

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.

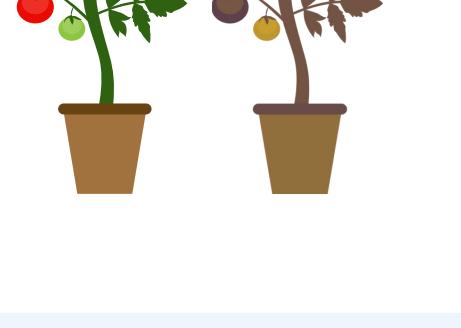


External threats can be categorized as **abiotic stresses** if caused by non-living factors or **biotic stresses** if caused by living factor. In the worst-case scenario, plants can experience a combination of environmental stressors that greatly threatens their survival.

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.



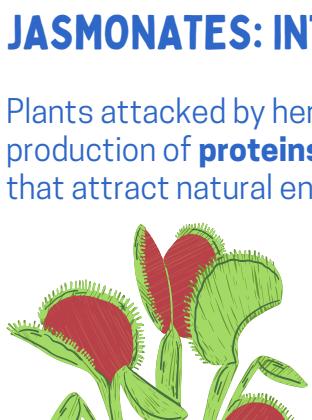
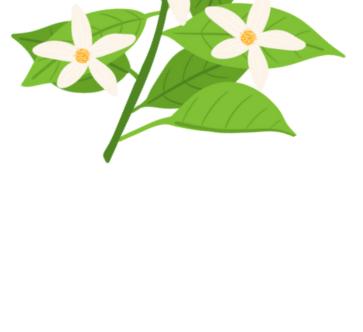
HORMONES & PHYTOHORMONES

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., Abscisic 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 a-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.



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.

