



CASE STUDY

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The puzzling phenomenon of trees flourishing under street lights: Unraveling the effects of artificial roadside night lighting on ecosystems

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Abstract

This study investigates the phenomenon of trees thriving under street lights, presenting observations from an educational institution's campus. Trees, naturally illuminated by streetlights, exhibit robust growth without deliberate human intervention. Such adaptation challenges conventional understanding of circadian rhythms and highlights the resilience of urban ecosystems. The unexpected symbiosis between street lights and trees underscores the need for re-evaluation in urban planning strategies, emphasizing sustainable cohabitation between human infrastructure and nature. Understanding the intricate relationship between artificial lighting and plant development offers opportunities for enhancing urban greenery and mitigating the adverse effects of urbanization on ecosystems. Further research is warranted to elucidate the mechanisms underlying this phenomenon and optimize lighting strategies for urban sustainability.

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Introduction

Natural light cycles, including daily, lunar, and seasonal variations, have been significant environmental factors on Earth since life first appeared (Gaston *et al.*, 2015). Artificial light at night (ALAN) has significantly altered the natural light patterns throughout the past century. This stems from several sources such as street lighting, advertising illumination, architectural lighting, security lighting, home lighting, and vehicle lighting (Davies *et al.*, 2013). Artificial light at night (ALAN) is becoming a significant factor in driving worldwide transformation. ALAN is expanding worldwide with a 6% annual increase in sky luminance (Dalle *et al.*, 2023). Streetlamps affect the night-time lighting of trees in urban areas; however there is no research on how street trees behave ecophysiologicaly in these situations (Liu *et al.*, 2021).

Light is crucial in the physiology and ecology of plants. Plants utilise light for both photosynthesis and as a means of receiving information. Natural light cycles influence circadian rhythms, seasonal changes, and the development of traits like growth shape and

resource allocation. Many natural or semi-natural habitats are exposed to artificial light at night at levels that can have physiological impacts on plants (Bennie *et al.*, 2016). The interference of natural light cycles due to the presence of artificial light at night has been proven to significantly impact several species by changing their physiology or behaviour (Long *et al.*, 2004). There is a lack of research on the impact of outdoor artificial night time lighting on plant species (Bennie *et al.*, 2016).

Researchers are studying the detrimental impact of streetlights on plant growth in urban areas dominated by concrete jungles, where an interesting phenomenon is occurring under the artificial light. Some trees grow and bloom under street lights without purposeful human care. This inexplicable event has aroused curiosity, leading to an investigation to reveal the mysteries surrounding the peculiar link between trees and street lighting. Upon closer examination, it is evident that certain trees are not only surviving but flourishing in the vicinity of street lights, presenting an unexpected paradox.



Fig. 1A-B. Street lights and trees in night



Fig. 2A-B. Street light lamp posts and trees in day time

Here, I present my observations regarding the growth of trees naturally illuminated by street lights in a street within an educational institution. Streetlights illuminate the Educational institutions campus streets where mobility is unavailable at night. Trees are located sporadically under the illumination of each streetlight pole. The streetlights are powered by underground electrical wires, which have not caused any problems for the workers. Moreover, there is little foot traffic, which enables trees and plants to grow unrestrictedly around these poles. These trees are not deliberately planted by people and have not been cared for with water or fertilisers. Fig. 1A & B show the trees at night under the lampposts. The trees along with the lamp posts in day time (Fig. 2A & B).

Light is a key element in photosynthesis and is essential for the growth and development of plants (Yang *et al.*, 2023). Sunlight is the main energy source for photosynthesis. However, what happens to trees exposed to city lights at night? Trees adapting to artificial light sources complicates our understanding of their circadian rhythms. Despite being influenced by natural light-dark cycles, these adaptable trees have evolved strategies to utilise the energy from city lights, challenging the distinction between day and night.

Trees prospering under street lights demonstrate the inadvertent impact of humans on urban ecosystems, even in the absence of deliberate intervention. Street lights, originally set up to ensure the safety and comfort of people, unintentionally end up protecting these sturdy trees. Creating a fostering environment for specific tree species has unforeseen consequences that challenge conventional urban planning ideas and need a reassessment of the complex relationships between humans and nature in urban areas.

Some trees can adapt and survive under street lights, highlighting the need for more exploration of the intricate relationship between urban settings and nature. More research is required to go deeper into this remarkable phenomenon and understand the underlying causes.

Conclusion

The surprising growth of trees under street lights is a reminder of nature's capacity to thrive in urban environments due to its resilience and adaptability. Understanding the intricate connections between trees and artificial light is essential as we work towards constructing sustainable and environmentally friendly communities. The hidden narrative of trees flourishing

under street lights prompts a reconsideration of our urban planning strategies, promoting a balanced cohabitation between man-made structures and the environment. The finding that street lights aid in the growth of trees suggests a significant relationship between artificial lighting and plant development. This discovery holds implications for urban planning and environmental management. The integration of street lighting systems with considerations for tree growth can potentially enhance urban greenery and mitigate the adverse effects of urbanization on ecosystems. Municipalities and urban planners should take into account this newfound synergy between street lights and trees to foster sustainable urban environments that promote both human well-being and ecological balance. Further research is warranted to explore the precise mechanisms underlying this phenomenon and to develop optimized lighting strategies that benefit both urban infrastructure and natural ecosystems.

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