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Research Article

USE OF BIOLOGICAL PRODUCT ELICITORS IN OPTIMIZING THE BIOLOGICAL ACTIVITY OF THE MEDICINAL PLANT (CYNARA SCOLYMUS L.)

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ABSTRACT

Approximately 50% of the drugs produced in the pharmaceutical industry worldwide are prepared from raw materials of medicinal plants. Increasing the synthesis of secondary metabolites through the use of local biologically active agents is an urgent issue in the cultivation of ecologically pure medicinal plants. In this regard, several works are being carried out in the countries of the world, and this article contains information about the importance, advantages and prospects of using microbial preparations based on rhizobacteria in forestry practice abroad and in our republic, methods of production of bioproducts based on microorganisms that accelerate the growth and development of plants, production of bioproducts resistant to stress conditions biotechnological foundations, the technology of production of bioproducts consisting of the association of microorganisms is noted.

KEYWORDS

Artichoke, Stress condition, elicitor, PGPR, PAMP- or pattern-triggered immunity, Zamin-M", Microbiological product.

INTRODUCTION

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In recent years, consistent reforms have been implemented in the world in terms of protection of medicinal plants, rational use of natural resources, establishment of medicinal plant plantations and their processing. However, the analyzes show the need to protect medicinal plants, establish their plantations, and create an additional value chain through processing.

Microorganisms present in the rhizosphere and soil organic matter are supposed to occupy less than 5% of the total area. Microorganisms are the means of transforming the environment into a habitat necessary for plants, and play a key dynamic role in the process of decomposition and circulation of nutrients as a result of the mineralization process. Microorganisms used in agroecological and organic systems affect soil quality and microbial activity. The soil structure is diverse and consists of plant growth stimulants, fungi and bacteria [1; pp. 283-289; 11; 54-63 p].

In ancient times, Theophrastus (372-287 BC) suggested mixing different soil samples in order to increase plant viability and protect against diseases [10; pp. 188-239]. Due to the fact that the number of some natural medicinal plants is decreasing, it is important to cultivate them in farms [5; pp. 91-100]. However, differences can be observed between the phytochemical composition and productivity of medicinal plants grown on farms and those produced under the influence of the natural environment [4; p. 32].

Medicinal plants are exposed to a number of biotic and abiotic environmental stresses that adversely affect their growth and development. Among various environmental stresses, salinity, floods, heavy metals, drought, cold climate, soil compaction, mechanical resistance and lack of nutrients are some of the main factors of abiotic stress. Under stress conditions, some physiological imbalances in plants, such as increased production of ethylene, as well as the regulation of nutritional and hormonal balance, can affect the growth and therapeutic properties of plants. The use of conventional approaches to mitigate abiotic stresses associated with medicinal plants has had little success. The role of PGPR in medicinal plants and their effect on growth and synthesis of therapeutic metabolites under stress is still unclear [6; 135-166., 2; 109-117.]. Currently, there are several promising ecologically clean agents used for plant protection. One of them is disease resistance inducers, that is, elicitors - substances of biotic and abiotic nature, which are recognized by plants as a signal, and in response, plants activate defense mechanisms, which reduce the effects of biotic and abiotic stress [15; 3-12 p]. That is, once elicitors are recognized by plants, they trigger signaling systems that lead to the expression of defense-related genes and, accordingly, increase plant resistance. These substances are not toxic and do not

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have a harmful effect on the environment [3; pp. 880-895] Thus, it is important to assess the extent of the threat to the plant and adopt appropriate and proportionate responses. These can lead to incompatibility, from responses to attack, expression of PTI (PAMP- or pattern-triggered immunity)-based defense mechanisms, if the microbe/pathogen is unable to suppress these responses. The use of elicitors in agriculture reduces the need for pesticides by using the plant's own defense system (Figure 1).

