

Viruses, Insects and Hunger

Shivaji Pandey

Director, Plant Production and Protection Division, FAO, Rome, Italy

Plant diseases cause annual losses of about US\$ 60 billion, by lowering both quantity and quality of agricultural production. With over 800 recognized plant viruses, they are a major contributor to these losses, especially exacerbating food insecurity of the poorest of the poor. Approximately, 75% of the world's one billion hungry and poor live in rural areas, deriving their livelihoods from agriculture. Viral diseases cause serious losses in cassava, banana, rice, potato and other staple crops, affecting livelihoods of millions of poor in rural communities. Unfortunately, plant viruses in agriculture go beyond just lowering quantity and quality of production; they also hamper international trade through quarantine restrictions.

Plant viruses cause diseases with a range of symptoms. They are transmitted mainly through vector organisms such as insects and mites. The virus-vector relationship is specific for different diseases and is critical for disease management strategies. Some plant viruses are transmitted through seeds and through vegetatively propagated plant parts.

Disease diagnosis and virus identification are essential to exploit appropriate disease management strategies based on pathogen epidemiology and transmission mechanisms. Such strategies include use of virus-free planting material, appropriate cultural practices, integrated vector management and host plant resistance. Resistance breeding is effective against plant-to-plant transmission (seed and vector transmission), intracellular virus multiplication, and virus translocation and colonization of the plant.

The increase in emerging infectious plant diseases globally has been expressed in the form of 1) an increase in incidence, geographical or host range, or 2) changes in pathogenesis, or 3) newly evolving, or 4) newly discovered or identified plant diseases. Most emerging infectious plant diseases are caused by viruses.

The range of mechanisms involved in this process of evolution and emergence of infectious viruses includes recombination and synergism between virus species, new vector biotypes, genome integration, host adaptation and long distance dispersal. These processes are consistently linked to major human-induced changes in the agricultural production system including crop introductions, crop intensification, germplasm movement, and introduction of new genotypes.

The risks associated with emerging viral diseases are higher in developing countries due to increased agricultural intensification within systems that have low capacities to design and implement appropriate control measures. Limitations are particularly prevalent in disease diagnosis and pathogen identification, surveillance and implementation of phytosanitary measures including plant quarantine (especially in conflict areas), production and utilization of virus-free material, application of appropriate cultural practices and vector control. FAO supports its member countries in development of appropriate policy, technological, regulatory, socio-economic, and political environment for improved disease management.