role in recreational and sports facilities. From a health perspective, green spaces created by turfgrasses contribute to mental well-being, promote physical activity and also improves air quality. The article discusses the classification of turfgrasses into warm and cool-season species, their modes of establishment and essential management practices such as mowing, irrigation, fertilization and pest control. As sustainable land use becomes increasingly important, turfgrasses continue to serve as valuable tools for ecological balance and landscape resilience.

***Keywords* :** Turfgrasses, Environmental benefits, Economic value, Green spaces, Mental well-being.

Introduction

The term 'turf' comes from the Sanskrit word *darbha*, meaning 'tuft of grasses' and the concept of managing grass as lawns dates back to at least the 16th century (Hoad, 1986). Turfgrass has been used in civilized landscapes for a long time and is defined as grass species that form a dense ground cover and can withstand regular mowing and foot traffic (Turgeon, 2002).

Lawns occupy a significant proportion of green spaces in many cities worldwide. Despite of aesthetic and ornamental benefits, turfgrass also possess many inevitable functional benefits. It helps in maintaining ecological balance and reclamation of polluted environments due to profuse exploitation of nature in urban landscape. The major benefits include controlling soil erosion and improving soil quality, water purification and noise reduction, mitigating air pollution and dust. Turfgrass plays a major role in carbon sequestration which reduce the atmospheric temperature. Apart from these functional benefits, turfgrass is also used in various medical therapies as a tool for reducing mental stress.

Importance of turfgrass

Lawn serves decorative function also as it is called as heart of the garden as it enhances the beauty of a landscape (De, 2017). It can also act as mulches. It provides a soft cushion to playgrounds in many games mostly golf, football, baseball, soccer and athletic fields. Turf grass provides soil stabilization, means it has a binding effect of an interconnecting system of fibrous roots and aerial shoots to prevent soil erosion from air and water and it also provides a cooling effect in warm weather. On roadside, it absorbs toxic emissions from vehicles. Along airport runways, it reduces dust and prolongs the engine life. One of the strongest arguments for installing natural turf is that it is by far the most sustainable and environmentally and carbon-friendly option (Milesi *et al.*, 2005).

The turfgrass sector encompasses the development, production and management of specialized grasses used for utility, beautification and recreational purposes. It combines scientific research, creative development and the marketing of turfgrass products and services. Despite its economic significance, turfgrass remains one of the least surveyed segments among agricultural commodities, often earning it the title of a "Hidden Agricultural Industry" (Janakiram *et al*., 2015).

Over the past fifty years, landscape designers have used ornamental grasses to create a soft and dreamy look. Garden lovers should remember that a well-maintained lawn is key to a beautiful garden (Randhawa & Mukopadhyay, 1986). A lawn often called the natural green carpet, is a permanent feature that covers 60 to 70% of a garden and adds open space and beauty to the landscape (Sindhu, 2016).

Turfgrass is mainly used for lawns, athletic fields and golf courses, where proper selection and care depend on understanding the grasses environmental adaptability, maintenance needs and quality traits (Riaz *et al*., 2010). The turfgrass industry has both direct economic impacts and indirect effects on tourism in developed countries (Harivandi *et al.,* 2009). Growing concerns about water use and turf quality have increased research on water-saving practices, better management, drought resistance and the effects of nutrients and pesticides on turf areas (Shearman, 2006).

Turfs are important for functional, recreational and decorative purposes. Studies show that lawn grasses can reduce urban runoff, absorb air pollutants, cool the environment through evaporation (saving energy and improving comfort), clean up polluted soils, increase property values and support mental well-being. Grasses differ in how they grow: if the new shoot stays within the sheath of the mother plant, it's called a tiller or bunch type; if the shoot breaks through the sheath and grows sideways, it's called a spreading type. Spreading-type grasses are usually preferred over bunch-type grasses and turfgrasses grow best at temperatures that suit their natural growth patterns.

Bermudagrasses are widely utilized on athletic fields, bowling greens, tennis courts, golf courses and home lawns. Due to their high biomass yield and favourable forage characteristics, they are also cultivated as forage crops for hay production and grazing. In addition, Bermudagrass is commonly established along roadsides, waterways and other erosion-prone areas to minimize water runoff and soil loss. Among warm-season turfgrasses, it is highly wear-resistant and possesses excellent recuperative ability. Its heat and drought tolerance were highly valued by early golf course superintendents, as it required little to no irrigation during the summer months (Dunn & Diesburg, 2004).

