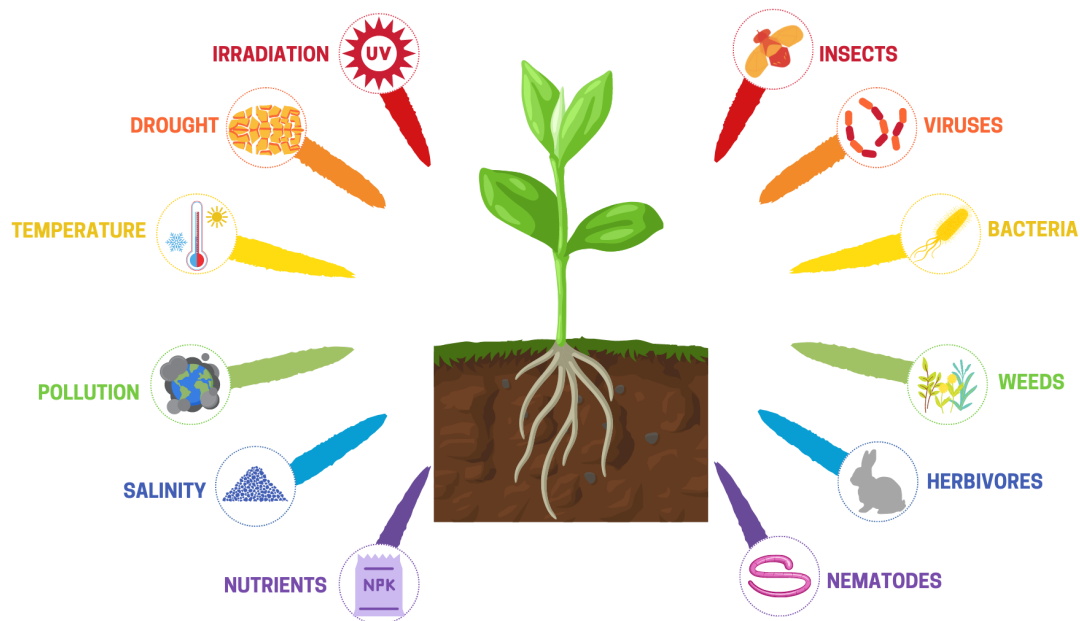


PLANTS UNDER PRESSURE: ACTIVATION OF STRESS HORMONES

PLANTS GET STRESSED TOO

Throughout their lives, plants are exposed to a wide range of environmental challenges that can affect their growth and jeopardize their health.



External threats can be categorized as **abiotic stresses** if caused by non-living factors or **biotic stresses** if caused by living factor. In the worst-case scenario, plants can experience a combination of environmental stressors that greatly threatens their survival.

STRESSED ORGANS SEND SIGNALS OUTSIDE & INSIDE THE PLANT

A recent research showed that plants experiencing water deprivation or physical damage start **emitting ultrasonic sounds** in the nearby, whereas plants grown in optimal conditions are “calm”.

Besides external signals, stressed plants also experience hormonal fluctuations inside their bodies. Specifically, plants accumulate **stress hormones** that trigger a wide array of defensive and adaptive responses.



HORMONES & PHYTOHORMONES

Hormones are **signalling molecules** produced by multicellular organisms that move through the body to regulate developmental and physiological processes. In plants, these chemical messengers are called phytohormones and act as **growth regulators**. Some of them (e.g., Abscissic Acid and Jasmonic Acid) accumulate in stress conditions to coordinate plant growth and defence response.

JASMONATES: BIOSYNTHETIC AND SIGNALLING PATHWAYS

This class of phytohormones was first described in 1962 and named Jasmonates (JAs) as they were identified from flower extracts of *Jasminum grandiflorum*.

Upon external attack, damaged plants detect foreign molecules that act as **elicitors** and trigger a cascade of events leading to JAs production. A complex series of metabolic reactions takes place in plant cell organelles, transforming the precursor α -linolenic acid into bioactive JAs. A family of **transporters** facilitate cellular import/export of JAs, resulting in short and long distance transmission of the stress signal.



JASMONATES: INTERACTION BETWEEN PLANTS & INSECTS

Plants attacked by herbivore insects accumulate JAs, which induce the production of **proteins with toxic effects** or volatile organic compounds that attract natural enemies of the herbivores.



The carnivorous plant Venus flytrap activates the JA pathway after the second mechanical stimulus, which induces the production of **lytic enzymes** used to digest the captured insects.