УДК

SOLUTIONS FOR THE POLLINATORS OF AGRO-INDUSTRIALCROPS

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The article presents a brief information about of production of biological means for the processing of agro-industrial crops and the problem of poisoning pollinators - colonies of bees and other beneficial insects, which affected the large quantitative reduction in the amount of honey obtained. The main objective of this article is to summarize information on existing Bayer works in the field of processing of plant raw materials and the protection of plant pollinators from the deadly ingredients used by the company Bayer and other world-leading companies in this field of economy.

В тезах представлена коротка інформація про виробництво біологічних засобів для переробки агропромислових культур та про проблему отруєння запилювачів - колоній бджіл та інших корисних комах, які вплинули на значне кількісне скорочення кількості отриманого меду. Основною метою цієї статті є узагальнення інформації про існуючі роботи компанії Bayer у галузі обробки рослинної сировини та захисту рослин-запилювачів від смертельних інгредієнтів, що використовуються компанією Bayer та іншими світовими компаніями у цій галузі економіки.

In the last decade, the amount of production of biological means for the processing of agro-industrial crops has increased. This, in turn, led to the problem of poisoningpollinators- colonies of bees and other beneficial insects, which affected the large quantitative reduction in the amount of honey obtained.The main objective of this article is to summarize information on existing Bayer works in the field of processing of plant raw materials and the protection of plant pollinators from the deadly ingredients used by the company Bayer and other world-leading companies in this field of economy, as well as to familiarize the reader with news in this area and development perspectives.

In the debate about “bee deaths” in some regions of the world, neonicotinoids – a class of insecticidal active ingredients – are being named as one factor responsible for the regionally increased rates of bee colony collapses.

For a crop protection agent to be licensed, it has to pass a number of tests. Only once the product has been meticulously examined in the laboratory, and to some extent also subjected to field tests, may it be certified “harmless to bees”, their crop protection agents are not harmful to beeswhen used rightly.

The latest research indicates that a complex combination of factors is adversely affecting bee health. The main culprits are diseases, parasites such as the Varro mite, weather conditions and loss of the honey bees’ food sources.

It’s well known that Varro Mitesis dangerous to bees. Bayer is actively involved in the search for new bee health solutions, such as by developing new products for the treatment of infestation with Varro mites. The Bayer Bee Care program was founded specifically to thoroughly investigate this issue[1].

During treating seeds, the substance used to dress them– which protects the plant from pests at germination and in the early growth phase –under no circumstances should be allowed to enter the environment as dust when the seeds are sowed. A tough goal, but an ambitious project is aiming to achieve just that. Its name is its aim: “Zero” Dust.

Bees have to be safeguarded from direct contact with plant protection products. Together with Crop Science, Bayer Technology Services has developed an array of solutions to keep dust generation to a minimum during seed treatment.

Dressing means that the seeds are coated with a plant protection agent prior to sowing. This keeps both seeds and plants safe from the very start. And the specialists agree that very little of an active substance is needed to have a very big impact.

The researchers are similarly in agreement that treated seeds have to be handled with extreme care, because the layer of active substance coating the seeds has to stay in place and not be rubbed off. Otherwise there is a danger that the substance could be released into the environment in an uncontrolled way, and that is something that has to be avoided because it could potentially have a negative impact on bees and other beneficial insects.

For Bayer, this was the starting point for a comprehensive project comprising a large number of individual measures: "Zero" Dust. Under this name, a wide variety of possibilities for large-scale dust reduction were put forward, analyzed, tested and finally put into practice: from "SweepAir" – a kind of "field vacuum cleaner" – to the use of polymers to improve the adhesion of the seed dressing. This is largely dependent on the design of the seed-dressing machine: With one, the plates that break up the evenness of the motion are attached near the top. With another they are attached at the side. Sometimes there are many of these "spoilers," sometimes only a few. And when the design changes, so does the dressing of the seeds.

Precise knowledge of the processes at work in a seed dressing machine also leads to significant improvements in terms of reducing dust: Specialists are now able to assess exactly what forces are at work and whether they will lead to avoidable abrasion and dust.

