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Research Article

BIOLOGICAL FEATURES OF PLANT ENDURANCE AND DEFENSE PHYSIOLOGY

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ABSTRACT

In this article, there are opinions about the physiology of endurance and metabolism of plants, its structure and growth conditions.

KEYWORDS

Biology, physiology, plant science, chemical properties, durability, biological and physical factors.

INTRODUCTION

It is known that all living organisms have the characteristics of adaptation to biotic and abiotic factors of the environment and protection from adverse conditions. It has developed and improved during evolution since the formation of living organisms. Due to the fact that there are many factors that harm organisms and lead to their destruction, the mechanisms of protection against them are not limited to metabolic changes, but also morphological changes, for example, the formation of thorns. In plant physiology, the growth and development of plants in alternative and unfavorable conditions is represented by the concept of "stability".

"Resilience" takes into account the processes of stagnation and regeneration. Each stage of biological development has its own mechanisms, for example, at the molecular level, in the form of polyploidy, at the level of the organism, the formation of many gametes and sperm, etc. Examples of recovery processes include the repair of damaged DNA with the help of

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enzymes, the formation of growth buds, regeneration, etc.

Physiology of arousal. "Arousal" consists of three stages as an organism's response to an unfavorable factor. These are the stages of "revival", adaptation and exhaustion. If the last third stage of agitation develops quickly, the organism may die. A plant organism, unlike an animal organism, responds to stimulation not by activation of metabolism, but by reduction. This is due to the increase of ethylene and ABK hormones, which stop metabolism in the body in the state of excitement. Factors that induce the state of excitation in plants can be divided into three groups.

THE MAIN FINDINGS AND RESULTS

Physical factors. These include lack or excess of moisture, light, temperature, radioactive radiation, and mechanical effects.

Chemical factors. These include salts, gases, herbicides, insecticides, fungicides, industrial waste, etc.

Biological factors. These include damage by pests and diseases, competition with other plants, the impact of animals, flowering, fruit ripening. The effect of the same factor on one or another plant may or may not cause agitation depending on its type of resistance. For example, in relation to drought, vegetation can be divided into two groups.

Mechanisms of cell movement. Even when there are weak effects on the cell, for example, the absorption of a dye, the light transmission of the cytoplasm and its viscosity change. When the effect is strong, the opposite of the above cases is not the case. If the stimulus is strong and its effect increases rapidly, the following changes occur in the cell:

1. Increased membrane permeability and repolarization of plasmalemma membrane potential.
2. The transfer of Ca2+ ions from the cell wall, vacuole, ET, mitochondria and other internal compartments of the cell to the cytoplasm.
3. Shifting the pH of the cytoplasmic environment to the acidic side.
4. Activation of the assembly of cytoskeletal meshes and actin microfilaments and, as a result, an increase in the viscosity of the cytoplasm and light transmission.
5. Increased oxygen absorption, increased consumption of ATF and development of free radical reactions.
6. Increased hydrolytic processing.
7. Increased synthesis and activity of stress proteins.
8. Increased activity of the H+ pump in the plasmolemma. It can also be present in hoi tonopiast and resists changes in ion homeostasis to a non-optimal direction.
9. Synthesis of ethylene and ABK hormone increases. Cell division and growth stop, and normal physiological and metabolic processes are inhibited.

The cessation of cell functional activity is caused by inhibitors, and the energy value of the cell is used to resist undesirable changes.

Inflammatory reactions can be triggered by any stimulus and are aimed at protecting the internal compartments of the cell and preventing unwanted changes. All these things develop and develop together. Protection of plants from adverse factors in various forms, for example, changes in the characteristics of the anatomical structure - the formation of cuticles, shells and mechanical tissue, the formation of special protective organs, for example, the formation of thorns, scalds, movement and physiological reactions, in particular, it can be in the form of synthesis of various protective agents - waxes, phytoalexins, toxins and protective proteins.

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The level of strength of the plant is measured by its resistance to adverse factors, i.e. resistance to high and low temperatures, lack of oxygen, water shortage, salinity, environmental pollution, ionizing rays, infection, etc. All the unpleasant factors mentioned above can be called triggers, and the reaction of the organism can be called "excitement". Protection mechanisms are created depending on the time of exposure to these triggers. For example, if the effect of an unfavorable factor on the plant lasts for a long time, special mechanisms of protection arise, and if it is short, non-specific mechanisms of protection arise.

Biochemical defenses. The basis of biochemical defenses in plant organisms is that some toxic compounds formed as a result of the plant's reaction to an unfavorable environmental factor and that is, caused by the decomposition of high molecular substances, are released through leaves and other organs. For example, the water retention property of the cytoplasm in drought conditions is ensured by the formation of small molecular hydrophilic proteins in its composition. These hydrophilic proteins bind a lot of water as hydrate shells.

Proline helps to preserve water in the cytoplasm during drought. That's why the amount of proline in the cell increases significantly when there is a lack of water. Also, an increase in the amount of monosaccharides in the cytoplasm has a positive effect on water retention. The recovery of plants after drought depends on the preservation of their genetic composition in the conditions of lack of water and high temperature. For example, the protection of the DNA molecule from drought is determined by the property of its molecule to partially lose its activity with the help of nuclear proteins. Therefore, changes in the amount of DNA can be observed only in the case of long-lasting severe drought.

Drought can also cause a number of significant changes in plant hormone systems. Such changes can be attributed to a decrease in the amount of auxin, cytokinin, gibberellin, and phenolic growth-accelerating substances that accelerate plant growth, and an increase in the amount of ABK and ethylene hormones. It is important to increase the amount of growth-stopping hormones in plants, especially in the initial periods of drought. Because, when the plant is not provided with alternative water, the quick closing of the leaf openings depends on the amount of ABK hormone, which increases many times in these plants in a few minutes. For example, the amount of ABK hormone increases several times even when the lack of water for a plant is very small - 0.2 MPa. But in mesophytic plants, the potential of water to increase the amount of ABK is different. For example, for corn, the water potential that causes an increase in ABK hormone is 0.8 MPa, while for rye, this indicator is 1.0 MPa.

In general drought conditions, the amount of ABK hormone in plant tissues can increase by an average of 0.15 micrograms per hour in relation to the weight of 1 gram of water. What is the amount of water consumed as a result of evaporation through the closing of the mouths of the leaves, which occurred as a result of the increase of the ABK hormone in plant tissues? reduces Also, ABK accelerates the synthesis of proline, which causes protein degradation. This condition also causes a certain amount of water to be preserved in the cell. Accumulation of ABK hormone in plant roots leads to inhibition of RNA and protein synthesis, and slows down the synthesis of another growth hormone, cytokinin.

CONCLUSION

In short, it can be said that in the conditions of water shortage, the increase in the amount of ABK hormone

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in the plant tissues reduces the water loss through the leaf stomata of the plant. A large amount of water causes evaporation of proteins, and changes the metabolism in the cell to a relatively alternative state. Another of the biochemical changes that occur in plants when there is insufficient water is the increase in a certain amount of the hormone ethylene ($CH_2=CH_2$), which is one of the growth inhibitory hormones in plant tissues. In agriculture, it is possible to increase the resistance of plants to drought to a certain extent [1]. For this purpose, the plant seeds are dried before planting, that is, they are cooled and dried several times. In this case, plant seeds are adapted to drought. Xeromorphological signs appear in the morphology of the leaves of plants sprouted from such seeds, which, in turn, affect the evaporation of water from the leaves, giving the plants more drought-resistant properties.

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