VIRAL DISEASES OF VALERIANA OFFICINALIS L.

Taras Shevchenko’ Kyiv National University, Ukraine.

Monitoring of cultural phytocenosises of Valeriana officinalis L. is carried out. Virus from the leaves and stems of infected valerian plants is isolated. Viral nature of disease was proved with biotesting method. The morphology and length of particles were established with electron microscopy method.

Introduction. Medicinal plants are used in pharmacological, food and parfumery industries. Valerian (Valeriana officinalis L.) is one of the well known medicinal herbs, its has been used in phytotherapy for a long time [2]. Valerian drugs reduce excitation of central nervous system, control heart functioning, raise the secretion in gastrointestinal tract, reduce intestines fermentation [9]. Valerian is applicable for insomnia and migraine [8]. Phytopreparations take part in biochemical reactions of human organism faster than synthetic drugs. Moreover, drugs made with herbs do not cause complications, especially allergy. Complex of these plant active substances possesses many-sided, varied display of pharmacological activity, promoting effective treatment.

All these facts represent a reason for obtaining significant yield in these medicinal plants. There are many problems in herbs growing, because it is needs special organizational, agrotechnical and many other cultivating methods. First of all, main reason of yield reduction is herbs diseases. It was noted that viruses are able to reduce yield and quality of medicinal plants [3, 6, 10]. It is known that various vermin, fungal and bacterial pathogens infect valerian plantations causing damage for plant quality. For instance, 60 % of valerian plants were contaminated with Erysiphe cichoracearum D. C. f. valerianae Jacz., Septoria valerianae Sacc. et Fautr. – 20 %, Sclerotinia Libertiana Fuck. – 15 % of plants [1]. In cultural phytocenosises, except fungi and bacteria, Valeriana officinalis L. can be infected with viruses. In Bulgaria it was shown that some of the herbs, including valerian, are infected with alfalfa mosaic virus (AMV) and cucumber mosaic virus (CMV) [7].

Thus, our research was focused mainly on the indication of viruses that infect valerian plantations in Ukraine.

Object and methods of investigation. Valeriana officinalis L. plants with symptoms of viral infection were investigated with visual diagnostic method. Samples of these plants were taken on Medicinal plants research station of agroecology Institute of Ukrainian Academy of Agricultural Sciences (Berezotocha, Ukraine).

Isolation of viruses from the infected plants has been carried out by Novikov experimental technique [4]. Homogenization of symptomatic plant leaves and stems was made in 0,05 M phosphate buffer in proportion 1:2 (w/v) with following low-speed centrifugation at 12 000 rpm for 20 minutes at 4 °C to remove the debris of plant tissues. Sedimentation of virus has been carried out with 5 % polyetilenglicol, M, 6 000 for 2 h at 4 °C. Virus was extracted with 0, 05 M borate buffer pH 7, 6. After high – speed centrifugation (36 000 rpm for 1, 5 h) sediment was resuspended in 1 ml 0, 01 M borate buffer pH 8, 0.

Mechanical inoculation of indicator-plants with sick valerian sap was carried out for biotesting. With this purpose young Datura stramonium, Nicotiana tabacum (cv. Immune and Trapezon), Chenopodium amaranticolor, Ch. album, Ch. quinoe and Phaseolus (cv. Pinto) plants in stage of two true leaves were used.

Morphology and size of virus particles were detected with electron microscopy method. Purified virus preparation was placed on the copper grid with support that has been made of 0, 2% formvar solution (Serva, Germany). Contrasting has been made with 2% solution of phosphorus - tungstic acid pH 7, 4 for 2 minutes and then monitored on electron microscope JEM 1230 (JEOL, Japan) and EM-125 (Sumy, Ukraine) [5].

Sample analysis for presence of virus antigens has been carried out employing sandwich ELISA modification. ELISA has been carried out in polystyrol plates “Labsystem”. Results were registered using Termo Labsystems Opsis MR reader (USA), programme Dynex Revelation Quicklink at the wavelength 405 / 630 nm.