Independently of the seed dressing itself, improving the drying process has also been a focal point for the experts. The idea of drying the seeds during the dressing process was proposed.

This is known among experts as In-Bowl-Drying and involves hot air being directed into the bowl of the seed dressing machine. It causes the evaporation of large amounts of water and increases the space available for the dressing substance itself. Like this, specialists are able to increase throughput substantially. A big part of the challenge was ensuring that the hot air was passed through the seed perfectly evenly. This was achieved using a special metal plate with specially designed gaps. And again, it's no coincidence that a similar apparatus has already been used in the past – for a pharmaceutical in the field of tablet drying [2].

But how do you know, exactly, when you have reached the right point to end the dressing process? This point is influential in determining how much dust is likely to be produced when the seed is sowed. If the seed is too moist, the individual grains can stick together and can't be sowed as desired out in the field. But if they are treated for too long, it can lead to an increase in the amount of abraded dust.

For this reason, a specially qualified employee constantly stands beside the basin in which the seed is being dressed. This person, because of their long experience, can hear the precise moment when the sound changes, and that is the signal for the drying to stop. This results in the dressing adhering to the seed as optimally as possible. Tests have shown that stopping the process ten seconds too late can mean up to 30% more dust.

But, according to the experts in process analysis technology at Bayer Technology Services, this process could be improved even further. This was a job for application engineer Reinhard Gross and his team. Gross proposed relying on a sensitive microphone rather than trusting the human ear. But in an environment that generally tends to be very loud, putting this idea into practice was no easy task. Two years have now passed since the inception of the project: the problem has been solved and a patent issued.

However, it was clear from the start that they were focused only on the issue at hand. The aim was also to come up with a technology that Bayer's competitors would also use. At the end of the day, it comes down to ensuring that less active substance enters the environment, not just for Bayer, but across the board.

Pollinators and their health not only impact the livelihoods of farmers, beekeepers and pollination service providers but also the quality of life and healthy lifestyle that so many of us enjoy. As the world population continues to grow, we need to contribute to the protection and conservation of pollinators and, at the same time, help farmers optimize their agricultural productivity in a sus-

tainable manner. This is, naturally, an area in which Bayer is highly interested in contributing to progress. Pollinators need us to join forces to ensure their health and safety. It is important that we exchange knowledge, seek understanding, discuss options and take appropriate action. In 2017, the Bayer Bee Care Program celebrates five years of dedication to promoting excellence in pollinator science, communication and dialog with stakeholders. The program comprises over30 collaborative research projects worldwide, addressing some of the main threats and opportunities for pollinators and pollination and helping farmers optimize their harvests. In this edition of the BEENOW magazine, they cover a selection of the projects and collaborations, showcasing tailor-made local and regional approaches. These include examples from each of the threekey areas of this program, namely Feed a Bee, Healthy Hives and Sustainable Agriculture. They see it as a crucial part of their mission to contribute to bee and pollinator health via cutting-edge research and educational activities. As such, they are fully committed to continuing to invest in pollinator health in line with their mission [3].

Good new's that a comprehensive, joint study by Exeter University, Roth Amsted Research and Bayer researchers has identified and characterized the enzymes in honey bees and bumble bees that determine how sensitive they are to different neonicotinoid insecticides, namely CYP9Q, a subfamily of P450 detoxification enzymes.

The results reveal these enzymes in the metabolic mechanisms in bees effectively break down certain insecticides quickly, allowing their safe application even in flowering crops where foraging bees can be exposed. The investigations also show that you can't make generalizations about the bee toxicity of insecticides of a chemical class such as neonicotinoids (A major class of insecticides, chemically related to nicotine, used to protect crops against piercing and sucking insects, and for flea control on cats and dogs) [4].

References

1. [Електронний ресурс]. – Режим доступу:https://www.bayer.com/en/bee-health-pollinator-straightforward.aspx
2. [Електронний ресурс]. – Режим доступу: https://wikipedia.org/wiki/Bayer
3. [Електронний ресурс]. – Режим доступу:https://beecare.bayer.com/home
4. [Електронний ресурс]. – Режим доступу: http://www.oxfordreference.com/search?q=neonicotinoids&searchBtn=Search&isQuickSearch=true