

RESISTANCE INDUCERS AND PHOSPHITES 2

"Although plants do not have an immune system, they are surprisingly resistant to diseases caused by fungi, bacteria, viruses, and nematodes that are always present in the environment.

There are several types of mechanisms that plants have evolutionarily evolved to resist infection, including the production of antimicrobial agents and a type of programmed cell death called the hypersensitivity response, and one of the most important, a special type of plant immunity called acquired systemic resistance.

PHYTOALEXINS - one of the mechanisms best studied by science today are these substances. They are groups of secondary metabolites that are formed around the lesion that have microbial activity. In general, they are not present in plants before infection, but are synthesized very quickly after the attack, due to a complex biochemical activation through biosynthetic transduction mechanisms and transcription of messenger RNAs and their consequent translation into corresponding enzymes.

Several are the phytoalexins. Isoflavonoids such as medicarpine and gliceolin are common phytoalexins in legumes, whereas in potato and tomato, there are several, including ristinin and capsidiol.

Exogenous sources of phytoalexins have so far not been proven to be effective. Phytoalexins themselves, like isoflavonoids, do not induce resistance. There is nothing in the official scientific literature that proves this. However, exogenous sources that induce the production of phytoalexins, such as the phosphite ion, are capable of acting as an inducer and accelerator source in the production of these defense compounds.

The phytoalexins are **SECONDARY** metabolites and, as such, do not have a function in the growth and development of the plant as **PRIMARY** metabolites such as gibberellins, cytokinins, etc.

Jasmonic acid, differently from phytoalexins, is a hormone related to plant stress that activates defense responses. It is not a phytoalexin, but a hormone.

Exogenous sources of this acid have puzzled scientists and botanists (Taiz et al. 2004 p. 329), because exogenous sources of this hormone have not been proven to induce resistance. Unlike auxins, cytokinins and gibberellins that are related to plant growth and development and not to self-defense, which is only triggered in the presence of pathogens

or various damages, whereas growth and development is a constant factor in the internal activities of plant metabolism.

However, there are studies that, in specific dosages not so well delineated yet, exogenous sources of linolenic acid, a compound present in the lipids of the plasma membrane including the leaf epidermis, can favor the production of jasmonic acid.

The linolenic acid can be considered as a factor of PRIMARY metabolic route for the formation of jasmonic acid, which is a SECONDARY metabolite.

For all this to be triggered, researchers have isolated some genes in plants called R-genes that are formed FROM ELICIATORS. The elicitors are fragments of pathogen molecules that start a COMPLEX signaling pathway that leads to the ACTIVATION OF DEFENSE RESPONSES within minutes after infection.

These genes can be improved in modified plant varieties. However, some improvements to produce the R genes may cause negative effects on productivity.

In conclusion, we understand that only PRECURSORS of defense mechanism formation (inducers of phytoalexin formation and defense hormones), when applied exogenously, are effective in accelerating resistance.

ACQUIRED SYSTEMIC RESISTANCE (SAR) - "When a plant survives attack by a pathogen, it often shows an increase in its resistance to subsequent attack elsewhere in the plant and shows protection against a wide variety of pathogens. The phenomenon called systemic acquired resistance (SAR) develops after a period of several days after the initial infection." TAIZ et al (2004 apud Ryals et al., 1996). Acquired systemic resistance appears to result from increased levels of certain aforementioned defense compounds, including chitinases and other hydrolytic enzymes.

Although the mechanisms of SAR induction are still unknown, one of the endogenous signals is probably salicylic acid.