Planting and Protection Measures for Seedlings in Urban Landscaping Construction

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Abstract: This paper focuses on urban landscaping construction, delving into seedling planting techniques and protection measures. In the preliminary stage of planting, foundational growth conditions are established through site investigation, soil improvement, seedling selection and transportation, and material preparation. During the implementation phase, key operations such as planting pit excavation, seedling fixation, watering, and support are strictly controlled to ensure planting success. Seedling protection involves meticulous water and fertilizer management, scientific pruning and shaping, comprehensive pest and disease control measures, and protection in special environments. Relying on the construction of skilled work teams, the establishment of a quality supervision system, and the creation of a long-term maintenance mechanism, comprehensive guarantees are provided for the planting and protection of seedlings, promoting the optimization and upgrading of the urban ecological environment.

1. Introduction

Seedlings are the core element of landscaping. Their planting quality and subsequent protection status are directly related to the success of greening efforts and the exertion of ecological functions. However, at the current stage of urban landscaping construction, seedling planting faces issues such as non-standard techniques and low survival rates. Protection measures also often lack systematic and scientific approaches, making it difficult to effectively respond to complex environmental changes and pest threats. Therefore, deeply exploring the key techniques of seedling planting and establishing a complete framework of protection measures have become urgent tasks essential for enhancing the quality of the urban landscape environment and promoting sustainable urban development.

2. Key Technical Points for Seedling Planting in Urban Landscaping Construction

2.1 Pre-planting Preparation

Pre-planting preparations require establishing initial growth conditions for seedlings from multiple dimensions. First, conduct site investigation and design calibration. Compare the construction drawings to verify seedling planting locations, specifications, quantities, and planting pit parameters. Simultaneously, investigate regional climate, topography, and underground pipeline distribution to ensure the design matches the site conditions. Secondly, perform soil improvement. Test soil pH, organic matter content, and permeability. Plow compacted soil to a depth of 30-40 cm. Add lime to adjust acidic soil and sulfur powder to acidify alkaline soil. Incorporate well-rotted organic fertilizer when fertility is insufficient. Plan open ditches or blind pipes in areas with poor drainage. Furthermore, select and transport seedlings. Choose seedlings adapted to the local environment with well-developed, undamaged root systems. For balled-and-burlapped (B&B) seedlings, the soil ball diameter should be 6-8 times the trunk diameter near the base (caliper), and it should be wrapped for moisture retention. Bare-root seedlings should retain protective soil around the core roots (hu xin tu). Avoid strong light and high temperatures during transport to prevent crushing damage. Finally, prepare materials. Tools such as shovels and cranes, as well as maintenance supplies like organic fertilizer and fungicides, should be prepared and must pass

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quality inspection[1].

2.2 Planting Process Operations

Planting operations require precise control of key steps. Excavate planting pits according to seedling specifications. For B&B seedlings, the pit diameter should be 50 cm larger than the soil ball, and the depth 30 cm deeper. For bare-root seedlings, the pit diameter should be 20-30 cm wider than the root spread. Remove debris and disinfect the pit. The bottom can be layered with loose soil or organic fertilizer. Before planting, trim damaged roots and diseased or weak branches. Remove wrapping materials from B&B seedlings. Position the seedling, adjust for verticality and the optimal viewing angle. For bare-root seedlings, when backfilling halfway, gently lift the seedling to spread the roots, then backfill in layers and tamp down firmly. Water thoroughly immediately after planting (settling-in water). For large B&B seedlings, insert a water pipe for supplemental watering. Check for soil settlement and add more soil if needed. Support trees with a caliper over 5 cm using triangular supports. Wrap support contact points with soft material. Finally, mulch with straw to retain moisture and suppress weeds[2].

3. Seedling Protection Measures in Urban Landscaping Construction

3.1 Precise Water and Fertilizer Management

3.1.1 Water management should follow the principle of "supply on demand, avoid imbalance."

Newly planted seedlings have unstable root systems. Within 7 days after planting, water thoroughly twice with settling-in water to ensure close soil-root contact and maintain consistent moisture, creating conditions for root healing and growth. During the growing season, water demand stabilizes; watering once every 20 days can meet basic needs. During high temperatures and drought, increase soil irrigation frequency and also spray foliage to increase air humidity and reduce water loss from transpiration. During rainy seasons, reduce watering promptly and clear drainage systems (open ditches, underground pipes) in planting areas to avoid waterlogging causing root oxygen deficiency and rot. Pay attention to details: irrigation water temperature should be close to ambient temperature; if using groundwater, let it warm up beforehand to prevent cold shock to roots; avoid watering during midday high temperatures to reduce evaporation and root scalding risk; for water-loss-prone seedlings, apply anti-transpirants up to 3 times within the first month after planting, avoiding excessive use that affects normal physiological functions[3].

