

Opinion

From plant blindness to plant awareness

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Abstract

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A tendency to pay limited attention to plants, often described as “plant blindness”, can lead to failing to recognise their biological, ecological and societal importance. This opinion paper argues that botanical education should be an integral part of environmental education and sustainable development, not a narrowly specialised branch of biology. The paper proposes that plant education should connect botanical knowledge with biodiversity conservation, climate resilience, human health, the food system and responsible decision-making. This should be achieved through age-appropriate, experiential approaches in both formal and informal education settings. Integrating botany into school curricula, higher education, and community-based learning can strengthen the connection between plant knowledge and biological, ecological, health, and environmental contexts, thereby fostering ecological literacy. Plant education is not a nostalgic return to classical botany; rather, it develops the knowledge and competencies needed to understand biodiversity, use biological resources responsibly, and respond to environmental and climate challenges. Recognising and teaching the ecological and societal value of plants is essential for fostering an informed attitude towards biodiversity and encouraging responsible environmental action. In conclusion, to envision the future, we must first learn to appreciate the value of plants.

Keywords: biodiversity conservation, botany, citizen science, environmental education, plants, sustainability.

INTRODUCTION

In the late 1970s, the punk generation adopted the slogan “No Future” to express their social alienation and disillusionment with the future (Sex Pistols, “God Save the Queen”, 1977). This was not only a cry of protest, but also a cultural response to social alienation, conformity, and uncertainty about the future. Their sharp, uncompromising music reflected a generation’s disillusionment, a refusal to see a future.

Today, the loss and degradation of plants and plant-dependent ecosystems pose a different kind of threat: an ecological one. Our survival depends

not only on technological or political resilience, but also on our understanding of living systems and our relationship with them. However, plants remain underrepresented in education, politics, and the public imagination.

Half a century later, this slogan has taken on an ecological dimension: “No plants – no future”. While the original slogan reflected a social and cultural crisis, the updated version highlights an ecological one. This evolution from a protest anthem to an ecological warning underscores how critically dependent human well-being is on healthy ecosystems and biodiversity (Keck et al., 2025; Simões et al., 2025; Robinson et al., 2024).

At first, this may seem an exaggeration – after all, there are more obvious threats to human survival. However, there are no “secondary” issues. We may fear nuclear catastrophe or artificial intelligence, yet we could die from something as simple as the disappearance of pollinators. When pollinator populations decline, pollinator-dependent flowering plants may reproduce less, with consequences for species interactions, food resources, and ecosystem functioning. A seemingly small change in one part of an ecological system can trigger a cascade of consequences across species and ecosystems. This “butterfly effect” (named after Edward Norton Lorenz) of ecological interdependence reminds us that we cannot understand plants in isolation from the organisms, environments, and human societies to which they are connected.

THE CULTURAL CRISIS OF PLANT BLINDNESS

In a world facing climate change, biodiversity loss and ecological crises, plants have become symbols of life itself. Just as punk culture once called for society to open its eyes to social problems, we must now confront “plant blindness”, the widespread indifference to plants (Wandersee & Schussler, 1999). Recognising this cultural and educational gap is the first step towards raising public awareness.

The term “plant blindness” was first introduced by James Wandersee and Elisabeth Schussler (Wandersee & Schussler, 1999) to describe the difficulty of noticing plants, recognising their biological and societal importance, and appreciating their unique features. More recent research has increasingly used the terms “plant awareness” and “plant awareness disparity” to describe this broader phenomenon from positive and deficit-oriented perspectives (Stagg et al., 2025; Brković et al., 2025; Dünser et al., 2025). Examples of plant blindness include difficulty identifying common local species, perceiving plants merely as a “background” for animals or humans, and failing to recognise their fundamental role in ecosystem functioning (Stagg et al., 2025).

Studies of plant awareness suggest that limited attention to plants is linked to poorer plant identification, reduced awareness in everyday environments, and weaker recognition of their ecological

importance (Balding & Williams, 2016; Stagg, Hetherington & Dillon, 2025). This evidence suggests that botanical education should not be regarded as an optional addition to environmental education. In my view, developing plant awareness is a practical way to strengthen ecological literacy, helping learners to understand plant diversity, ecological relationships and human dependence on plant resources.

