Scope

*Plant Physiology* is an international journal that publishes on the broadest aspects of plant biology. The journal welcomes original submissions that offer new and fundamental insights into the origins, development, and function of plants from the molecular to the whole organism and its interactions within the biotic and abiotic environment. *Plant Physiology* encourages submissions that span a range of technologies, including those of structural, molecular, and cellular biology, biochemistry, biophysics, bioenergetics, genetics, physiology, and field-based approaches as well as those making use of the tools of synthetic biology, modeling, bioinformatics, and all types of “omics”. Manuscripts submitted to *Plant Physiology* must not be under simultaneous consideration or have been published elsewhere, either in part or in whole. Prior publication on preprint servers, as a poster abstract or an oral presentation or as thesis for a degree is not considered previous publication of the research.

Biochemistry, Biophysics, and Structural Biology

Welcomes manuscripts that have uncovered the chemical/physical/structural features of plant molecules and that contribute to important mechanistic insights into biological processes in plants. This section considers various in vitro and/or in vivo studies of plant macromolecules including their synthesis, degradation, transport, targeting, and interaction/reaction with other molecules. Reports of macromolecule structures (such as protein complexes, protein-DNA/RNA complexes) that bring new functional and mechanistic perspectives into plant biology are also welcome.

Breakthrough Technologies, Tools, and Resources

Addresses the development and application of new experimental or theoretical methods, tools, and resources that are frequently the key for new insights into physiological processes. This area provides a platform for developments in theoretical, analytical, and experimental methodologies, and for enabling tools and resources that will find wide use within the plant research community. Such technologies, tools, and resources are expected to go beyond incremental improvements to what currently exists and should enable major advances in addressing fundamental questions in plant physiology.
**Cell Biology**

Publishes on specialized functions of different cell types that support all aspects of plant physiology, signaling, development, morphogenesis, and the interactions of plants with their environment. The Cell Biology area welcomes manuscripts that address the cellular mechanisms behind these processes across the scales from molecules to organelles, cells, and tissues, as well as manuscripts that integrate these topics with dynamic processes relevant to homeostasis, growth, and development. Work that addresses fundamental questions through quantitative analysis of cellular activities and that provides mechanistic insight into plant functioning is especially welcome.

**Ecophysiology and Sustainability**

Focuses on plant physiology as it synthesizes genetic, biochemical, biophysical, cellular and tissue level concepts in a whole plant context. The area of Ecophysiology and Sustainability is home for physiological work that can include plant responses to environment in a laboratory setting and/or under natural field conditions. It welcomes submissions within the plant side of a continuum that extends to ecology and to crop improvement.

**Genes and Development**

Addresses the fundamental questions of genes and pathways in plant growth, development, and the relationship between form & function, including but not limited to stem cell maintenance, differentiation, tissue patterning, and morphogenesis in vegetative and reproductive stages as well as during regeneration. Molecular and genetic studies, as well as those using approaches such as quantitative imaging, mathematical modeling, and genomics/epigenomic approaches, are highly welcome. This section also considers manuscripts reporting the role of abiotic and biotic factors influencing plant development and function.

**Genomics and Evolution**

Focuses on plant evolution at both molecular and organismal levels. Topics include (but are not limited to) the diversification of genome structure, genomic components, epigenetics, chromatin biology, and mechanisms underlying the emergence of morphological, physiological, and biochemical diversity of plants. Comparative analysis of omics data or first-time genome sequences of plants or alternative ecotypes of a reference organism is welcome if it provides new mechanistic insights about one or more aspects described above.
Membranes, Transport, and Bioenergetics

Focuses on the basic physiological processes that generate biological energy and utilize it to carry out work that underpins cellular homeostasis, plant growth and development. Manuscripts addressing fundamental aspects of these processes, including transport of solute/solvent, photosynthesis, and respiration, across scales using biophysical, biochemical and physiological approaches are encouraged.

Metabolism

Includes work on primary (including photosynthetic and respiratory metabolism) and specialized (secondary) metabolism. Submissions must make a significant advance and provide an insight into function. Use of large-scale datasets is encouraged, provided that they contribute insight into biological pathways. The design and applications of new molecules through synthetic technology is of interest, as are new methods, especially those that, in the longer term, will allow the production of plants that work more effectively for us.

Signaling and Response

Is home for basic research into the molecular mechanisms by which plants perceive, transduce, and convert signals into responses across scales from the molecular and cellular to the whole plant. Manuscripts are particularly welcome that address questions pertaining to plant growth and development, responses to biotic and abiotic stress, and to symbiotic and endophytic interactions. Submissions are encouraged that broaden our mechanistic understanding of receptors, biomechanical/mechano-sensing, second-messenger systems, hormone signaling, and transcriptional regulation.

Systems and Synthetic Biology

Features articles in plant-related synthetic biology, i.e. research involving radical redesign or repurposing of function, including:
- Rational engineering and directed evolution of photosynthetic organisms at all levels from enzymes and sensors to protein complexes, microcompartments, and metabolic, signaling, and regulatory pathways
- Engineering plant-microbe interactions and reconstructing plant pathways in microbes
- Informatic tools, precise genome editing, and other technologies that support synthetic biology of photosynthetic organisms
Systems and Synthetic Biology also encourages submissions of work on computational analysis and modelling in all areas of plant sciences, including ‘omic’ and other system-wide datasets.

Reviews

Reviews are commissioned by invitation only.

Plant Physiology normally will not publish work that is:

- Confirmatory, preliminary, or incomplete, including research based primarily on analysis of a single allele or a single transgenic line.

- Report of an additional case or cases of processes that are already well understood in another species without providing species-specific insights.

- Primarily descriptive in content; i.e. papers are expected to go beyond documenting observations and to contribute significantly to explaining the relationships between them in a way that advances our understanding of plants and/or their interactions with their environment.

- Report of a bioinformatic or –omic analysis, macromolecule structural models (e.g. Alphafold prediction of protein structures), or genetic association study, without functional validation and new insights.

- Report of a new genome sequence and assembly unless the assembly is used to address a broad biological or evolutionary question.