3.1.2 Fertilizer management should follow the principle of "stage-specific adaptation, scientific application."

Apply fertilizer differentially according to growth stages: Sapling stage (spring): focus on nitrogen fertilizer (e.g., urea, 10-15 kg per mu) to promote leaf bud growth and photosynthesis. Flowering and fruiting stage (summer): emphasize phosphorus and potassium fertilizers (e.g., potassium dihydrogen phosphate) to supplement nutrients needed and improve flower/fruit quality. Autumn, as growth slows: increase potassium fertilizer (e.g., potassium chloride, 7.5-15 g/m²) to enhance lignification and cold resistance. Adjust application methods based on seedling type: For trees, use the circular trench method: dig a trench of suitable depth along the drip line (outer edge of canopy projection), spread fertilizer evenly, and backfill soil to guide roots outward. For shrubs, the band application method is suitable: trench along the plant row for convenient operation and even nutrient distribution. During key growth stages like flowering and fruiting, foliar spraying of micronutrient fertilizers (e.g., boron, potassium dihydrogen phosphate) can quickly supplement nutrients. Avoid direct contact between fertilizer and roots; dilute fertilizer or mix it with soil first to prevent root burn from high concentration[4].

3.2 Pruning and Shaping

3.2.1 Pay attention to the phenological period of seedlings.

Prune spring-flowering seedlings (e.g., peach, apricot) after blooming to prevent loss of flower buds from early pruning. Prune autumn-flowering seedlings (e.g., camellia, osmanthus) during the winter-spring dormancy period when nutrient consumption is low, minimizing impact on growth. Deciduous seedlings are best pruned intensively during winter dormancy to reduce water evaporation and nutrient consumption. Evergreen seedlings can be lightly pruned during the growing season; avoid winter pruning which may sparse foliage, affecting landscape appeal and cold resistance.

3.2.2 Differentiated operations, balancing growth needs and landscape effects.

Tree pruning should shape the tree according to cultivation goals: For a "natural open-center shape", thin out overcrowded and crossing branches to ensure an open, ventilated canopy. For a "central leader shape", maintain the dominance of the main trunk, remove competing branches, ensuring an upright trunk. For street trees, control the branch point height to no less than 2.5 m to avoid affecting traffic and pedestrians. Shrub pruning should focus on landscape integrity: Increase planting density appropriately at the edges of massed shrubs to ensure smooth, natural lines and an arched profile. Prune spent flowers promptly after blooming to reduce nutrient consumption, promote new shoot growth, and extend the flowering period. Regularly prune withered and yellow leaves from herbaceous plants to maintain plant tidiness and prevent decay-induced diseases[5].

3.3 Integrated Pest and Disease Control

3.3.1. Reduce pests and diseases through natural regulation

Biological control is a core method for maintaining ecological balance. Introduce natural enemies of pests, such as using ladybugs (e.g., *Coccinella septempunctata*) to control aphids or trichogramma wasps to control lepidopteran pests, utilizing the food chain for population control. Also, apply biological pesticides like *Beauveria bassiana* and *Bacillus thuringiensis* (Bt), which have specific toxic effects on target pests and are harmless to the environment and beneficial organisms, avoiding chemical pollution.

3.3.2 Combine early prevention with direct intervention

In early spring, remove insect eggs and larvae by spraying water to wash leaves and branches, and tilling the soil to reduce overwintering pest bases. During the growth period, install insect traps to kill phototactic pests and set up insect-proof nets to block pest infestations, physically cutting off transmission paths and reducing the probability of damage.

3.3.3 Strictly control pesticide use

Chemical control, as an emergency supplementary measure, requires strict control of pesticide use. Choose low-toxicity, high-efficiency, low-residue pesticides, such as imidacloprid for aphids and cypermethrin for lepidopteran pests. Strictly follow the instructions on the label for dosage and application frequency to avoid phytotoxicity and environmental pollution from overuse. Ensure even coverage on both sides of leaves and branches during application for effective control.

3.4 Protection in Special Environments

3.4.1 Deploy measures in advance

Before cold waves, wrap the main trunks of seedlings with materials like straw or thermal cotton to reduce heat loss. Apply tree whitewashing (trunk painting with white latex) to reflect sunlight and prevent bark frost cracking caused by large day-night temperature differences. For precious or less cold-hardy seedlings, set up plastic sheds or shade nets (which also provide insulation in winter) to create a locally warmer environment. In autumn, apply NPK fertilizers to enhance nutrient accumulation and cold resistance, preparing for overwintering.

