good reason to think that the nation's top electrical engineering technology will continue to benefit the power supply systems of all nations, enabling the international society to advance more quickly.

УДК 582.288:581.92

ECOLOGICAL IMPORTANCE OF TRICHODERMA SPP. AND THEIR SECONDARY METABOLITES FOR ORGANIC FARMING

Kharitonchik A., Russkikh I.
Republican center of ecology and local study
institute of microbiology of the national academy of scince of Belarus
Belarusian state university
e-mail: olgaburda@tut.by

Summary. *The development of organic farming around the world and in Belarus in the last 10–15 years has shown the importance of studying and introducing biological methods for combating plant diseases. For this, studies of various microorganisms are carried out throughout the world, which can become the basis for modern plant protection products that do not damage the environment and human health.*

The widespread occurrence of fungi of the genus *Trichoderma* attracted our attention due to the possibility of isolating and studying them to identify new highly active strains with a protective function, as well as useful for agriculture. For example, many people, including my family. Are engaged in composting plant residues in order to obtain organic fertilizer. Adding *Trichoderma* to such a compost would speed up its maturation and also give it the property of a plant protection product.

Therefore, the goal of our work was to create a collection of *Trichoderma* strains of various origins and conduct a comprehensive study of it in order to select isolates that are most promising for crop production. To achieve this goal, we solved a number of tasks:

1. Take samples of soils and other materials for the isolation of *Trichoderma*;
2. Carry out the isolation of mushrooms from the collected sources and take samples of *Trichoderma*;
3. To select homogeneous morphotypes of *Trichoderma* to create a collection of isolates;
4. Study isolates for a complex of morphological characters;
5. Study the growth rate of the collection isolates using different carbon sources;
6. To evaluate the antagonistic activity of *Trichoderma* isolates from the working collection in relation to a number of plant pathogens;
7. To identify in the collection of *Trichoderma* isolates producers of siderophores;
8. To evaluate the resistance of *Trichoderma* isolates to some fungicidal preparations;
9. To study the ability of *Trichoderma* isolates to grow at 37 ^{o}C.
10. To characterize the diversity of the collected collection of *Trichoderma* isolates according to the complex of the studied traits and to highlight the most promising for use in plant growing.

We have used a number of standard microbiological methods to locate, isolate, collect, maintain and preserve isolates of *Trichoderma* fungi. We also used special published methods to describe isolates and study their special characteristics: growth rate on various substrates and under various other conditions, the ability to release secondary metabolites, antagonism towards phytopathogenic fungi.

As a result of the experimental work, we have created a collection of fungi of the genus *Trichoderma* and described it according to different parameters. We have also identified the most promising isolates for creating a biological plant protection product.

The scientific novelty of the work lies in the collection and study of new, previously unexplored *Trichoderma* isolates. The practical and economical significance of the work lies in the collection and assessment of a wide range of *Trichoderma* isolates for some important economic traits,

which can be used in various directions, for example, to protect plants from diseases and stimulate their growth.

Based on the data obtained during the execution of the work, we can draw the following conclusions:

1. Well-decomposed wood, fruiting bodies of mushrooms, as well as the soil are inhabited by mushrooms of the genus *Trichoderma*. The fruiting bodies of the present tinder fungus are the richest source of a variety of fungi of the genus *Trichoderma*.

2. The created collection of *Trichoderma* isolates has a significant diversity in the morphological characteristics of the mycelium. The distribution by morphological groups is heterogeneous.

3. The collection contains both slow and fast-growing isolates. At the same time, the growth rate of mycelium in isolates differs depending on the period from the beginning of growth. Isolate 35 has the highest growth rate, which is not inferior in this indicator to industrial strains from commercial preparations.

4. Isolates in the collection exhibit a different capacity for cellulose utilization. The best growth rate on the medium with cellulose was shown by isolate 22, which is not inferior to isolates from commercial preparations.

5. Wood, fruiting bodies of fungi, as well as soil are inhabited by fungi of the genus *Trichoderma.*

6. Some isolates from our collection are capable of synthesizing siderophores.

7. Many isolates are capable of inhibiting the growth of soil pathogens. Perhaps this is due to the fact that fungi of the genus Trichoderma are soil fungi. The pleasant result was that Trichoderma suppressed phytophthora well.

8. The growth of isolates at a temperature of 37 degrees Celsius shows the impossibility of using such isolates for the needs of crop production.

The main practical conclusion is the creation of a prototype of a commercially viable biological product that can be widely introduced into the practice of organic and conventional farming through its commercialization.

References

1. Alimova F. K., Modern system Trichoderma / Hypocrea, 2005 (https://cyberleninka.ru/article/n/sovremennaya-sistema-Trichoderma-hypocrea/viewer?fbclid=IwAR2tAdra4l9W-b22ZDDSDARnsY5sK2NMnAPM2n).

2. Babitskaya, V. G. Fungi are effective destructors of lignocellulosic substrates: their morphological and physiological and biochemical characteristics [Text] / V. G. Babitskaya // Mycology and phytopathology. – 1993. – T. 27. – 75. – P. 38–44. (In Russian).

3. Chernyavskaya M. I., Sidorenko A. V., Golenchenko S. G., Lysak V. V., Samsonova A. S. Environmental microbiology: study guide. allowance. – Minsk: BSU, 2016. –P. 63 (in Russian).

4. Claus, H. Laccases: structure, reactions, distribution [Tech / H. Claus // Micron. – 2004. – V. 35. – P. 93–95 (in Russian).

УДК 582.288:581.92

AN AUTOMATIC CATCHMENT AND ROOT IRRIGATION DEVICE FOR DESERT TREES

Lai Qinghao, Yang Zeying, Wu Xinyang
Northeastern University
e-mail: 2960179844@qq.com

Summary. *Now, there are 36 million km^2 of deserts on the planet, a quarter of the land area, and expanding by 60,000 km^2 per year. To combat climate change and achieve the carbon peaking and carbon neutrality goals, China is engaged in afforestation. However, water scarcity, strong winds and shortcomings of current irrigation methods make afforestation a major challenge. Based on the problems, we design an automatic catchment and root irrigation device for desert trees.*