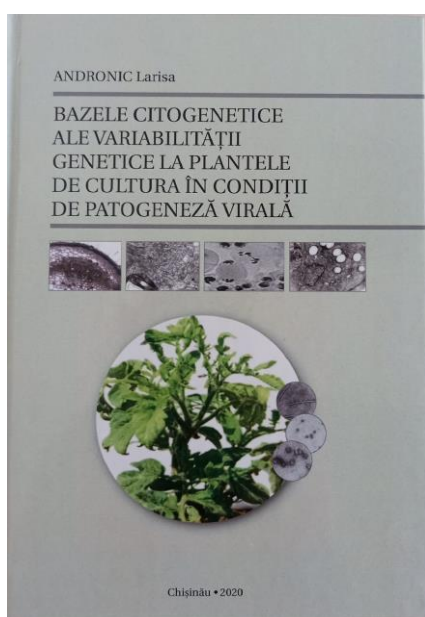


BOOK REVIEW

to the book entitled: “**Bazele citogenetice ale variabilității genetice la plantele de cultură în condiții de patogeneză virală**” (Chișinău, Editure “Print-Caro”, 2020, 236p.) elaborated by ANDRONIC LARISA PhD in biological sciences, associate professor (docent).



The monograph “*The cytogenetic bases of genetic variability in crop plants under viral pathogenesis*” published in 2020 in Chisinau, in the publishing house “Print-Caro” is a topical scientific paper, with applicative character, based on a deep foundation. It sums up valuable, extensive scientific data from various fields of research, the author highlighting the latest achievements in this field.

The paper is a comprehensive monograph that presents in 5 chapters very interesting aspects about the importance of knowledge of research on cytogenetic effects caused by viral infections in crops.

Global population growth, pressure on natural resources and global warming are major challenges at the national and international levels. The negative impact of

phytoviruses (> 1500) capable of infecting plants varies greatly (10–80%, sometimes even 100%). For this reason, the creation of new varieties characterized by productivity and superior quality, resistance to external factors is a topic of great interest, with great applicability. In this context, the subject of this paper – cytogenetics of genetic variability in crop plants in conditions of viral pathogenesis – is part of a broad, topical and interesting issue at global, national and local level, representing a major objective of plant protection and strategies of increase productivity.

The research presents an important degree of scientific novelty by highlighting the genetic effects induced by viral infections on plants, their mode of action in the processes of production of intracellular proteins. It is noted the possibility of using induced genetic changes in order to deplete cultivated species.

A short review of the content, by chapters, allows us to notice a serious documentation of the author on the analyzed subject.

In the **Introduction**, the author clearly formulates the purpose and objectives of the paper, convincingly arguing the theoretical and practical importance of the research results. It performs a very precise analysis of the types of phytoviruses, the way of replication, the mechanisms of reaction of plants to virus infection.

After the introductory chapter, the reader is presented with concrete data, very well argued by recent bibliographic titles, on the special theoretical and practical significance of the cytogenetics of viral pathogenesis (molecular organization of phytoviruses, plant reaction mechanisms, cell proliferation and genetic diversity inducers). The rich experience of the author, accumulated over the years, to efficiently synthesize a large volume of scientific data is highlighted here. Despite the fact that the data presented are specialized, they are easy to understand, thanks to the author.

The following chapters (chapters 2 and 3) describe the virus-induced cellular reactions and the study of the meiosis process in the studied crop plants: tomatoes, barley, cabbage. The objectives of the study include the identification of changes induced by viral infections during cell division in the analyzed culture plants, the determination of the impact of virulence on meiotic and mitotic divisions of the plant, the establishment of the degree of genetic variability induced by viral infection, the development of induction and selection procedure, valuable genotypes obtained from genetic variability. By cytological evaluation of microsporogenesis in tomatoes and spring barley, the regularity of meiotic divisions in viral pathogenesis conditions was highlighted.

Chapters 4 and 5 are devoted to the cytogenetic evaluation of viral pathogenesis and the manifestation of quantitative and qualitative traits in infected plants and their offspring.

The author makes a complex approach to research using various modern techniques such as biochemistry (enzymology), molecular, cytogenetics, electron microscopy, without neglecting the classic morpho-anatomy, histo-morphometry.

The defense effects triggered by the plant organism against viral infection in the case of tomatoes are highlighted. In the case of barley plants, the mitogenic effect (induction of cell proliferation), aneugenic (cell cycle disturbance) and clastogenic (chromosome modification) induced by the striped mosaic virus are noted.

