

Modeling and Agroecosystem analysis Using in Integrated Pest Management Programs(IPM)

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Summary:

The widespread and increasing of pests and challenges for farmers and agricultural specialists represent mostly by epidemic appearance of pests causing economic losses annually. And because we live in an information era and the technological revolution and the enormous techniques provided by modern computer programs and Analysis system. . So thought to benefit from these programs to develop Modeling and Mathematics equation that express Agroecosystem interaction relation as reality approach .

These programs provide additional data to fill gap in the basic information for the diagnosis of the key factors and important in the agricultural system, also Modeling Simulation helps mathematical models to predict the emergence of pests and population density Monitoring to keep low levels of economic injuries. The results of the information and projections provided by such programs contribute significantly to the decision-making process about optimal controlling times as well as to the importance and efficiency of this information in the development and evaluation of integrated pest management programs (IPM), which represent the aspirations and ambitions of specialist towards the agricultural pests control in reduction the use of chemical pesticides and their negative impact on public health and the environment.

Introduction:

The development artificial intelligence and its applications in the different fields of knowledge, including the Life Sciences during the past five decades, and the importance of using simulation models and analysis systems in the agro-ecosystem with its various components, environmental factors of climate temperature, humidity and wind components agriculture, including plant and agricultural pests such as insects, plant diseases, nematodes and invertebrate animals as well as its biological enemies, predators and parasites (Joenes & Carberry 1994)

the concept of integrated pest management depend on that the pest is one of the components of the complex agro-ecosystem and the interaction between the various components in the environmental system that override traditional control of pests, which requires in addition to the application of all the different ways and on an integrated basis

to merge and represent the huge size of complex information resulting from agro-ecological system provided by modern computer technology in configuration of high strategy in pest management. (Abu alhab 1992).

Many of researchers tried a lot of to study the overlapping biological - environmental relationship and take advantage of the abundance of information to reach for more objective conclusions and decisions when developing programs of integrated pest management IPM (Keenan et al. 2003). Biologists and researchers tend toward analysis systems in recent decades of the last century to develop models and new active programs and equations represent interrelationships in plant and pest systems by using of a computer not only as a tool for coordination and arrangement of information but also to develop examples of mathematical samples mimic the real-world systems. (Zhang et al.2009), (Paul et al. 2009) . Many researches and studies were made in developed countries in this field of research, and agricultural research centers have adopted national projects to control some species of pests which may become epidemic. The aims of project have included as an essential recruitment of simulations Modeling and the possibility to apply them on a large scale and to success the policies and strategies placed for IPM programs for these pests, as in the national program for the management of wheat pests, including *Nezara viridula* L. and *Schizaphis graminum* Rond. Which implemented by one of the research centers at the University of Oklahoma (Keenan et al.2003). Another research project was conducted to develop computer models to simulate Population Dynamics of flour beetle *Tribolium castaneum* in storages and mills, which lasts for five years to compare the results of these models with applications of control to achieve more efficient treatments and put optimal strategy to control this insect (Zhang et al.2007)

Another research was carried to predict the population density of certain store insects such as rusty flour beetle and lesser grain borer, mathematical models were developed to determine the fluctuation of population density of these insects and their importance in the optimal strategy to control through the IPM program for insects. (Paul et al.2009). A research of population movement for forest pests developed a model to simulate the Population dynamic as part of the management of these pests to reduce damages caused to forest plants and trees contribute in IPM programs (Sharov 1996).

In a study conducted in Colorado for the design of simulation models the population density of hopper *Melanoplus sanguinif* and analyze the fluctuation of the population during the growing season (Carter et al.1998). A study was undertaken to analyze the information for the models of adult emergence of maize roots worms *Diabrotia barberi* and *Diabrotica virigifera* to design maps of population density in the field (Ellsbury et al.1998). In research to predict the emergence of adults and nymphs of *Homalodisca coagulata* in citrus orchards of Southern California has generally developed independent models of temperature and climate, also the enemies of the insect, which provided information about the increase and decrease in population density of the insect during the growing season (Castle et al. 2005).

The purpose of this study is to profile and to shed spotlight on the importance of the application of computer programs as simulation Modeling and analysis systems in the field of agricultural research in Iraq especially of the research in IPM programs that not previously cited by other researchers, and to make the first initiative to open the door for agricultural researchers to keep up with progress in this research area and to develop

integrated pests management programs IPM, because of their importance in controlling and reducing pest damage, that the importance of these models and analysis systems in general provides ways to help researchers to diagnose the key factors and their importance in the agro-ecosystem. Developing of useful models helps in predicting of the pests emergence and monitoring of population density of these pests electronically which contributes in the process of taking appropriate decisions to control pests and to prevent an epidemic or out break of a specific pest and to prevent access to the economical harmful levels and thus develop strategies for the most appropriate control and the most realistic for the field pest status without excessive in chemical control and access to IPM programs more accurate, objective and less cost and pollute for the environment.

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