



DIGITAL TECHNOLOGIES AND ARTIFICIAL INTELLIGENCE IN PLANT PROTECTION

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Article history:		Abstract:
Received:	21 th May 2024	The history and trend of development of digital technologies and artificial intelligence throughout the world, including in Uzbekistan, are considered. Examples of their application in agricultural production, including in the field of plant protection, are given. The scientific and organizational tasks of their application are outlined
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ENTER. In agriculture, including protection of plants from pests and diseases, the use of modern information technologies remains the need of the hour. At present, in our Republic, cooperative farms that grow cotton and grain on large areas have been replaced by farms with the help of small-scale technologies. This, in turn, allows reducing the costs of cotton and grain cultivation, fertilizer consumption, and bringing irrigation systems to an alternative level. For this reason, it is important to create and introduce the basics of phytomonitoring in cotton and grain cultivation. One of the main tasks of phytomonitoring is to know and analyze the condition of crops, to determine the reasons for avoiding (behind) the development.

Obtaining such information in time allows to clarify and change the technology of cotton and grain cultivation, to determine the effect of certain factors and to create optimal conditions for the development of crops. These works cannot be carried out without automated computer systems and without the use of digitization technology. Transferring the solution of the above-mentioned issues to "numbers", that is, it is based on the development of digitization technology, digitization of process coding, transportation, forecasting, optimal decision-making stages.

RESEARCH RESULTS.

Digitized Coding – The development of automated systems for solving plant protection problems (especially forecasting) requires the collection, analysis and processing of large amounts of data. In order to receive such information quickly and on time, it is important to encode it. In addition, the use of coded information reduces the distance transmission of this information and reduces the costs for it several times. Digitized transport consists of determining the degree of damage to plants by pests, diseases and weeds using various sensors. The data obtained is analyzed by computer and a diagnosis is made according to the level of damage. Such a diagnostic system works in "online" mode. The basis of the digitized diagnostic system is the automated data and knowledge bases, with the help of which accurate and quick diagnoses of the development of harmful organisms are made.

Digitized monitoring is the automated phytosanitary monitoring of the condition of plants and the effects of biotic and abiotic factors affecting them, determining their indicators by phases of development (development phases, varieties, weather data, agro-technological and economic indicators, etc.) and coding them.

Consists of collecting data in digital forms.

Such monitoring is carried out continuously or at fixed periods.

Based on the results of the conducted phytosanitary, agroecological, economic and economic monitoring, the development of plants and their harmful organisms is evaluated, and forecasts are developed on their condition. Optimal decision-making is the analysis of the condition of plants and their harmful organisms based on the results of digital diagnostics and monitoring, and optimal decisions are made regarding the agrotechnical and protective measures, their strategy and tactics. Digitization technology has its scientific and industrial applications in all fields, including agriculture and plant protection. We can see the application of this technology in the field of plant protection in the following examples. In the 80s of the last century, the VNIIF-3 automated system for protecting potatoes from phytophthora disease was developed at the Russian Institute of Phytopathology, and the results were delivered to users via teletype [7].

The Dutch company "DACOM" developed the "PLANT plus" system, with the help of which the user would have the opportunity to obtain the status of plants, forecasts of their damage levels [6].

In Denmark, the "LANDBRUGSINFO" system was developed, with the help of which they would have the opportunity to take into account agrometeorology and phytosanitary conditions in the protection of crops [4].

The information-advisory system "SOVET-1" developed at the All-Russian Institute of Plant Protection allowed to use it as a system that could provide advice on protection of winter wheat crops from pests, diseases and weeds [5].

Among the works that include some elements of automated digital technologies in the field of plant protection are [1-11]. Many such examples can be cited. The history of the scientific field "Artificial intelligence" dates back to the middle of the last century. The definition of this word was given by John McCarthy at a conference at Dartmouth University in 1956.

According to him, the meaning of this word is not related to human intelligence, but it consists of a method that can be used to solve a certain problem, and it does not exist in humanity [12]

Research on artificial intelligence has been conducted and is being conducted in the Republic of Uzbekistan. In the 80s of the last century, the "Artificial Intelligence" laboratory was established at the "Cybernetics" Institute of the Academy of Sciences of Uzbekistan under the leadership of Academician M.M. Komilov, and nowadays it operates at the "Center for the Creation of Software Products and Hardware-Software Complexes" under TATU. In this laboratory, students of academician M.M. Komilov, Ph.D., professors Sh. Fozilov, R. Khamdamov continue research in this field.

Professor Kh. K. Yakhyaev, Doctor of Agricultural Sciences, and his students are conducting effective research on the application of the methods developed in this laboratory in agriculture, in particular, in the protection of plants from harmful organisms at the ITI "Plant Quarantine and Protection" [8-11].

From the information described above, it can be concluded that if the Republic of Uzbekistan develops digital technologies in agriculture (including plant protection) and effectively introduces and uses elements of artificial intelligence in the field:

- # Determining priority areas for digital technologies in the field and developing a program;
- # Development of the program of scientific research works in accordance with the priorities;
- # Development of automated monitoring systems and their software;
- # Implementation of developed digitized technologies in agricultural production.

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