

Peculiarities of formulations approved in Ukraine to use against «gray rot» in comparison with European formulations

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ABSTRACT

Introduction: Since 2009, new regulations have been introduced in Europe that tighten the requirements for chemical compounds used as pesticides. Considering Ukraine's active course towards joining the European Union, signing agreements on the harmonization of standards and obtaining the status of a candidate for EU membership, all the above-described approaches will gradually be integrated into domestic legislation and agricultural practice. As a result, the range of chemical plant protection products will be significantly reduced. Which, in turn, carries the risk of reduced harvests and a worsening of the world's hunger situation, given the volume of imports from Ukraine and its crop losses during a full-scale invasion. An alternative to chemical plant protection products today are biopesticides, the use of which for plant protection can lead to many positive results, such as reducing pesticide residues in food, thereby reducing the risk to the consumer.

Aim: Assessment of peculiarities of formulations approved in Ukraine to use against "gray rot" and their comparison with European formulations.

Materials and Methods: The following data were used to analyze and compare formulations: List of pesticides and agrochemicals approved for use in Ukraine 2022; EU Pesticides Database; information from the websites of manufacturers and official regulation documents.

Results: Already today, throughout the world, the use of chemicals is the main method of combating plant diseases both before and after harvest. Fungicides used exclusively to control *B. cinerea* account for 10% of the global fungicide market. Several families of synthetic botrycides are used to control plant diseases caused by it. However, resistant strains of *B. cinerea* may exist, as this fungus can generate and accumulate mutations in its genome. In addition, consumers prefer organic products, the production of which does not use pesticides. The use of biopesticide formulations, in particular based on *Bacillus amyloliquefaciens*, is gaining more and more popularity in Europe and the world.

Today, in Ukraine, there are fungicides to combat gray rot. But, to date, there are certain problems with every fungicide against "gray rot" in Ukraine: a long period before harvesting, which significantly exceeds the duration of the therapeutic and protective effect, primarily berries; impossibility of processing before storage; absence of the possibility of processing ripe berries, since they are used raw, without any processing that could reduce pesticide residues; the ban of active substances in the EU, which will potentially lead to their ban in Ukraine in the near future; maximum residue limits (MRLs) values significantly exceed the EU MRLs, which contradicts the requirements of the harmonization of the regulatory framework.

The solution to these problems can be the use of biopesticides. Today in Ukraine there are several drugs recommended for combating gray rot based on *Bacillus amyloliquefaciens*. However, only two of these preparations contain exclusively *Bacillus amyloliquefaciens*, are used on special crops (berries) and are declared by their manufacturers as biofungicides.

Conclusions: It has been established that the only full-fledged alternative to chemical means of plant protection today are biopesticides, the use of which in plant protection systems will reduce pesticide residues in food products, and therefore the risk for the consumer. It is shown that considering the current processes of European integration of Ukraine, which include the harmonization of medical and sanitary standards and the review of the entire base of plant protection products, the development, study and introduction of new biological preparations is an extremely urgent and promising task.

KEY WORDS: Biofungicide, regulations harmonization, "gray rot"