Cover Stories:

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Knowledge For Tomorrow's Solutions

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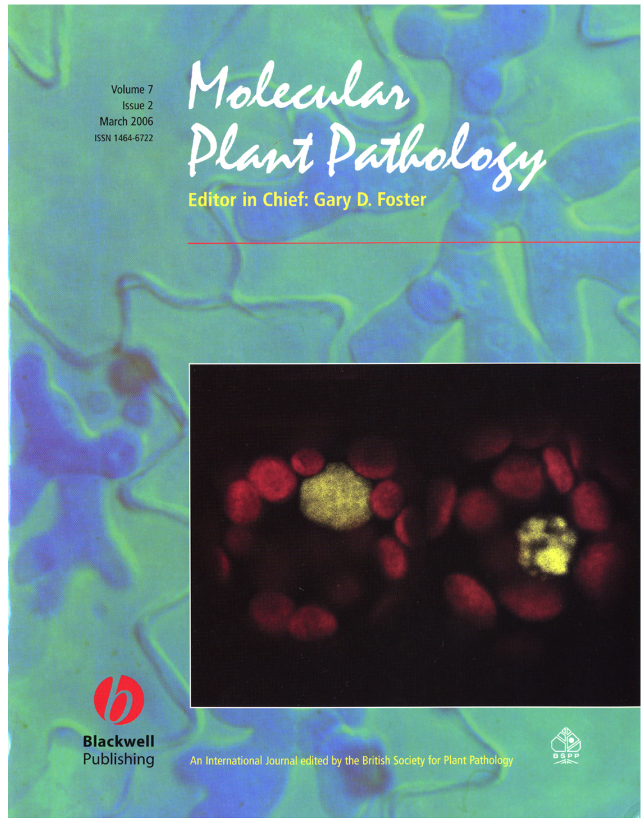
Krichevsky, A., S.V. Kozlovsky, Y. Gafni, and V. Citovsky, 2006, Nuclear Import and Export of Plant Viral Proteins and Genomes, *Molecular Plant Pathology,* 7, 131-146.



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Communication between the nucleus and cytoplasm of a cell occurs by the bidirectional exchange of molecules, including proteins and nucleoprotein complexes. This macromolecular transport is specified by sequences, termed nuclear localization signals (NLS) or nuclear export signals (NES), within the proteins imported or exported respectively. The fundamental components of the nuclear trafficking machinery are conserved between virtually all eukaryotes. Furthermore, many animal and plant pathogens, including viruses, utilize cellular nuclear import pathways to gain access to the host cell nucleus for replication and, then, to exit the nucleus for the spread of infection. Examples of such viral pathogens include the human immunodeficiency virus (HIV), the causative agent of AIDS, and Tomato yellow leaf curl virus (TYLCV), a major tomato pathogen responsible for extensive crop losses world-wide.

For all nucleus-replicating viruses, nuclear transport represents a crucial stage in their life cycle. This information can be used to create potent anti-viral compounds. Recently, antibodies and peptides that specifically bind viral NLSs have been developed and shown to block nuclear import of HIV-1 nucleus-targeted proteins, Tat and Vpr. A similar antiviral strategy is now being employed to produce anti-NLS inhibitors of TYLCV nuclear import for crop protection. Although traffic of animal viruses into and out of the host cell nucleus has been extensively studied, the field of nuclear transport of plant viruses has remained out of the spotlight. A better understanding of plant viral protein trafficking between the host cell cytoplasm and the nucleus, followed by production of inhibitors capable of blocking specific viral nuclear import or export proteins, will allow development of novel and efficient strategies to combat plant viral diseases. The results of this study will lead to healthier plants and increased crop yield and quality for the American consumer.

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