The results obtained by studying the 5 viruses (cauliflower mosaic virus, tobacco mosaic virus, tomato aspermy virus, potato X virus, barley striped mosaic virus), which induce tissue and cellular changes, allowed the following effects to be highlighted: chromosome conjugation, destabilization of microsporogenesis, genotoxic and mitogenic effects on host cells and their offspring.

The impact of viral infection on host plants causes reactions that stimulate asynchronous cell division, as well as inhomogeneous morpho-functional and

genetic changes. Distortions of the expression of genes involved in antioxidant metabolism and of proteins involved in pathogenesis have been observed, with the possibility of defining genotypes sensitive to the viral agent.

From the many data obtained during the experiments described in this monograph, the following are of particular significance:

- Interdisciplinary studies of viral pathogenesis in crop plants (tomatoes, barley, cabbage) have shown differentiated reactions at the cellular and tissue level to genotypes with different degrees of sensitivity, which was the basis for substantiating variability in host x virus systems and the development of procedures for identifying resistant genotypes.

- Structural alterations of cellular components affected by viral infections are achieved through a series of reorganizations of a specific nature (replication and localization of viral virions) and nonspecific (typical restructuring - intensifications, compensations, extensions and replacements of functions).

- The genotoxic capacity of the analyzed viruses was highlighted by identifying the increase in the frequency of chromatid exchanges in the proliferative cells of infected plants.

- In offspring, a reduction in the percentage of abnormalities and an increase in the frequency of mitotic and meiotic conjugation have been identified by studying cell proliferation in detail. The effects of cell division on offspring free of viral germs lead to the appearance of forms with new allelic combinations, which confirms the possibility of using viruses as genetic recombination factors.

- Cytological analysis of mitosis demonstrated the mitodepressive effect of barley striped mosaic virus on the roots of the host plant.

- Following biochemical studies on the expression of genes involved in antioxidant metabolism (APX and SOD) and pathogenesis-associated proteins (PR-3, PR-5 and PR-10) in susceptible host plants and offspring obtained under viral pathogenesis conditions, identified the distortion of these processes induced by the barley striped mosaic virus.

- Cytoplasmic morphometry showed changes (increased ratio of condensed and decondensed chromatin, nucleus to cytoplasm) in the mesophilic cells of tomato plants infected with tomato aspermy virus or potato X virus, but also in callus cells derived from various explants of cabbage genotypes infected with cauliflower mosaic virus.

- Somaclonal variability in cabbage somaclons, regenerated from virus-infected plants using morphological and biochemical indices, was highlighted.

- Cytogenetic analyzes of cell proliferation in viral infection conditions revealed the mitogenic and genotoxic properties of viral agents depending on the characteristics of the host-pathogen genotype system.

The concluding chapter presents briefly, clearly and well-argued elements of novelty, but also personal contribution in the field of determining the cytogenetic effects of viral pathogenesis in culture plants. Understanding the interaction

between viruses and plants is essential for establishing antiviral resistance strategies in crop plants.

The applicability of the obtained results is of particular interest due to the possibility of inducing genetic variability, followed by the selection of valuable genotypes for breeding.

The monograph, through its approaches, enriches the national and international scientific literature with unique elements, constituting at the same time a promising starting point for further studies and similar research in the case of other species of economic importance, affected by many viral pathologies.

The paper comprises 196 pages, is well structured, presenting in its 5 chapters, in a logical and balanced sequence both well-argued general elements that come to justify once again the choice of subject and personal results obtained by using an adequate, modern methodology.

In this paper are presented a number of 42 tables, a rich iconography represented by 68 photographs and explanatory schemes, original, well made both technically and the scientific information it provides.

The bibliography is consistent, including no less than 439 titles, works by national and foreign researchers. It is worth mentioning that 74 titles represent personal contributions, mostly as first author, published in journals indexed in international databases, a positive element that highlights the researcher's concern for disseminating the results of his research.

The numerous bibliographic data analyzed emphasize the author's interest, attention, but also her capacity for synthesis. Recent bibliographic titles (after 2010) highlight the interest of this topic in the new global context of climate change.

The monograph is a very useful and useful read for both graduates and professionals involved in production, those who are interested in studying and combating the effects of viral infections on plants, or their use for amelioration.

Through the wide scientific analysis, through the wide spectrum of the approached aspects, through the capacity of analysis and interpretation, through the conclusions regarding the possibility of inducing new varieties resistant to viral attacks, the monograph contributes fundamentally to the development of this field in the future.

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