USE OF A MODIFIED - VIRAL GENE TO CONFER RESISTANCE AGAINST APHIDS IN TRANSGENIC PLANTS

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Abstract

Use of chemical insecticides, the predominant control method thus far, has resulted in environmental damage, pest resurgence, and negative effects on non-target species. Genetically modified crops offer a promising alternative, and *Bacillus thuringiensis* toxin genes have played a major role in this respect. However, to overcome insect tolerance issues and to broaden the target range, it is critical to identify alternative insecticidal toxins working through novel mechanism. Our group has identified a coat protein kinase from Chilo iridescent virus (CIV) that has insecticidal activity. The CIV toxin, expressed in yeast systems, induces 50% mortality in cotton aphids and 100% mortality in green peach aphids (GPAs). Our hypothesis is cloning this viral kinase gene into plants will generate transgenic lines toxic for aphids and other pests. Expression of foreign genes in plants is often complicated by codon usage, mRNA instability, translational efficiency, and proteolytic degradation. Therefore, the viral toxin gene was codon optimized to favor translation and stability in planta. This optimized viral gene was stably transformed into *Arabidopsis* plants. The stable lines expressing this toxin induced moderate to very high mortality in GPAs and significantly affected its population growth. The aphidicidal potential of these transgenic *Arabidopsis* lines will be presented. Our long term goal is to generate insect-resistant cotton using the viral gene. This will ultimately yield transgenic cotton cultivars resistant to pests other than caterpillars and therefore be more profitable for US farmers in an increasingly competitive global market.