



Inhibition of the Development of Phytopathogen Populations by Extracts from the Zoohumus of the Insect *Hermetia Illucens*

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Abstracts.

The method of application of extracts from the zoohumus of the insect *Hermetia illucens* (black soldier fly) for inhibition of phytopathogenic microorganisms – pathogens of root rot, tracheomycosis wilting and leaf spots is substantiated.

Keywords: phytopathogens, *Hermetia illucens*, zoohumus, tracheomycosis wilt, root rot.

Modern plant protection should not interfere with the ability of agrobiocenoses to self-regulation and should be based on the use of environmentally friendly methods and means. The use of an expensive and unsafe chemical method of plant protection does not guarantee a long-term positive effect, since resistant phytopathogenic forms of microorganisms appear and, at the same time, the number of saprophytes decreases.

One of the ways to solve this problem is the use of organic fertilizers that can inhibit the development of populations of soil pathogens. An example of such an organic fertilizer is zoohumus, a product of disposal by the larvae of the insect *Hermetia illucens* (black soldier fly) of various organic waste [1]. Zoohumus is a well-balanced organic fertilizer and, like the larvae of the black lion, has a rich microflora consisting of bacteria, fungi and actinomycetes, which are antagonists of soil pathogens [2, 3].

Purpose of the study.

To determine the effectiveness of various concentrations of extracts from zoohumus in inhibiting the development of populations of soil pathogens.

Materials and methods.

The work used zoohumus obtained as a result of utilization by the larvae of the insect *Hermetia illucens* (black soldier fly) of the substrate from beer production waste. Some of the work (some experiments) were performed using the equipment of the State Collection of Plant Pathogenic Microorganisms, Indicator Plants and Differential Cultivars at the All-Russian Research Institute of Phytopathology (SCPPM ARRP). Phytopathogenic fungi used in the experiment *Fusarium oxysporum*, *F. moniliforme*, which are the causative agents of fusarioses of grain crops, *Rhizoctonia solani*, *Bipolaris sorokiniana* are the causative agents of root rot, *Sclerotinia sclerotiorum* is the causative agent of white rot.

Phytopathogenic organisms were sown on the Czapek nutrient medium in Petri dishes, after the mycelium of fungi grew (on the 3rd day), with a cork drill with a diameter of 10 mm, holes were made in the agar and extracts from zoohumus with a concentration of 10%, 20% and 30% were poured there. The radial growth of the mycelium of fungi was determined on the 6th day. The effect of zoohumus extracts was determined by suppressing the growth of mycelium of phytopathogens in the

experiment compared with the control (water). Suppression of mycelium growth of phytopathogens was calculated using Abbott's formula.

Research results.

Анализ радиального роста мицелия грибов показал, что экстракты из зоогумуса оказывают ингибирующее действие на рост мицелия грибов фитопатогенов. Эффективность этого действия увеличивается с увеличением концентрации экстракта. Наиболее сильно подавлялся рост мицелия грибов при применении экстракта зоогумуса в концентрации 30% у грибов *F. oxysporum* на 32%, *F. moniliforme* на 34%, *R. solani* на 25%, *B. sorokiniana* на 22%, *S. sclerotiorum* на 20%.

Analysis of the radial growth of fungal mycelium showed that extracts from zoohumus have an inhibitory effect on the growth of mycelium of fungal phytopathogens. The effectiveness of this action increases with increasing concentration of the extract. The growth of mycelium of fungi was most strongly suppressed when using zoohumus extract at a concentration of 30% in fungi *F. oxysporum* by 32%, *F. moniliforme* by 34%, *R. solani* by 25%, *B. sorokiniana* by 22%, *S. sclerotiorum* by 20%.

Conclusions.

В результате проведенных исследований показано, что экстракты из зоогумуса, полученного вследствие переработки личинками мухи *Hermetia illucens* (черная львинка) отходов пивного производства, оказывают ингибирующий эффект на развитие мицелия таких фитопатогенных организмов, как *F. oxysporum*, *F. moniliforme*, *R. solani*, *B. sorokiniana*, *S. sclerotiorum*. Возможно, такое воздействие на рост мицелия вызвано не только компонентами зоогумуса, но и метаболитами его микрофлоры, что требует дополнительного изучения.

As a result of the conducted studies, it was shown that extracts from zoohumus obtained as a result of processing by the larvae of the *Hermetia illucens* fly (black soldier fly) of beer production waste have an inhibitory effect on the development of mycelium of such phytopathogenic organisms as *F. oxysporum*, *F. moniliforme*, *R. solani*, *B. sorokiniana*, *S. sclerotiorum*. It is possible that such an effect on the growth of mycelium is caused not only by the components of zoohumus, but also by the metabolites of its microflora, which requires additional study.

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