Functional benefits of turf grasses

Controlling soil erosion

During a 30-minute storm with 76 mm/h rainfall, sediment loss from turfgrass plots ranged from 10 to 60 kg/ha, while bare soil plots lost an average of 223 kg/ha. Turfgrass is particularly effective at preventing erosion due to its dense ground cover and high shoot density, which can range from 75 million to over 20 billion shoots per hectare (Beard, 1973; Gross *et al.*, 1991).

Lawns improve the soil quality structure

Lawns play a significant role in enhancing soil quality. Grass maintains a loose and open soil structure, promoting water infiltration through abundant pore spaces. According to (Gould, 1968) many of the world's most fertile soils have developed under vegetative grass cover. In agriculture, cover crops are used for similar benefits, improving soil chemical, physical and biological properties including soil organic carbon content, cation exchange capacity, aggregate stability and water permeability (Dabney *et al*., 2001; Jose, 2017).

Turfgrass and Air pollution

It is well known that trees, shrubs and other natural vegetation in urban areas reduce air contaminant levels. By extensions like green wall and green roof, air quality and the overall experience of health and well-being of humans living in urban areas can be increased. (Nowak *et al*., 1998; Johnson and Newton 1996) estimated that 2,000 m^2 of un-mowed grass on a roof could remove as much as 4,000 kg of particulates from their leaves and stems. One meter square of uncut grass on a roof would provide enough oxygen to meet the needs of one person over one year (Minke & Witter, 1982).

Turfgrass and Carbon sequestration

One of the most effective methods for reducing atmospheric carbon dioxide concentrations is carbon sequestration. This process involves the absorption of atmospheric CO_2 by plants through photosynthesis after which it is stored as carbon in the form of carbohydrates in growing shoots (Jain, 1983; Sharma *et al*., 2014).

Turfgrasses function as carbon sinks, absorbing more CO_2 than they emit, thereby contributing to carbon sequestration. Based on their photosynthetic pathways, turfgrasses are categorized into C_3 and C_4

grasses (Ehleringer & Cerling, 2002). C_3 grasses have an adaptive advantage in regions where minimum temperatures are low during the winter growing season. In contrast, the presence of C_4 species increases with decreasing rainfall and they dominate in areas characterized by high temperatures throughout the year (Vogel *et al*., 1986; Ghannoum *et al*., 2000; Keeley *et al*., 2005).

Urban heat Island

Urban areas have higher temperatures than surrounding regions due to reduced vegetation, a phenomenon known as the Urban Heat Island effect. Turfgrass can help lower temperatures in cities by cooling itself and the surrounding air through evapotranspiration. This process can remove about 50% of the sun's heat, helping to reduce the need for indoor cooling and saving energy in nearby buildings (Beard & Johns, 1985).

Influence on surface water quality and ground water recharge

Turfgrasses are highly effective at trapping runoff and increasing water infiltration into the soil (Angle, 1985; Gross *et al*., 1990). Rainwater filtered through turfgrass is about 10 times less acidic than runoff from hard surfaces. Turfgrass also supports large earthworm populations (200-300/m²), which help create soil pores, improving water infiltration and retention (Potter *et al.,* 1985; Lee, 1985).

Water purification and noise reduction

Runoff from hard surfaces in urban areas often carries pollutants like heavy metals (Pb, Cd, Cu, Zn), hydrocarbons and hazardous wastes (Artina *et al*., 1999; Kim *et al.,* 2005; Zhao *et al*., 2006). Turfgrasses can be designed to catch and filter this polluted runoff (Schuyler, 1987). The microflora in turfgrass soils play a key role in breaking down chemicals and pesticides (Alexander, 1977). About 10% of U.S. golf courses already use treated wastewater to irrigate turf. Turfgrass also reduces noise by absorbing sound from traffic and people and its surface minimizes glare by reflecting light in multiple directions (Cook & Van Haverbake, 1971; Robinette, 1970). These environmental benefits are greatest when turfgrasses are used together with trees and shrubs, though this integrated approach has received limited scientific focus.