Furthermore, plant blindness is not merely a perceptual or educational phenomenon; limited plant awareness can constrain the ability to recognise the ecological and societal importance of plants.

Here, sustainability is understood not just as environmental protection, but as the ability of human society to meet its current needs while preserving the ecological conditions and biological resources necessary for future generations (United Nations, 2025). In the context of plant education, this includes conserving plant diversity and ecosystems, using plant resources responsibly to provide food, medicines, and other necessities, and acknowledging the role of plants in promoting human health, culture, and climate change resilience (UNESCO, 2026; Mykhailenko et al., 2025). Therefore, education is not an end in itself, but a means of developing the knowledge, skills, and values needed to make informed decisions about the natural environment. This interpretation of “sustainability” aligns with the broader concept of education for sustainable development, linking knowledge to the capacity for active engagement, environmental integrity, human well-being and responsible behaviour.

From school lessons and university curricula to community initiatives, plant education can redirect our future’s trajectory (Surendran et al., 2025). Plants are the foundation of life on Earth. They feed us, heal us, produce oxygen and shape ecosystems. Their silence conceals immense power, yet society often remains “blind” to this fact. Translating the message of youthful protest into an ecological context calls us to recognise the obvious: without plants, humanity has no future.

EDUCATION AS A TOOL FOR CHANGE

The decline in plant-focused education goes beyond simply reducing the number of lessons dedicated to botany. The problem also lies in how the curriculum structures and presents knowledge about

plants. As botanical content becomes dispersed across subjects such as general biology, ecology, health education, nutrition and environmental education, students may view plants merely as examples of biological processes. As a result, they may fail to develop a holistic understanding of plants as living organisms and components of ecosystems. Stroud et al. (2022) have coined the term “extinction of botanical education” to describe this process, highlighting the loss of specific knowledge and skills, particularly the ability to identify plant species, across various educational contexts.

Overcoming plant blindness requires more than just adding a few lessons about plants to the syllabus. It requires educational experiences that make plants visible, meaningful and relevant to students’ lives. Similarly, Surendran et al. (2025) argue for reintroducing botany as a contemporary and relevant field of study, emphasising that early, meaningful exposure to plants can stimulate curiosity, innovation, and engagement with wider global challenges. In my view, this means connecting botanical knowledge to issues students recognise in their own lives, such as health, food, biodiversity, climate change, and the sustainable use of biological resources. Early and repeated encounters with plants can combine scientific knowledge with observation, curiosity, and environmental awareness. Recent educational research also suggests that meaningful engagement with plants contributes to plant awareness (Krtková, 2024; Amprazis & Papadopoulou, 2025; Park & Kim, 2026).

Examples from different educational systems illustrate the potential and limitations of current approaches.

In the United Kingdom, plants remain part of the primary school curriculum (Department for Education, 2015), and school gardening initiatives offer opportunities for hands-on engagement with plants (RHS, 2025a, b). However, Stroud et al. (2022) have identified a decline in plant-specific knowledge and skills, particularly plant identification and ecological knowledge, across different educational stages. This suggests that simply including plants in the curriculum does not necessarily lead to meaningful awareness.

Recent evidence from Greece points in the same direction. Amprazis & Papadopoulou (2026) studied 1048 students aged 10–12 and found limited cogni-

tive understanding of plants, including misconceptions and flawed mental models. The authors argue that primary education should provide a stronger foundation for developing plant awareness. These findings suggest the challenge lies not only in whether schools include plants in their curricula, but also in what students learn about them and how they acquire this knowledge.

Ukraine illustrates a related but distinct change. Plant-related topics, such as plant structure, photosynthesis, reproduction, ecology and biodiversity, remain part of school science and biology education. However, the curriculum integrates practical, hands-on botanical learning less systematically. While extracurricular initiatives offer opportunities to study local flora, phenological changes and medicinal plants, access to these activities is limited and depends on individual programmes and institutions (Osvita.ua, 2025; NECU, 2025). The issue is not the complete absence of botanical education, but the limited and uneven opportunities for students to experience plants firsthand in their natural and cultural environments.

These examples demonstrate the importance of connecting botanical knowledge with direct observation and the local environment, rather than viewing plants solely as abstract biological entities. In my view, local relevance should therefore be considered a core principle of plant education rather than an optional enrichment activity (Cheng & Cowie, 2026). If students study plants primarily as examples of biological processes or as resources for human needs, they may acquire facts without developing a holistic understanding of plant diversity, ecological interconnections, and the value of living plants in their natural habitats.

