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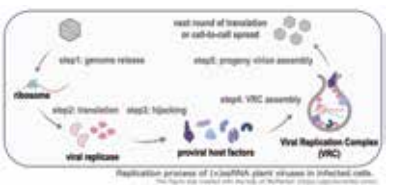
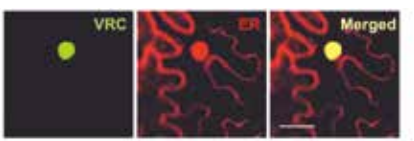
Plant-Virus interactions

Plants are constantly attacked by various kinds of pathogens and pests, resulting in 40% yield losses annually. Among plant pathogens that pose a major threat to sustainable agriculture and global food security, viruses account for nearly half of the plant endemics and cause estimated economic losses more than US$30 billion annually. Positive-sense single-stranded (+ss)RNA viruses are the most abundant in plant viruses and cause the economically important diseases in major vegetable and field crops worldwide. The vast majority of plant (+)ssRNA viruses are very simple entities comprising a nucleic acid genome encoding from 4 to 11 viral proteins needed for genome replication, local and systemic spread within the host plant, and transmission to a new host. Despite the simple nature of these pathogens, there is still much to be learned about how they interact with their hosts and cause disease. Understanding the molecular mechanisms underlying pathogenicity of (+)ssRNA viruses is a crucial step towards the design of effective strategies for crop protection.

In general, virally encoded proteins have a multifunctional property with the potential to interact with several virus- and host-derived molecules, thus creating a complex web of molecular interactions in infected cells. Because of the limited number of viral-encoded proteins, (+)ssRNA viruses need to subvert the host cell machinery for their own vital functions, ultimately creating a cellular environment favorable to the infection. For this purpose, (+)ssRNA plant viruses co-opt an array of host-derived factors (referred to as proviral host factors) to establish viral infection, in which viruses remodel their functions to facilitate every step of the viral life cycle. The identification of the global landscape of plant-virus interactions at the molecular level is key to understand how the virus hijacks the host cell to facilitate infection.

Our research aims at deciphering the molecular network of plant-virus interactions using (+) ssRNA plant viruses as models. Discoveries in this area will provide insight into host-virus interactions as well as identify new breeding targets for the development of virus-resistant crops.





VRC: viral replication complex
ER: endoplasmic reticulum