Monitory value

Turfgrass, when used in a well-maintained landscape, can increase a home's property value by 15 to 20% and is part of the larger "Green Industry" which is highly profitable due to its high selling price per unit area compared to other ornamentals (Roshini *et al.,* 2017). It enhances the beauty of millions of lawns, supports outdoor recreation for nearly 26 million golfers on over 17,000 golf courses and creates jobs for seed producers, sod growers, lawn care workers and landscapers. In India, turfgrass sells for Rs. 100 per m^2, generating up to Rs. 20,00,000 per hectare. In tropical regions like India, the highest benefit-cost ratio is achieved by planting Mexican grass, using chemical weed control and establishing turf through seed sowing (Sithin *et al.,* 2020).

The Health Benefits

Walking barefoot on turfgrass stimulates nerve endings in the feet, helping to balance the nervous system and improve blood circulation, which supports heart health and reduces the risk of cardiac issues (Janakiram *et al.,* 2015). Improved circulation also enhances brain function and reduces blood viscosity. Some studies suggest it may even improve eyesight. In acupuncture therapy, walking on grass is used to treat various conditions. It also helps regulate the body's circadian rhythm for better sleep and reduces stress, with the green color of turfgrass providing mental relaxation often used in yoga practices.

Assessments of turfgrass quality

All turfgrass quality assessments were conducted visually, with care taken to ensure consistency and accuracy. The evaluation followed the method described by the National Turfgrass Evaluation Program and The Pennsylvania Turfgrass Council. Turf quality was rated on a scale of 1 to 9, where 9 represented the highest quality. A rating of 6 or higher is considered acceptable. However, quality is rated relative to the species; for instance, a 6 in tall fescue is not equal to a 6 in Kentucky bluegrass. The overall quality score reflected the general appearance of the turf and included several components such as density, texture (leaf width), uniformity, colour, stress tolerance, drought tolerance and frost tolerance (Morris, 2004).

- **Colour** was rated based on the natural green colour of the turf excluding effects of stress or damage with 9 indicating the darkest green.
- **Uniformity** referred to the evenness of the turf surface and was rated visually on a 1 to 9 scale.
- **Density** was a visual estimate of the number of healthy turfgrass plants per unit area, excluding areas affected by disease or pests. A higher score indicated greater density.
- **Texture** measured the fineness or coarseness of the leaf blades with higher ratings representing

finer textures. Texture indicates leaf width; 1 means coarse and 9 means fine. Visual ratings are preferred over measurements for practicality.

- **Stress tolerance** scores reflected the turf's response to environmental stress, pests or diseases, where 1 indicated severe damage and 9 indicated no visible stress.
- **Drought Tolerance** This measures wilting, leaf firing, dormancy or recovery using a 1 to 9 scale, where 9 means no symptoms and 1 means complete damage.
- **Frost Tolerance** Winter injury is measured as percent damaged ground cover or by a 1 to 9 visual scale for frost injury, with 9 meaning no injury.

Morphological characters

Shoot growth:

Mansour & Hussein (2002) found that turfgrasses grown on sand were the most sensitive to salinity, showing the lowest lawn coverage, plant height before mowing and fresh and dry weight of clippings. Plants grown on clay had higher levels of sodium (Na), calcium (Ca) and chloride (Cl) than those grown on sand or a clay-sand mix.

Jordan *et al.* (2003) found that coarse-textured soil led to more drainage. However, better root exploration for water and nutrients improved turf quality and increased shoot density.

Soldat *et al.* (2007) showed that proper fertilizer management for turfgrass promotes healthy growth while reducing the risk of nutrient and sediment runoff that can pollute water. (Lunenberg *et al.,* 2009) found that *Festuca trichophylla* cv. *Smirna* and *Barcrown*, *Agrostis stolonifera* cv. *Penn-G2* and *Agrostis canina* cv. *Avalon* performed best in acidic soil with a pH of 5.7.

Root growth

To promote root growth, soil needs a good balance of water, air and structure. In high-traffic areas, good soil aeration is especially important (Grable, 1996). (Matthieu *et al.,* 2011) found that soil compaction limits deep root growth and reduces access to water and nutrients. They tested seven turfgrass species in soil columns with varying compaction levels. Root growth was reduced in all species, especially when compaction was between 1.7 and 1.8 g/cm³. The results showed little difference between species in their ability to grow in compacted soil, suggesting that proper soil preparation and management are more effective than selecting specific grass types to deal with compaction.

