**Update: Peptide Aptamers for Broad Range Virus Resistance**

Single-stranded DNA (ssDNA) viruses cause severe disease problems in plants and animals. Geminiviruses and nanoviruses infect many important crop species, including corn, cotton, pepper, sugar beet, cassava, beans and tomatoes. **Dr Linda Hanley-Bowdoin and co-workers at North Carolina State University** have developed a new and **broadly applicable strategy**, based on peptide aptamers, to **target eukaryotic ssDNA viruses**. These peptide aptamers can be expressed in transgenic organisms to confer resistance to viral infection or can be delivered directly to an infected organism to block the spread of the infection.

Geminiviruses are evolving rapidly and often occur as mixed infections in the field. As a consequence, it is essential to develop a **broad-based resistance strategy** that does not require extensive knowledge of the target(s). Traditional host resistance strategies often are limited in their ability to withstand early or severe infection pressures, are usually not effective against different viruses and are often linked to detrimental phenotypes like poor fruit quality. The use of peptide aptamers builds on the effectiveness of the **targeting of the replication protein** of viruses while **minimizing undesired effects** and also broadening the effectiveness of the virus resistance strategy. The aptamers are used with an inactive protein scaffold enhancing specificity and affinity; thioredoxin is the most commonly used scaffold. The “aptamer” is used to designate the peptide in the scaffold protein and the “peptide” refers to the inserted sequence. These aptamers interact with viral protein and **interfere with viral replication in plant cells**. This strategy confers broad-based resistance against viruses, which have single-stranded DNA genomes.

Now the inventors have **confirmed, in tomato, the earlier results** obtained in Arabidopsis. In Florida alone the annual economic impact of geminivirus infection of tomato plants can easily exceed $100m. **Tomato** plants, which can be infected by over 100 geminivirus species, have been transformed with the best aptamers identified in the earlier Arabidopsis experiments. The transgenic tomato plants (see pictures below) were infected with tomato yellow leaf curl virus (TYLCV), symptom scoring and measurements of viral DNA loads confirmed that plants containing the aptamers are **resistant to TYLCV** and only develop mild symptoms.

The picture shows tomato plants 10 weeks post-infection with TYLCV. On the far left is the wild-type control and next to it the transformed control (thioredoxin-GST, i.e. no active aptamer). The other two pictures are tomato plants transformed with two different aptamers showing only very mild symptoms.

In summary the new results confirm that peptide aptamers enable to confer virus resistance to a range of geminiviruses to plants and should offer a durable resistance strategy.

**References:**