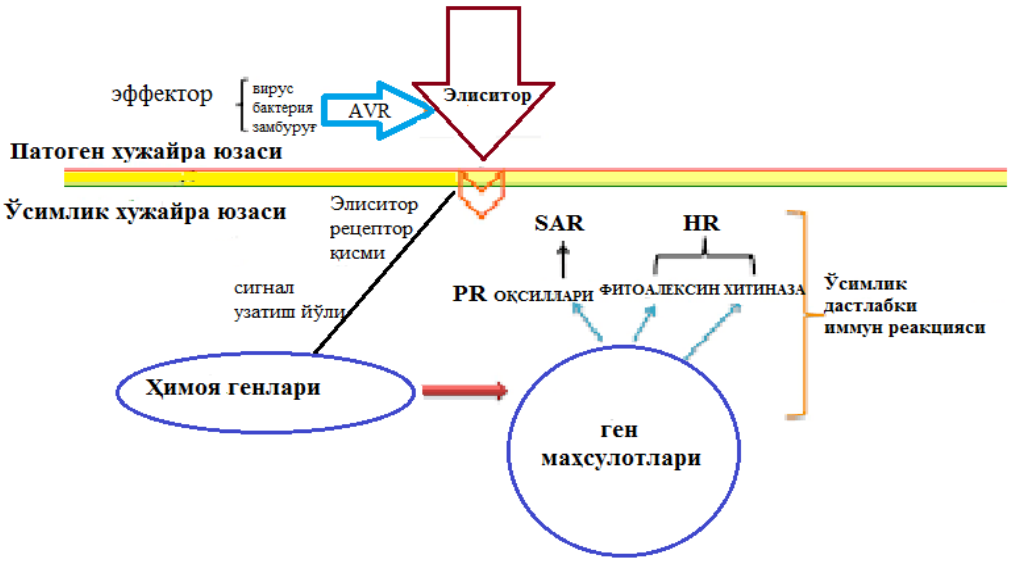

Figure 1. The primary plant immune response in plant-pathogen interactions.

Cultivation of rhizobacteria in nutrient media

Rhizobacteria were grown in a nutrient medium with the following composition:

Pepton -10 г/л; MgSO4x 7H2O -0.3 g/l; glucose – 20 g/l; K2HPO4 -0,4 g/l; NaCl -3,0 g/l; CaCO3-3,0 g/l; pH-6,8; distilled water 1000 ml. The nutrient medium was sterilized in a Systec autoclave (D-35440 Linden, Germany) at 1200C for 20 min at 1 atm pressure. Culture of microorganisms was used as seeding material. Planting was carried out in a laminar box (BSC 120A, EU)). The seeded material was grown in a thermostat (TC 1/80-CPU, Russia) at 280 C for 72 hours.

The method of extraction of "Elicitor" and determination of volatile organic substances contained in the elicitor.

To obtain the "elicitor" extract, the association of rhizobacteria grown in a thermostat for 3 days was placed in a microorganism autoclave (D-35440 Linden, Germany) at a temperature of 1200C at 1 atm. for 20 minutes, and the cooled autolysate was filtered.

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Technology of preparation of ecu material from pure culture

Preparation of inoculation material, depending on the type of producer and its physiological and biochemical characteristics, consists of several main stages: initial culture (in a test tube) cultivation in agar medium (in a test tube) cultivation in flasks in a liquid nutrient medium in microbiological shakers (one or two stages) cultivation in special equipment (one or in several inoculators) accumulation of microorganism cultures in small fermenters is equivalent material [13.].

In the process of processing primary raw materials, microbiological synthesis includes a number of complex technological operations that ensure the production of finished products necessary for human activity. The microbiological approach to plant protection is more important, and the use of microorganisms allows to solve the tasks of biologizing agriculture and increasing soil fertility. However, exposure to microorganisms with chemical factors affects the natural microflora and causes their death.

This has a negative effect on the effectiveness of their use. In modern microbiological production, each of the various biopreparations is produced on the basis of separate technologies. However, the microorganisms used in all production processes go through almost the same life cycle stages. Taking this into consideration, a model diagram of technological processes suitable for microbiological synthesis was adopted [7.8.9.12.14].

CONCLUSION

Globally, microbiological products are a safe investment solution that guarantees quick harvest and protects seeds from pests and diseases. Taking this into account, one of our next tasks is to study the economic efficiency of its improved forms in elicitor production.

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