Leaf growth and grass coverage

Gary (1967) found that different turfgrasses vary in how quickly they spread, with Bermuda grass showing the fastest growth among warm-season grasses. (Morgan *et al.,* 2001) reported that bentgrass established more quickly on amended sand because it held more water and had better nutrient-holding capacity than unamended sand.

Fresh and dry weight:

Mahaboob Basha (2007) reported that red soil gave the highest root-to-shoot ratio and was best suited for Korean, Mexican, Bermuda and St. Augustine grasses. For black and laterite soils, St. Augustine or Bermuda were the most suitable. According to (Al-Qahtani,2009) adding sand did not affect germination but higher sand content reduced the fresh and dry weight of turfgrass.

Classification of turf grasses

Temperature and other environmental factors play a crucial role in the evolution of turfgrasses, leading to diverse physiological and morphological adaptations. Based on variations in temperature and precipitation patterns, turfgrasses are generally classified into two categories: warm-season and cool-season grasses (Xu *et al.*, 2011).

Turfgrasses are divided into two main types: warm-season (C_4) and cool-season (C_3), each consisting of various species with different growth habits, stress tolerance and care needs. Warm-season grasses thrive in warmer southern regions, while cool-season grasses are suited to cooler northern climates.

Cool-season grasses grow best at 15.5 to 24°C and stay green in cold weather, while warm-season grasses prefer 27 to 35°C, tolerate drought well, but lose color in low temperatures (Beard, 1973). For landscaping, turfgrass should have both visual and functional qualities-visually, it should have good color, texture, density and uniformity; functionally, it should be strong, flexible, resilient and able to recover and withstand use (Paramanguru, 2010).

Several grass varieties are popular for turfing in warm climates, including Cowgrass (*Axonopus compressus*), Bermudagrass (*Cynodon dactylon*) and St. Augustine grass (*Stenotaphrum secundatum*). Among Zoysiagrasses, three commonly used warm-season species are Manilagrass (*Zoysia matrella*), Koreangrass (*Zoysia japonica*) and Mexicangrass (*Zoysia tenuifolia*) (Beard, 1973).

Alessandro *et al*. (2007) studied warm-season turfgrasses in northern Italy and found that the

Bermuda grass cultivar 'Tifway-419' had the fastest establishment, while the Zoysia matrella cultivar 'Zeon' had the highest shoot density and rhizome-stolon length.

Namita and Janakiram (2012) reported that *Agrostis palustris* had the highest shoot and root densities, while *Cynodon dactylon* var. 'Panama' had the lowest.

Beard (1973) classified 'Emerald' Zoysia and 'Tiffine' Bermuda grasses as fine-textured, 'U-3' Bermuda, 'Meyer' Zoysia and Buffalo grass as medium-textured and Centipede grass as coarse-textured.

Mastalerezuk *et al.* (2011) found *Lolium perenne* to be one of the best turfgrasses based on appearance, root density and growth.

Martin and Hillock (2000) reported that Bermuda grass had excellent drought resistance, good wear tolerance and established faster through sods, sprigs and plugs than by seed, while St. Augustine and Zoysia grasses showed moderate establishment rates in Oklahoma.

Description of the turf grass species

Kentucky bluegrass (*Poa pratensis*)

Kentucky bluegrass (*Poa pratensis*) is a widely used cool-season species, also grown at higher elevations in subtropical zones. It spreads by strong rhizomes, forming a medium to high-density turf, making it ideal for athletic fields due to its excellent recuperative ability (Emmons, 1995). It is preferred over other grasses for its dense growth, attractive color, clean mowing, cold tolerance and competitiveness against weeds when properly maintained at a mowing height of 1.5 to 3 inches (Double, 1989).

Bermuda grass (*Cynodon dactylon*)

Bermuda grass (*Cynodon dactylon*) is a widely used turf species for sports fields, lawns, parks, golf courses and utility areas in regions like Australia, Africa, India, South America and the southern U.S. It is a sod-forming, perennial grass that spreads through stolons, rhizomes and seeds. The stolons easily root at the nodes and the leaf pattern alternating long and short internodes gives the appearance of multiple leaves at a single node (Daniel & Umamaheswari, 2001; Manickam *et al*., 2003).