In my view, effective education in this field should combine scientific knowledge with direct observation, species identification, plant cultivation, fieldwork and study of local biodiversity. These activities should not be treated as optional supplements to the core curriculum. They help students to connect theoretical knowledge with their surroundings and understand ecological relationships, human dependence on biological resources and the consequences of their loss.

This approach aligns with the broader concept of education for sustainable development, which em-

phasises knowledge, skills, values, and the ability to act in the face of interrelated challenges, such as biodiversity loss, climate change, and the overconsumption of natural resources (UNESCO, 2026). Similarly, Amprazis & Papadopoulou (2025) argue that systems thinking, holistic problem solving, critical thinking, and self-awareness can help students understand the value of plants, shifting the educational process from a purely utilitarian perspective to a more holistic appreciation of plants and their intrinsic value.

Therefore, the study of plants should not be viewed as an additional topic competing for limited class time. Instead, they can bridge existing educational objectives in areas such as biology, ecology, health, food systems and environmental education. This helps students understand not only the benefits plants provide to humans, but also how they function within ecosystems, how their resources are utilised, and why conserving them is vital for human society and future generations.

HIGHER EDUCATION AND THE MISSING GREEN THREAD

Plant literacy matters not only for ecologists, but also for pharmacists, doctors, engineers and policy-makers. Plants are still a key source of medicines and bioactive compounds. About 25% of modern pharmaceuticals are of plant origin (Newman & Cragg, 2020). Examples include cardiac glycosides from *Digitalis purpurea* L., the alkaloids vinblastine and vincristine from *Catharanthus roseus* (L.) G. Don, and the anticancer drug paclitaxel from *Taxus brevifolia* Nutt. Other well-known plant-derived medicines include morphine from *Papaver somniferum* L., quinine from *Cinchona officinalis* L., artemisinin from *Artemisia annua* L., ginkgo-based preparations from *Ginkgo biloba* L., tetrahydrocannabinol and cannabidiol from *Cannabis sativa* L., and many others. For centuries, plants have been central to medicine, with many of the most important drugs derived from nature.

University programmes provide the foundation for a professional understanding of the value of natural product sources, particularly plants. In the UK, USA and EU, universities offer a wide range of plant-focused programmes, including Plant Biology, Plant Science and Medicinal Plant Chemistry. These programmes vary in their specialisations, ranging

from traditional plant systematics to modern fields such as pharmacy, ecology, agronomy, and biotechnology. Recent evidence from undergraduate life science education also supports this approach. A survey of 245 educators found that hands-on botanical experience is particularly useful for raising awareness of plants, and that using plant examples can help to integrate botanical knowledge into broader biological concepts (Zhu et al., 2025).

Recent work has also called for broader strategic reform of plant science education. Alvey et al. (2026) propose a framework centred on five priorities: positioning plants at the heart of education; addressing societal challenges; adopting effective, forward-looking pedagogical approaches; embedding equity and inclusion; strengthening partnerships between educational institutions and external stakeholders; and providing educators with resources and opportunities for professional development. This framework highlights that strengthening plant education requires changes not only to curricular content, but also to teaching practices, institutional support and the connections between education and society.

Universities in Europe, Asia, and North America increasingly adopt interdisciplinary approaches to ‘green curricula’, linking plant science with climate research, biotechnology, health and sustainable development (Spada et al., 2025; UNESCO, 2024). However, the extent and form of plant-focused education varies considerably between educational systems. In countries with strong botanical and natural history traditions, such as Ukraine, Poland, Lithuania and Greece, academic and research traditions are well established. However, its integration into contemporary interdisciplinary education is uneven. In my view, a particular challenge arises from this: the issue is not necessarily the absence of botanical knowledge or expertise, but rather how well existing knowledge connects with current educational priorities, such as biodiversity conservation, climate change, health, sustainable resource use, and environmental decision-making.

This strategic perspective should also be accompanied by a broader understanding of why plants matter. Amprazis & Papadopoulou (2025) argue that plant education should move beyond a purely utilitarian or instrumental view and adopt a holistic perspective that considers ecological interconnections

and the intrinsic value of plants. Such an approach can help students see plants as living components of the ecosystems on which human society depends, rather than merely as sources of food, medicine, or other resources.

