

Short Communication

Virus Diseases in Plants

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ABSTRACT

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In this Short Communication, it is presented the nature of the virotic agents in plants, their molecular constitution, the various symptoms that occur most frequently, the climatic conditions that favor infection with, in summary, the description of the most common therapeutic methods are described.

1. INTRODUCTION

Viruses, as well known, are present also in plants and cause infectious diseases. But can it be possible that there is similarity with those which attack the men, especially the covid-19? If so, new experimental prospective could be opened. Among the agents of infectious diseases, those defined as "virosis" have been increasingly found in the vegetal world. By the terms "virosis", we mean submicroscopic nucleoproteic entities capable of altering the metabolism of the host cells in which they are present.

Viruses consist of a nucleic acid (RNA or DNA) similar to that of the cells constituting the genome of the host and, in particular, those affecting plants are made up mostly of ribonucleic acid (RNA).

2. SUMMARY OF THE CURRENT STATE

Viruses isolated in the external environment are not able to exert their action, because they manifest their activity only once inside a living cell, being passively introduced by different vectors.

Therefore, infecting the cell, they affect the metabolism of protein substances and nucleic acids, leading to the production of new viral molecules.

Viruses, penetrating the cells only passively through microlesions or traumas of different types, enter the vascular system, and quickly spread to the whole plant through the lymphatic humors, consequently resulting in a systemic infection.

The classification of virosis is based on the symptomatology provided by the virus to the host, and on the physico-chemical and serological properties of the virus itself, and can be performed assessing certain features such as the degree of thermal inactivation, and through vegetative transmission tests.

From a physiological point of view, viral infections in plants lead to a decrease of the photosynthetic activity, with inhibition of the chlorophyll synthesis, or the degradation of the related pigment. Moreover, an increase in growth inhibiting hormones can occur in infected plants, resulting in abnormal changes in the morphology of the affected organs.

The most common symptom is given by a limitation of the overall development of the plant (hypoplasia) and of some of the organs, which appear completely deformed with reduced extension of the leaf flap, and generalized microphylla and shortening of the internodes. In addition to these alterations, other symptoms may occur, such as colour changes of the leaves and the "mosaics", which are constituted by chlorotic areas alternating with internodal chlorosis.

The bundled appearance of the branches is also frequent, as a result of the increase in the primary and secondary ramifications following an early awakening of the adventitious gems, together with anomalies such as dwarfism or gigantism of the plant.

The alterations or lithiasis of the fruits are also common, on which various depressions and deformations appear making fruits to lose a good part of the commercial value.

The severity of these symptoms is highly variable depending on various intrinsic and extrinsic factors, such as environmental and microclimatic conditions. In fact, depending on the seasonal period, the most intense manifestations occur during the spring, while in summer, with the progressive increase in temperatures, there is a gradual inhibition of the infectious viral process with a considerable decrease in the activity and thus the infectious load.

Obviously, this trend differs from plant to plant, according to the physiological state and the varietal characteristics.

The virus is spread, as well as with the normal cultivation practices, also by means of various biological vectors such as mites, nematodes and insects, and in particular aphids. As a matter of fact, virus transmission takes place from a sick plant to a healthy through punctures on the tissues by the pungent sucking mouth apparatus.

These determine micro-wounds on which cellular juice from infected subjects is deposited. Even some parasitic fungi living in the soil can transmit virotic infections through their propagating organ the so-called mycelium. In some cases, even spontaneous plants, especially perennials or multi-annuals, can constitute a source of virotic infections in different crops.

Likewise, the transmission of the virus from the infected host to the healthy one can occur in certain specialized herbaceous plants, such as tobacco, by simply rubbing two leaf

surfaces with consequent epidermal trauma.

The control of viral affections can be carried out basically by adopting rational prevention methods such as the disinfection of work tools with quaternary ammonium salts, the destruction of infected plants and the use of propagation material, such as bulbs, tubers and healthy cuttings. This good protocol should be certified by specific laboratory tests, such as the micropropagation.

This latter is based on the cultivation of the apical meristems of infected plants, whereby the vegetative apices are aseptically isolated by transplanting them onto artificial nutrient soil, thus forming new healthy plants.

The restoration can also be carried out by adopting the so-called thermotherapy technique, consisting in the controlled exposure of the vegetal material at a high temperature and

humidity for variable periods of time, with the aim of deactivating the viral entities.

3. CONCLUSION

This therapeutic methodology, which changes in intensity upon changing the plant and the viral agent, exploits the sensitivity of the virus to the action of heat, in order to inactivate the contagious nucleoprotein inside the cell without making the same cell suffering from any consequence. In this regard, researchers have exploited this type of intervention for the creation of virus-free clones of fruit trees, as well as vegetables and also various ornamental plants. This can be the future road.