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Commentary

Insights of Wound Response in Plants

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DESCRIPTION

Plants are persistently exposed to different stresses that result in wounding. Plants have adapted to shield themselves against wounding events, like herbivore attacks or environmental stresses. There are many defence mechanisms that plants count on to help fight off pathogens and subsequent infections. Wounding responses can be local, like the deposition of callose, and others are systemic, which encompass a variety of hormones like jasmonic acid and abscisic acid.

There are many forms of defence that plants use to react to wounding events. There are physical defence mechanisms that some plants advance, through structural components, like lignin and the cuticle. The structure of a plant cell wall is exceptionally vital for wound responses, as both protect the plant from pathogenic infections by inhibiting various molecules from entering the cell.

Plants are accomplished of activating innate immunity, by responding to wounding events with Damage-Associated Molecular Patterns (DAMPs). Additionally, plants depend on on Microbe-Associated Molecular Patterns (MAMPs) to defend themselves upon sensing a wounding event. There are examples of both rapid and delayed wound responses, depending on where the damage took place.

Plants have Pattern Recognition Receptors (PRRs) that distinguish MAMPs, or microbe-associated molecular patterns. Upon entry of a pathogen, plants are susceptible to infection and lose a fair amount of nutrients to said pathogen. The constitutive defences are the physical barriers of the plant; counting the cuticle or even the metabolites that act toxic and deter herbivores. Plants maintain capability to sense when they have an injured area and induce a defensive response. Within wounded tissues, endogenous molecules become released and become Damage Associated Molecular Patterns (DAMPs), prompting a defensive response. DAMPs are typically triggered by insects that feed off the plant. Such responses to wounds are found at the site of the wound and also systemically. These are intervened by hormones.

As a plant senses a wound, it immediately conducts a signal for innate immunity. These signals are controlled by hormones such as jasmonic acid, ethylene and abscisic acid. Jasmonic acid induces the prosystemin gene along with other defence allied genes such as abscisic acid, and ethylene, contributing to a rapid induction of defence responses. Other physical factors also play a vibrant role in wound signalling, which include hydraulic pressure and electrical pulses. Most of these that are intricate within wound signalling also function in signalling other defence responses. Cross-talk events normalize the activation of different roles.

CONCLUSION

Plants can shield themselves from abiotic stress in many different ways, and most include a physical change in the plant's morphology. Phenotypic plasticity is a plant's ability to modify and adapt its morphology in response to the external environments to protect them against stress. For example, it is easier for water to evaporate off of large surface areas which can rapidly drain the soil of its water and cause drought stress. Plants will reduce leaf cell division and expansion and vary the shape to reduce leaf area.

Another way that plants alter their morphology to defend against stress is by changing the leaf orientation. Plants can suffer from heat stress if the sun's rays are too strong. Changing the orientation of their leaves in different directions (parallel or perpendicular) allows plants to lessen damage from intense light. Leaves also wilt in response to stress, because it alters the angle at which the sun hits the leaf. Leaf rolling also decreases how much of the leaf area is exposed to the sun.

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