3.4.2 Focus on protection during high temperature and drought periods

During high temperatures, set up shade sheds to block intense light. Maintain a certain distance between the shed and the canopy to ensure air circulation and avoid stuffy conditions affecting growth. Regularly spray foliage to lower leaf temperature, supplement water, and reduce leaf scorch and wilting caused by transpiration water loss[6].

3.4.3 Strengthen response to extreme precipitation

After heavy rain, promptly check for water accumulation in planting pits and low-lying areas. Use pumping equipment to quickly remove standing water to avoid prolonged root soaking. Simultaneously, check the drainage system for blockages and clear or repair clogged open ditches and underground pipes to ensure subsequent rainfall can drain promptly, preventing root oxygen deficiency and rot.

4.Safeguard Measures for Seedling Planting and Protection in Urban Landscaping Construction

4.1 Strengthen Construction Team Building

The construction team is the core force ensuring planting quality. Specialized training and professional guidance must be implemented simultaneously to solidify personnel expertise.

Training should focus on core technical modules, targeting key links in seedling planting and protection. Content should cover soil improvement (e.g., pH adjustment, permeability optimization, fertility supplementation), seedling fixation (practical standards for pit excavation, root treatment, plant alignment, layered backfilling), pest and disease control (applicable scenarios and methods for biological, physical, and chemical control). Combining theoretical explanation with practical demonstrations ensures workers master technical standards, understand operational taboos, and avoid seedling damage or reduced survival rates due to substandard techniques.

Technical guidance requires enhanced on-site professional support, deploying technicians with landscaping backgrounds (e.g., landscape engineers) for site supervision. Professionals must follow the entire construction process, inspecting operations for compliance, and promptly correcting issues like improper planting posture, non-compliant pit dimensions, or inadequate soil treatment. They should also proactively engage with workers to solve technical problems encountered, such as root pruning extent for different seedlings or adjustments to soil improvement plans, ensuring construction always follows scientific requirements and improves overall construction quality[7].

4.2 Improve the Quality Supervision System

Quality supervision must run through the entire process of planting and protection, forming closed-loop management through pre-approval, process inspection, and post-assessment to eliminate quality loopholes.

Pre-approval needs to solidify the quality foundation. Strictly review construction drawings, checking the alignment of planting locations, specifications, pit parameters, etc., with the site reality, ensuring the design is practical and avoiding subsequent issues due to discrepancies. Also, conduct physico-chemical tests on planting area soil to determine pH, organic matter content, permeability, etc., providing a basis for soil improvement and ensuring conditions meet seedling growth needs.

Process inspection should focus on key links. Key inspection points include planting pit specifications (diameter, depth, wall smoothness, debris removal), seedling fixation posture (trunk verticality, viewing aspect orientation, root spread), settling-in water irrigation (volume, penetration depth). Establish a comprehensive construction log system, detailing construction time, operations, seedling status, and site environment for traceability and timely adjustment of plans.

Post-assessment needs to track seedling survival status. Within one month after planting, conduct weekly site inspections, observing leaf color, branch vitality, root growth signs, and checking for wilting or pests/diseases. Calculate survival rates after inspections, analyze reasons for low survival (e.g., unsuitable soil, improper planting), providing data support for optimizing future planting and protection measures[8].

4.3 Establish a Long-term Maintenance Mechanism

A long-term maintenance mechanism is crucial for the sustained healthy growth of seedlings. Therefore, based on seasonal characteristics and growth requirements, define key maintenance content by season: Spring focuses on watering and fertilizing to supplement essential moisture and nutrients for budding. Summer primarily addresses sunscald protection and drainage, using spraying, shade cloths, and clearing drainage pipes to handle heat/drought and stormwaterlogging. Autumn emphasizes nutrient accumulation and cold resistance preparation, applying more potassium fertilizer and removing diseased/weak branches. Winter implements frost protection and insulation measures, such as trunk wrapping and whitewashing, ensuring seedlings survive the winter, forming a targeted, seasonally-differentiated maintenance closed loop.

5. Conclusion

This study systematically outlines the technical key points of seedling planting and protection measures in urban landscaping construction, while also proposing corresponding safeguard measures. Proper application of these techniques and measures can significantly improve seedling survival rates, promote healthy growth, and enhance the landscape effect and ecological function of urban landscaping. As urban construction continues to expand, relevant departments and practitioners must continuously explore and innovate, further refining strategies for seedling planting and protection to meet the increasing demands of urban development on landscaping, thereby helping the urban ecological environment enter a new stage of higher-quality development.

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