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Bitoxibacillin - Bioinsecticide

Pulotov F. S.
Doctor of Philosophy (PhD) of Veterinary Sciences, senior researcher

Ziyadullayeva Sh. Sh.
Junior Researcher

Abduxalimova Sh.
Researcher

Sayfiddinov K. F.
Researcher, Veterinary Research Institute of Uzbekistan

Abstract: This article provides information about a biological product - a bioinsecticide, that is, about the research work of foreign scientists carried out at the same time.

Keywords: Bitoxibacillin, drug, insecticide, insect, mite, bacterium, spore, strain, bacillus thuringiensis, biological method, nutrient medium.

Introduction. The deterioration of the environmental situation in our republic, the widespread distribution of toxic substances in the external environment are the cause of the emergence of various infectious diseases of humans and animals.Pollution of the external environment is a violation of environmental equality and its prevention remains one of the pressing problems of our time. According to researchers, an ecologically unhealthy environment does not exert its influence on living organisms, but there is an increase in various diseases, and then, without the organisms reacting to these diseases, a process of continuous development of diseases occurs observable.

The production of highly effective drugs of natural origin, safe for humans and farm animals, remains one of the main economic problems of our time.In the fight against ectoparasites of farm animals, the use of biological methods instead of chemicals is becoming increasingly important. The use of the biomethod has a number of advantages over the chemical method, which are expressed in overall efficiency and environmental safety. The problem of environmental pollution and related disturbances in the ecological balance in nature is considered very relevant today[1].

Purpose of the study. A review of the literature on bitoxybacillin, which is supposed to be used in the biological control of pests and mites, is presented.

Literary analysis.

Bitoxibacillin is a biological preparation based on the thuringiensis variant of Bacillus thuringiensis with crystal-forming spores. It was discovered at the former All-Union Institute of Agricultural Microbiology.1 g of dry powder contains 45-60 billion viable bacterial spores and 0,6-0,8% exotoxin and endotoxin crystals. The bacteria grow on MPA, MPB, form gram-positive

rods measuring 3-6 x 0,8-1,3 microns, single or chain, aerobic, pale gray, flat, with uneven edges of the colony. does not form indolease, ferments glycerol, glucose, maltose, starch, does not ferment arabinose, galactose, lactose, mannitol.Serologically indistinguishable and do not require passage. Resistant to low (-300) and high (+300) temperatures. Dried spores remain virtually unchanged for 10 years or more. Heat-labile enzymes, such as lecithinase and protease, produce penicillin-like antibiotics[6].

The scope of the parasite is wide and affects insects through spores, heat-labile endotoxin crystals and heat-stable exotoxins. Bitoxibacillin is currently produced in Russia (Sibbiopharm LLC, Berdsk). The total production volume is 8-15 thousand tons of products per year, depending on the product range. Consumers of the products are more than 600 enterprises of the Russian Federation. Products are supplied to 15 countries around the world. The company's product range includes more than 30 items focused on agriculture, healthcare, ecology, the oil industry and other areas of activity. Russian scientists have used the drug Bitoxibacillin against more than 50 plant pests with an effectiveness of 80-90% (www.bioeffect.ru/www.sadovod.ru/publics.)[9]. Plant biological control research is now an interdisciplinary field involving the mass rearing and use of entomophages and acarphages, as well as the assessment of conservation opportunities for natural beneficial insects[4].

The biological activity of the exotoxin identified in house flies is at least 2000 units. The lethal dose for insects consists of 103 - 2 x 106 spores and crystalline particles. LD50 for silkworm – 1 µg/g mass.

As a result of the research work of D.V. Watson, E.T. Schmidtman, P.A.V. Martin, 4616 strains of Bacillus megaterium were isolated, and J.B. Jespersen, J. Kading established that the Bacillus thuringiensis strain produces 2 types of toxins : delta-endo and beta-exotoxin (2000).

In Uzbekistan, since 1966, methods of biological control of blood-sucking insects and ticks have been studied in the laboratory of arachnoentomology of the Veterinary Research Institute (A. Ruzimurodov, D. Vakhidova, S. Mavlonov, etc.). As a result of Bacillus thuringiensis var. Thuringiensis of the Uzbekistan Research Veterinary Institute M No. 1, the bacterial strain Musca Domestica vicina Mcq. (house fly) was isolated from the larvae of the local population and included in the Research Veterinary Institute collection of microorganisms under registration number No. 1 (2000). However, the insectocaricidal effectiveness of this isolated strain against parasites and vectors of infectious diseases has not been sufficiently studied.

Today, more than 370 biological agents are registered in the world that protect crops from pests and diseases.Global sales of biopesticides account for more than $300 million annually, or about 1 percent of the global crop protection market.Russia produces 0,25% of the world's biotechnological products for plant protection[3].

One of the most effective and widely used pest control products (about 90-95% of the biopesticide market) are preparations based on the gram-positive spore-forming bacterium Bacillus thuringiensis (Bt).Preparations based on Bacillus thuringiensis are safe for humans and warm-blooded animals, for the body and the environment.Therefore, they are approved for use in organic farming abroad (Guide to Biocontrol Products, 2009, 2014) and in the Russian Federation (State standard 56508-2015)[5].

The current global biopesticide market is valued at US$4 billion and is expected to reach US$7,7 billion by 2021[8].

Biological products are also widespread in the Russian Federation - in 2016, the market for biological plant protection products grew by 35% in volume terms compared to the previous year and reached 5,8 thousand tons. Bacillus thuringiensis Berliner is a well-known insect pathogen that has been used for over a century as a biological control agent in forestry, agriculture, and as a vector control agent for human infectious diseases[7].

This composition of the drug not only enhances the insecticidal effect, but also expands the scope of its action. The drug is safe for humans, warm-blooded animals, fish and other aquatic organisms, beneficial insects and does not harm the environment[2].

Therefore, the research and application of modern and highly effective biomethods and means of combating pathogenic insects and ticks of farm animals is an urgent task. Currently, research work is ongoing in the laboratory of arachnoentomology and acarology. In 2005, the bitoxybacillin strain Bacillus thuringiensis var.thuringiensis RVI M was cultivated on the MPA nutrient medium and re-purified by inoculation onto the meat peptone agar - MPA and meat peptone broth - MPB nutrient media.In order to determine on what nutrient media this strain grows well, it was sown on the nutrient media “Blood Agar”, “Columbus Agar”, “Blood” and “Blood Serum”. As a result, it was found that this strain grows well and forms unique colonies on nutrient media with “Bloody” and “Blood Serum”. Purely isolated strains of Bacillus thuringiensis var.thuringiensis were propagated and placed in a special refrigerator.It has been established that this entomopathogenic strain of bacteria can grow in food environments for a long time, that is, even after 18 years. Experiments are ongoing on the technology of propagating this strain on effective nutrient media and preparing an entomopathogenic bacterial preparation (insecticide).

Conclusion. The bioinsecticidal drug bitoxybacillin is widely used against more than 50 plant pests around the world, but this is the first time scientific research has been conducted on its use against ectoparasites of farm animals. Based on this, the development of the use of this bioinsecticidal drug against ectoparasites of farm animals makes it possible to create a healthy epizootological and epidemiological situation, a clean ecological environment and a balance between people and animals in populated areas and livestock farms.

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