The problem is not simply that plants are absent from education. Rather, knowledge about plants can be fragmented across subjects, disconnected from students' local environments and insufficiently linked to observation and experience. Therefore, I argue that the goal should be to restore continuity, contextual relevance, and visibility to plant knowledge across education, rather than to restore botany as an isolated school subject.

PLANTS, CLIMATE AND SUSTAINABILITY

Together, terrestrial and ocean ecosystems absorb a substantial proportion of anthropogenic CO₂ emissions, thereby moderating the rate at which CO₂ accumulates in the atmosphere (IPCC, 2022). The destruction of tropical and temperate forests accelerates global warming, whereas restoring green spaces in urban areas reduces temperatures, purifies the air and facilitates climate adaptation. However, decisions about restoration or reforestation are often made without proper knowledge of plants. A poor understanding of plant biology and the ecological context can also limit the effectiveness of restoration and natural resource management decisions. Therefore, education must combine ecology and sustainability. Teaching about plants means teaching about climate, food, and resilience.

In regions recovering from conflict or environmental degradation, restoring flora is both an ecological and cultural act. In Ukraine, programmes to restore forest and steppe ecosystems destroyed by war could support a national climate change adaptation strategy while also fulfilling an educational function and integrating environmental knowledge into everyday life (Melnykovich et al., 2026; Support for Restoration, 2023). Active public involvement and citizen science initiatives can strengthen the effectiveness of such programmes. Integrating plant knowledge into formal and informal education can strengthen environmental awareness and provide learners and citizens with relevant conservation and restoration knowledge.

Initiatives such as iNaturalist and PlantNet already bring together millions of people worldwide to document flora and monitor biodiversity. These digital tools demonstrate how technology can enhance education by transforming passive learning into global collaboration (Jones & Jones, 2025).

Education can support ecological restoration by deepening understanding of local ecosystems and increasing participation in conservation and restoration activities.

A GREEN CURRICULUM FOR THE FUTURE

Reintegrating plant education into formal and informal systems is essential for achieving the Sustainable Development Goals by 2025 (United Nations, 2025), including Goal 4 (Quality Education), Goal 13 (Climate Action) and Goal 15 (Life on Land). A modern “green curriculum” should be plant-oriented and include:

1. Interdisciplinarity: the connection between plants, climate, health and technology.
2. Experiential learning, including observation, cultivation, and field ecology.
3. Public engagement: citizen science and community projects that combine learning with action.

The problem is not interdisciplinarity itself, but rather the lack of a coherent botanical framework for it to operate within. Such reforms can teach learners to recognise ecological interdependence, use biological resources responsibly, and help conserve plant diversity. Empowering young people to learn about plants helps them to envisage a sustainable planet. Experimental plant education provides a practical way to connect biological knowledge with local biodiversity, environmental responsibility, and real-world applications (UNESCO, 2024; Amprazis & Papadopoulou, 2025).

Plant education should connect genetics with geography, chemistry with culture, and biological knowledge with human responsibility for the environment. I use the term “green thread” to describe the continuity of plant-related knowledge across biology, ecology, health and environmental education, so plant knowledge is not encountered as a series of disconnected facts.

Field observations, plant identification, cultivation, school gardens, and citizen science activities

can therefore serve as pedagogical tools for connecting biological knowledge with local biodiversity and environmental responsibility, rather than simply being extracurricular additions.

SEEING THE FUTURE THROUGH GREEN EYES

The phrase “no future”, once a symbol of punk culture and youth protest, has taken on a new meaning today. In the 21st century, it is directly linked to ecological reality: without plants, there truly is no future.

Plants are not just decorative elements in human environments. They support food systems, medicines, ecosystem functioning, climate regulation, and a “cultural code” that unites generations. However, plant blindness threatens our ability to recognise this fundamental role. When society fails to see plants, it fails to see the future.

Therefore, the challenge is not just to teach more about plants, but also to rethink how we organise, contextualise, and experience plant knowledge. Students should encounter plants not only in textbooks, but also as living organisms in their local landscapes and communities. We must move from plant blindness to plant awareness and from limited recognition to informed engagement.

To see the future, we must first learn to see plants.

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