

Abstract of Presentation

Note: This paper should be typed in “Times New Roman” of 12pt.

Presentation Title(Should be no more than 20 words):

Development of Plants Resistant to DNA Viruses

Abstract :

Various plant DNA viruses are known to cause severe infectious diseases in agricultural crops. For many of these infectious diseases, we have yet to find an effective prevention or treatment. Therefore, new methodologies for the prevention of virus infections in agricultural crops have been vigorously sought for a long time.

Among plant DNA viruses, the basic mechanism of DNA virus replication is well conserved: after invasion of virus particles into plant tissues, a viral replication-associated protein (Rep) expressed binds to its replication origin in nuclei and nicks the stem-loop region, initiating DNA replication via a rolling-circle mechanism by cooperation with host enzymes. This suggests that we may be able to prevent DNA virus infection by blocking the Rep binding to its replication origin.

Previously, we developed a method of the rational design of artificial zinc-finger proteins (AZPs) by using a nondegenerated recognition code table. The AZPs designed by this method showed both high affinities and high selectivities for target DNA. In particular, six-finger AZPs bound to 19-bp DNA targets with extremely high affinities (i.e., apparent dissociation constants of <30 pM).

To prevent DNA virus infection, we applied our AZP technology to blocking Rep-binding. We constructed six-finger AZPs that bound to 19-bp DNA including Rep binding sites and demonstrated that the DNA-binding affinities of the AZPs were >1000-fold greater than those of Reps and that the AZPs inhibited Rep binding completely in vitro. Then, we generated transgenic plants by introducing AZP-encoding genes into plant genomes with the help of *Agrobacterium tumefaciens*. The resulting transgenic plants clearly demonstrated immunity to DNA viruses. We will present our results in detail.