



APPLICATION AREAS OF BIOLOGICALLY ACTIVE METABOLITES PRODUCED BY ENDOPHYTE BACTERIA

Shodiyeva Dildora

SamDTU, assistant of the Department of Microbiology, Virology and Immunology

Bobakandova Mekhriniso

Intern-assistant of the Department of Microbiology, Virology and Immunology, SamDTU

E-mail: dildoraannayeveva786gmail.com

Article history:

Received: November 24th 2022
Accepted: December 26th 2022
Published: January 30th 2023

Abstract:

Paclitaxel is a chemotherapy drug used to treat several types of cancer, including ovarian cancer, breast cancer, lung cancer, cervical cancer, and pancreatic cancer. But scientists have found the endophyte that synthesizes this substance, *Taxomyces andreanea*, from a small bushy tree known as *Taxus brevifolia*, which grows on the Pacific coast of North America. Currently, 19 endophytes have been identified from its composition, and all of them have the ability to synthesize paclitaxel and its analogs. In addition, these studies revealed the ability to synthesize a metabolite known as cichorin A, a metabolite first identified in endophytic microorganisms, which is 10-methoxy 8-methyl-3-(prop-1-en-2-yl)-3,4-dihydro-1H-benzeneisochrom-4-ol was found to be. It was named cichorin A because it was first isolated from the root of *Cichorium intybus* plant. This substance can be used in a wide range of pharmaceutical fields.

Keywords: Paclitaxel, *Taxomyces andreanea*, *Cichorium intybus*, mutualism, pathogenesis, Asteraceae.

INTRODUCTION

As a result of the development of the pharmaceutical industry in the world, the demand for medicinal plants is increasing. 750 species of more than 4,500 plants belonging to the local flora are considered medicinal, 112 of them are registered for use in scientific medicine, of which 70 species are actively used in the pharmaceutical industry. The symbiotic and antagonistic relations of plants and microorganisms have been studied by scientists on a global scale, establishing the relationship between plants and microorganisms, and talking about their various medicinal properties. It has been found that endophytic microorganisms spend a certain life cycle in plant tissues, improve the plant's immune system, and have a broad-spectrum effect against various pathogenic microorganisms and pest insects. To date, studying the chemical and microbiological composition of medicinal plants and evaluating their biotechnological potential, obtaining biopreparations based on them determines the relevance of the topic. Plants can have microorganisms that live on them, but do not have any type of activity and do not cause obvious symptoms. These microorganisms are known endophytes. The parasites that host these plants and the relationships between them are of great importance. Here we will describe all the features of endophytic microorganisms and the important aspects of the relationship of these fungi with host plants. The most important thing to study is the relationship between the endophytic microorganism and the host

plant. This type of relationship can vary from mutualism to pathogenesis. In a mutualistic relationship, both organisms benefit. Both microorganisms benefit from the host of the plant, and the plant benefits from the microorganisms that inhabit it. However, if we analyze the pathogenesis, endophytes are beneficial, but the plant suffers.

LITERATURE ANALYSIS AND METHODOLOGY

Isolation of endophytic microorganism isolates with antimicrobial and antagonistic properties from *Cichorium intybus*, belonging to the Asteraceae family. Identification of isolated microorganisms based on Bergy classification and MALDI TOF. Study of morphological, cultural and biochemical characteristics of antagonistic microorganisms. Determining the biotechnological potential of isolated *Bacillus cereus*, *Bacillus pumilus* and *Bacillus thuringiensis* strains in pharmaceuticals and agriculture.

In the research, generally accepted methods in microbiology and biotechnological, microbiological, statistical methods were used.

RESULTS

In the relationship between the two organisms, we can see the production of potentially toxic secondary metabolites. This means that some endophytic fungi can produce virulence factors. On the other hand, the plant increases the production of mechanical and biochemical defenses. The relationship between virulence of a microorganism pathogen and enhanced



defense by the plant implies that the two have a balanced antagonistic relationship. This means that both produce a mutually beneficial relationship. This balance depends on the intensity of virulence of the fungus, the level of protection of the plant. These aspects have different changes depending on the influence of environmental factors and the stage of development of both organisms. Mutualistic relationships occur when the virulence of the fungus and the defense of the plant are in constant balance. If there is a fungus, it will be more harmful, damaging the plant than what the plant is able to protect itself. On the other hand, if the plant has a high defense, the microorganism cannot stay in the plant for a long time. At the Institute of Microbiology of the Academy of Sciences of Uzbekistan, based on microbiological biotechnology, it was possible to prepare feed for livestock from plant waste (stalks, straw, straw and waste); in some countries (Brazil) extraction of sugar or alcohol from cellulose with the help of special microbes, extraction of methane gas from cow dung (especially in China, Brazil and European countries) has a very high economic effect. Membranes and immobilized enzymes can be used to produce equipment for measuring and controlling various processes.

DISCUSSION

Researches include the composition of the community of endophytes isolated from different parts of the *Cichorium intybus* plant, their interactions, and the importance of endophytic microorganisms. In addition, the production of secondary metabolites, biologically active substances by endophytes, the study of specific aspects of their physiological and morphological properties, and their use in the endophyte biotechnology industry are considered.

CONCLUSION

The study involves the isolation of endophytic microorganisms from the sprouts and evaluation of their biotechnological potential. The relationship of endophytic microorganisms with plants and the lack of different scientific approaches serve to fully study the mechanisms between plants and endophytes in the future.

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