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Phytoviruses and their Impact of the Plant Community Diversity

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Abstract: In negative environmental conditions phytoviruses are one of the most active factors that decrease persistence of plants to adverse effects, which leads to a change of biodiversity in natural plant communities. The presence of primary infection sources is of the most importance. In natural phytocenoses such a source could be infected plants growing close to crops. Cultivated plants could also be a source of inoculation. Ultimately, this leads to interchange. In the natural and agrocenoses there is an increased accumulation of phytopathogens, which differ by their harmfulness and – depending on it – affect the changes in biodiversity. The patterns of distribution of phytoviruses in biocenoses vary significantly. Viruses could be spread both vertically (seeds, tubers, cuttings) and by vectors. The virosis structures are markedly distant in different agroclimatic zones. In the Northern regions entomophilous viruses are unusual and they are more often spread mechanically with planting materials; in the Southern ones vector-borne viruses are more significant and they are depending on natural reservoirs.

Some pathogens delay the seed formation that can lead to the extinction of some plant species from biocenoses. Due to the fact that a large number of samples of wild and cultivated plant species are introduced into the Russian Far East, which are characterized by a high level of vertical transmission of viruses, the possibility of bringing and rapidly spreading new viruses arises. Import and rapid spreading of new previously unidentified viral diseases are obviously dangerous to the natural and agricultural plant communities.

The long-term monitoring of the phytosanitary condition in the farm units of the Russian Far East led us to comprehension of the close relationships between natural biocenoses and agrocenoses and the role of phytophages in spreading of viral infections. As a result of the conducted research, there were revealed a number of virus distribution patterns in nature. Diseases could be in the form of clearly limited foci of perennial plants affected by one or more phytoviruses. Overwintering aphids capable to transmit entomophilic viruses to these plants. Individual plants infected with phytoviruses can also be found. One of the sources of viral infections spreading is collection plant nurseries, seedling nurseries and farm units, where collections of breeds and varieties of cultivated crops are refilled from other regions and abroad. Definitely it can act as reservoirs of the set of viral infections.

On cultivated plants, the staff of the virology laboratory recognized and identified more than 40 viruses and strains with varying degrees of harmfulness for the Russian Far East. Especially dangerous pathogens include, for example, Cucumber mosaic virus (*Bromoviridae*, *Cucumovirus*), Tobacco mosaic virus (*Virgaviridae*, *Tobamovirus*), Barley stripe mosaic virus (*Virgaviridae*, *Hordeivirus*), and strong strain of potato virus X (*Tymovirales*, *Alphaflexiviridae*, *Potexvirus*). All of them are defined on wild plant species and, therefore, they can be reserved there and influence the biodiversity of plant communities. Thus, the distribution of phytoviruses depends on the degree of reproduction of various types' vectors, the presence of reservoirs in natural phytocenoses bordering collection and selection areas as well as on the infestation of planting material.

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