UDC: 632.937:623.746-519 DOI: https://doi.org/10.53040/ppap2026.58

OPTIMIZATION OF CROP PROTECTION PROCESSES USING DRONE-TYPE TECHNOLOGICAL SYSTEMS

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Currently, ecological agriculture involves improving existing crop protection systems. The trend towards reducing application rates for chemical plant protection products has stimulated the development of more effective non-chemical products. One of the priority areas is the use of biological plant protection methods based on new technological processes involving microbial products and beneficial biological agents.

Our scientific research aims to develop new technical solutions that will become an important element of modern, integrated plant protection technologies. This task has stimulated research into the potential use of technological devices such as small drone-type aircraft, to mechanize the transport of specialized equipment designed for distributing biorational products and releasing biological agents to combat crop diseases and pests. The main advantage of small drone-type flying devices lies in facilitating access to other technologies that enable both farmers and agricultural companies to cultivate larger areas and reduce their expenses.

In accordance with our research, two special devices were developed for distributing biorational preparations and launching biological agents to combat diseases and pests of agricultural crops. Following research, specialized equipment was selected, onto which devices designed for carrying out technological plant protection operations were mounted.

The first stage of the project involved the design and manufacture of the device in the form of a horizontal bar equipped with nozzles, suitable for the process of dispersing plant protection products. Preliminary testing of this device was conducted under laboratory conditions, followed by field experimental plots to determine optimal operating parameters, as well as the method for mounting and integrating it into the pumping system of the small drone-type aircraft.

The second stage was focused on developing the device for launching biological agents, specifically the *Trichogramma* parasitoid. The analysis of the preventive test results highlighted the need to improve the electrical operating circuit; implementing this modification enabled remote control within a 100-meter radius of the device attached to the small drone.

Drones retrofitted with additional devices serve as a means of transport for dispersing biorational and microbial preparations, as well as for launching utile insects within the framework of biological integrated plant protection methods.

Keywords: devices, biorational products, drone-type aircraft, biological agents, *Trichogramma*.

Acknowledgments. The research was carried out within the Subprogram 011103 "Development of ecologically harmless means of reducing the impact of harmful organisms of agricultural crops against the background of climate change", funded by the Ministry of Education and Research of the Republic of Moldova.