Results and Discussion. During 2006 -2007 years we were investigating valerian plant plantations of Medicinal plants research station of agroecology Institute of Ukrainian Academy of Agricultural Sciences (Berezotocha, Ukraine). Plants with symptoms of diseases were detected. These symptoms allowed supposing their viral nature of diseases. Valeriana officinalis L. with mosaic symptoms on the leaves, significant plants dwarfing were shown. Inflorescences of infected plants were missing. (Fig.1)

Plant – indicators Datura stramonium, Nicotiana tabacum (cv. Immune and Trapezon), Solanum nigrum, Chenopodium album, Chenopodium quinoe, Chenopodium amaranticolor, Phaseolus vulgaris (cv. Pinto) in stage of two true leaves were used in biotesting method. Symptoms of disease were observed only on the Chenopodium quinoe and Ch. amaranticolor on 20 day post inoculation. There were 2 -4 brown necrosises per 1 leaf with light brown oreol (Fig.2).

© Koreneva A., Mishchenko L., 2008
Conclusions. As a result of phytopathological monitoring of viral infection, found on the valerian plantations, it was infected Valeriana officinalis L. plants were revealed. It was shown that infected plants had the symptoms as mosaic on the leaves, significant plants dwarfing and absence of inflorescences in sick plants. After inoculation with sap of infected valerian plants-indicators showed necrotic reaction. These symptoms allowed supposing their viral nature of diseases. The morphology and length of particles were established with electron microscopy method. The investigated particles were presented as filamentous virions, 530±10 x 11 nm.


UDC 578.85/86

T.P. Mudrak, stud., A.S. Bysov, PhD, T.A. Kompanets, PhD, G.V. Korotyeyeva, PhD.

INCEDENCE OF CACTUS VIRUS 2 IN COLLECTION OF UKRAINIAN BOTANICAL GARDENS

Taras Shevchenko Kyiv National University, Ukraine.

Screening of Cactaceae plants on virus diseases in the collections of Fomin’s Botanical garden of Taras Shevchenko Kyiv National University and Botanical garden of Karasin’s Kharkiv National University have been conducted. Opuntia plants were the most infected in both collections. Basing on serological, biological and morphological properties, we suggest that isolated virus is related to Cactus virus 2.

Introduction. Virus diseases of cactaceae plants are of great significance because even when present in the latent state, the viruses could be transmitted to healthy plants and cause commercial losses.

Specific morphology of cactus conditions difficulties in deciphering visual symptoms of virus infection. In spite of that fact, that we could predominantly diagnose virus infection basing on specific symptoms such as ring spot, mosaic and necrotic lesions, the identification of the pathogen was not possible. Sometimes Cactaceae plant quite haven’t signs of virus infection. Besides, some factors such as disbalance of mineral nutrition, non-compliance with the light regime, invasion by insects and mites, infections coursed by bacteria, mycoplasms and fungus, or genetic distortions could manifest similar to virus symptoms. This involves necessity for serological diagnostics of the collections for preservation of their commercial value.

Materials and methods. Plants of Opuntia sp., Opuntia microdasys var. rufida, Consolea rubenscens, Pereskia aculeata v. godseffiana, Echinocereus sp., Caralluma sp. with visual virus-like symptoms from greenhouse collections of Fomin’s Botanical Garden of Taras Shevchenko Kyiv national university (Kyiv) and Mammillaria centricirrhra, Trichocereus bridgesii, Ritterocereus pruinuosus from the collection of Karazin’s Botanic Garden of Kharkiv national university (Kharkiv) were the objects of this research.

Infectious nature of disorders was confirmed proved using indicators plants typical for viruses normally infecting cactuses such as Gomphrena globosa, Datura stramonium, Nicotiana tabacum cv. Samsun, N. alata. Virus identification was carried out using TAS- and indirect ELISA [3].

Some staining samples were analyzed in electron microscopy at 30,000 magnification.

Viruses from Opuntia sp. were purified by differential centrifugation. Highspeed centrifugation was performed for 90 min at 100,00 x g at 4C using SW-40 rotor (Beckman, Germany). Capsid proteins of the virus extracted from Opuntia sp. samples were analyzed by SDS-PAGE (Laemmli) [6].