Grynchak O.V., Davletkhanova O.H., Mykhaylyshyna L.V.

CONTROL PROBLEM OF PHYSIOLOGICAL STATE OF FRUIT PLANTATIONS IN THE MICROSOFT EXCEL ENVIRONMENT.

Modern integrated plant protection involves managing of pest populations within specific agrobiocenosis by applying optimal measures system for the specific conditions to optimize the phytosanitary state of crops. The main factor for this is phytosanitary monitoring and prognosis of pests whose goal is to obtain the necessary information to develop prognoses and signaling of pests' expansion and making decisions on conducting of protective measures through the systematic evaluation of seasonal changes in pest's quantity and harmfulness based on direct methods of recording. To maintain such records, we offer information technology application developed in Microsoft Excel.

For convenient data entry we propose to use a special form. With such form it is easy to navigate through Logbooks, which recorded results of garden examining, to delete unnecessary and add new entries. There is also the ability to search entries in the form under conditions.

Using the tools of MS Excel as query construction (functions of the category "Work with database", pivot tables, control elements) queries were developed in such way, information of which allows to detect spreading areas of pests / diseases, to signal about time of their appearance in the garden, as well as to evaluate the expected threat.

To identify hazard thresholds we offer a tool of MS Excel – "conditional formatting" which allows changing the appearance of cells depending on a given condition (or criteria).

To select a way of garden protection from pests we propose to use the method of optimal decision making in conflict situation such as game theory.

Basic task assumptions of strategies selection to protect the garden depending on the weather conditions are the following:

- protection of garden vegetation from pests and diseases can be implemented with different technologies (strategies – C_i), which have different effects depending on the weather conditions (Π_j);
- decisions making on strategy selection occurs in a special uncertainty and without active target countermeasure "partner" (natural uncertainty);
- yield (a_{ij}) was accepted as optimality criterion (winning).

Game with nature is described as a payment matrix whose elements are gains from the strategy realizing. Risks matrix is based on the data of payment matrix and parameters are calculated necessary to select the optimal strategy according to different criteria. Trust Factor of weather forecast (risk of failure prediction, λ) is introduced with the help of control element "Scroll bar". The optimal strategies under criteria are separated with formatting created by the conditional formatting. The optimal strategy is selected by comparing the productivity of vegetation under various protection technologies based on weather forecast.

Thus an applied information technology for control of physiological state of

fruit plantations is proposed for implementation in the Microsoft Excel environment enabling an immediate receiving of up-to-date information for garden phytosanitary monitoring and, if necessary, receiving of recommendations for the pest control optimal strategy choice. The proposed technology includes a registry book, designed on the basis of database tools (work with reference books, lists, forms, appropriate functions, filtering tools, conditional formatting, etc.), and a decision support system, based on the theory of optimal decisions under uncertainty conditions, namely the theory of games with nature.

Key words: monitoring, strategy, information technology, fruits plantations, garden defense, pests.