



Nano-priming as an innovative seed-priming methodology for abiotic stress tolerance in crops

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Introduction

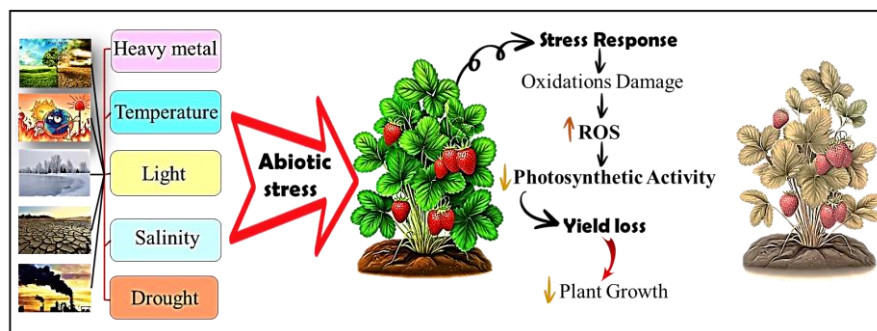
Plants face various abiotic stresses, like drought and salinity, which can hinder growth and development. Nanopriming, a seed treatment technique using nanoparticles, can enhance plant tolerance to these stresses. Nanoparticles influence plant responses by regulating ROS levels and phytohormone signaling, improving seed germination, growth, and overall plant resilience. However, high costs and potential environmental impacts limit widespread use. Future research should explore innovative approaches to improve the efficacy and sustainability of nanopriming.

Abstract

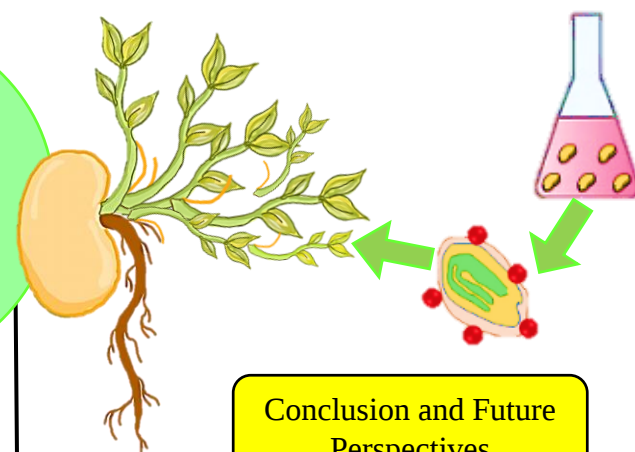
Nanopriming, a seed treatment method using nanoparticles, can enhance plant tolerance to stresses like salinity and drought. Nanoparticles influence plant responses by regulating ROS levels and phytohormone signaling. This can improve seed germination, growth, and overall plant resilience. However, high costs and potential environmental impacts hinder widespread use. Future research should explore innovative approaches, such as integrating beneficial endophytes, to improve the efficacy and sustainability of nanopriming.

Keywords: Abiotic Stress, Nanoparticle, Germination

Abiotic Stress Signaling Pathways in Plants



Nano priming



Conclusion and Future Perspectives

Nanotechnology: A promising tool for sustainable agriculture

Nanoparticles enhance plant tolerance to abiotic stress

Future research: optimize nanoparticle use and assess environmental impact

Nano-priming: a potential solution for sustainable agriculture

Nano-Priming in Enhancing Plant Stress Tolerance

Nanopriming is a seed treatment technique using nanoparticles to enhance plant tolerance to abiotic stresses. Nanoparticles influence plant responses by regulating ROS levels and phytohormone signaling, improving germination, growth, and overall resilience. However, high costs and potential environmental impacts limit widespread use. Future research should explore innovative approaches to improve efficacy and sustainability. Nano-priming, a seed treatment technique using nanoparticles, has shown promise in enhancing plant tolerance to various abiotic stresses. Nanoparticles like silver, carbon nanotubes, and titanium dioxide can improve drought tolerance, heavy metal stress resistance, and overall plant growth. They achieve this by modulating ROS homeostasis, activating hormonal pathways, and enhancing antioxidant activity. However, further research is needed to optimize nanoparticle application and ensure their safe and effective use in agriculture.

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