

## **Mucosal Immunology and the Mean Green Vaccine**

Carole L. Cramer and Fabricio Medina-Bolivar

Department of Plant Pathology/Physiology & Fralin Biotechnology Center  
Virginia Tech, Blacksburg, VA 24061-0346

Vaccines are highly effective in preventing many diseases and have become a mainstay of modern medicines. However, traditional vaccines (generally killed or attenuated disease organisms) have limitation in meeting current global vaccine needs for common infectious diseases and the new challenges associated with defense against bioterrorism. Plants show promises as bioproduction (and potentially delivery) systems for vaccine antigens that would address key limitations in cost, scalability, and safety. However, many recombinant antigens are not highly effective immunogens compared to the large complex antigens presented by whole organisms. We have identified a plant-based immune adjuvant, MAC1 (Mucosal Adjuvant/Carrier 1), which greatly facilitates mucosal delivery and immunogenicity of fused antigens. MAC1 is itself a non-toxic lectin that enhances both humoral and mucosal antibody responses to vaccine antigens. Our results have significant implications for development of plant-based vaccines for intranasal or oral administration.