Korean grass (*Zoysia japonica*)

Zoysia grasses are perennial, sod-forming turf species with both stolons and rhizomes. They range from very fine to coarse leaf textures and their stiff leaf blades are due to high silica content (Brosnan & Deputy, 2008).

St. Augustine grass (*Stenotaphrum secundatum*)

St. Augustine grass (*Stenotaphrum secundatum*) is native to the Gulf of Mexico, the West Indies and Western Africa. It is a fast-growing, coarse-textured grass with medium to dark green color that forms a dense, lush cover with proper care. Best suited for warm, humid regions, it thrive in fertile, well-drained soils and shows good tolerance to shade, salt, heat and drought but is sensitive to intense cold (Basha, 2007).

Dichondra *(Dichondra micrantha*)

Dichondra is a warm-season, perennial broad-leaved species known for its kidney-shaped leaves and spreading stolons that root at the nodes. It grows best in tropical areas, is intolerant to freezing temperatures and is easily damaged by cold. It forms an attractive, low-growing, dense ground cover with soft, pale green leaves. The plant tolerates partial shade and typically grows no taller than 3 inches in full sun and up to 6 inches in shaded conditions. It also shows good resistance to diseases (Christians, 2004).

Centipede grass (*Eremochloa ophiuroides*)

Centipede grass is a low-maintenance warm-season grass commonly used in the southern United States (Baird *et al*., 1989; Beard, 1973).

It has a membranous ligule with short hairs at the tip and spreads by stolons, not rhizomes. It can be established by seed or vegetative methods, but germinates slowly (10-14 days) and weed competition, especially from crabgrass (*Digitaria* spp.) can delay turf coverage (Brede, 2000; Gannon *et al*., 2004).

Its cold tolerance is moderate, falling between that of St. Augustine and Bermuda grasses. Its use is growing in lawns and quality turf areas, especially in coastal Louisiana and other Gulf regions, where sod production is increasing.

Site preparation

Accordding to (Dey *et al.*, 2024) proper site preparation is essential for establishing a healthy, long-lasting lawn. It begins with soil testing to determine nutrient needs and pH adjustments. Grading the site ensures water drains away from the lawn, preventing waterlogging. A gentle slope of 1-1.5% is recommended unless using a sand-based root zone. All debris such as stones, branches and roots should be removed. In poorly drained areas, both surface and subsurface drainage systems may be necessary. Avoid grading wet, fine-textured soils like clay as they compact easily.

Tillage is important to loosen the soil, improve aeration, and enhance water movement. Loosen the top 8 inches of soil, then firm the top 4 inches to support turfgrass growth. Summer is usually the best time to till, especially in clay soils. Before seeding or sodding, apply lime and fertilizers (nitrogen, phosphorus, potassium) based on soil test results. These should be mixed into the soil to a depth of 6-8 inches. Use slow-release nitrogen sources to reduce leaching and apply additional nitrogen when turf growth declines.

Soil amendments like compost, peat moss, biosolids, sand, gypsum and lime can improve soil structure and fertility. Organic matter is especially helpful in very sandy or heavy clay soils leading to faster and healthier turfgrass establishment.

Turf Establishment Methods

Lawn can be established in different ways-such as seeding, dibbling, sodding, stolonizing, turf plastering, hydro-seeding and astro-turfing depending on the grass type and the planting material available

After soil preparation, rapid turfgrass establishment is essential to prevent erosion and weed encroachment. Turfgrasses can be propagated either sexually (by seed) or asexually (vegetatively) but asexual methods are more commonly used due to their faster establishment.

