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Abstract

In-Plant Insect-Proofing by Trans-Kingdom RNAi †

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Helicoverpa armigera, the cotton bollworm, is a major insect pest for a wide range of agricultural crops. It causes huge yield losses through feeding damage and increasing the crop's vulnerability to bacterial and fungal infection. *H. armigera* has evolved substantial resistance to many different chemical insecticides, prompting the development of transgenic crop plants with alternative insect-resistance-conferring mechanisms. For example, transgenic crops producing Bacillus thuringiensis (Bt) toxins have been very successful. However, there is still a concern about insect populations emerging with resistance to these biopesticides. Novel strategies that give effective protection, without affecting the environment, need to be continuously developed and implemented. Such a strategy is Trans-kingdom RNAi, which is based on making plants express double-stranded (ds) or hairpin (hp) RNA for ingestion by herbivorous pests. The RNA triggers silencing of specific genes within the pest leading to its death or impaired growth. However, the efficacy of the approach appears to depend on the means of delivering the RNA. We will describe new approaches and delivery strategies, including chloroplast-based expression, which greatly enhance the potency of insect protection.

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