1. **Seeding:** When vegetative materials like sod, sprigs or plugs are unavailable, seeding becomes a viable option for turfgrass propagation. Ideally seeds should be applied using a slit/slice seeder or a drop-type spreader. For uniform coverage, seeding in two perpendicular directions is recommended. Seeds should be lightly incorporated into the soil at a depth of 1/4 to 1/2 inch. After seeding, rolling the area with a lightweight turf roller helps ensure good seed-to-soil contact. Although seeding is less expensive and offers a wide selection of grass species, it requires consistent moisture and generally takes longer to establish compared to asexual methods (Dey *et al.*, 2024).
2. **Dibbling:** Dibbling is a low-cost but slow method where mature grass cuttings are planted 7-10 cm apart in wet soil, usually between June and September and with regular care, they form a dense lawn in about six months.
3. **Sodding:** Turfing or sodding involves laying thin strips of grass with soil on prepared ground, quickly creating a lawn, especially useful on slopes, but it is costly and limits grass type selection.
4. **Stolonizing:** Stolonizing is a method of vegetative turfgrass propagation, also known as *broadcast sprigging*. In this technique, a recommended quantity of sprigs (above-ground, horizontal stems or stolons) is uniformly spread over a well-prepared soil surface. The sprigs are then lightly covered with soil and rolled to ensure good soil contact and to promote rooting. This method is especially suited for establishing turf over large areas such as athletic fields, golf courses and roadside landscaping (Vasanthkumar & Bulti Merga, 2017).
5. **Turf plastering:** This method doesn't work well in dry or arid areas. However, it allows for easy collection of submerged grass, which can be cut into long or short pieces (5-7 cm). Mix two baskets of cut grass with one basket each of fresh garden soil and cow dung, a shovel of wood ash and enough water. Spread the mixture evenly (about 2.5 cm thick) over a pre-wetted surface and water it using a can. The next day, roll the soil and let the grass spread. It will grow in about two weeks. (Hathi *et al.*,2020)

Advances in Management of Turfgrass

Turfgrass management involves various practices such as sowing, weeding, fertilizing, irrigating, mowing, rolling, aerating (through coring, drilling, slicing, spiking and water injection), vertical mowing, matting and applying wetting agents, turf colorants, plant growth regulators and following weed control and integrated pest management (IPM) strategies.

Turf specific practices

1. **Aerification:** Aerification reduces soil compaction, improves gas exchange, and helps remove thatch; it is best done during low-stress periods using equipment like lawn aerators, vertical motion units or circular motion units (Mathew *et al.*, 2016).
2. **Vertical mowing:** Vertical mowing, also known as power raking, uses rapidly spinning vertical blades to remove thatch from the turf.
3. **Water injection cultivation:** Water injection cultivation is a newer method to relieve compaction by releasing high-pressure, heated water through small nozzles to loosen soil, improve water infiltration and promote root growth.
4. **Syringing:** Syringing is the light application of water to turf to cool the surface and modify the micro-environment during high temperatures.

5. **Matting:** Matting involves dragging a heavy steel mat over the turf to remove soil from foliage, work topdressing into the turf and redistribute soil to fill low spots (Mathew *et al.,*2016).

6. **Turf colorants:** Turf colorants are used for various purposes, such as artificially coloring dormant turf improving the appearance of diseased or discolored areas and marking sprayed zones.(Shearman *et al.* 2005) reported that applying turfgrass colorant at twice the label rate enhanced the visual color rating of dormant buffalo grass turf.

7. **Rolling:** Rolling is used to correct minor surface irregularities in turf. (Richards *et al.*, 2007) found that ball roll distance improved most with a mowing height of 1/8 inch, mowing three times a week and rolling six times a week.

8. **Slicing:** Slicing involves penetrating turf to a depth of 3 to 4 inches using V-shaped knives on disks and is typically done on fairways or high-traffic areas during midsummer stress when coring may be too damaging (Mathew *et al*.,2016).

9. **Mowing:** The ideal mowing height depends on the grass species growth habit and leaf texture. Adequate leaf surface must be left to ensure photosynthesis and plant survival as mowing too low reduces food production and weakens the lawn. On the other hand, mowing too high may negatively affect turf appearance or performance (University of California, 2014).

Conclusion

Turfgrasses play a vital role in enhancing environmental quality, supporting economic sustainability and contributing to public health and well-being. Their ability to prevent soil erosion, purify water, mitigate urban heat and sequester carbon underscores their ecological significance. Additionally, well-maintained turf areas improves property value, support recreational industries and create employment opportunities. The therapeutic and psychological benefits of green spaces further emphasize the importance of integrating turfgrasses into urban and rural landscapes. Understanding turfgrass classification, species selection and proper management practices is essential for achieving both functional and aesthetic goals. As sustainable landscaping and environmental stewardship gain momentum, turfgrasses will continue to be a cornerstone of green infrastructure and ecological resilience.

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