RNA interference (RNAi): A novel strategy in insect pest management

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Insect pests limit crop productivity to a larger extent and warrant intensive and extensive insecticide application, which has often resulted in control failures. Of late, novel insect pest management strategies like transgenic plants expressing insecticidal crystal protein genes from the soil bacterium, *Bacillus thuringiensis* (*Bt*) are effective in managing the insect pests that belong to Lepidoptera and Coleoptera. But success of the above technology is threatened by accelerated development of resistance, which is also true with chemical insecticides[1]. Therefore, there is a need for identifying some additional effective pest management strategies, which could also augment integrated pest management (IPM). In this scenario, RNA interference (RNAi) offers a great deal of hope in successful mitigation of various insect pests[2]. RNAi has been increasingly used in establishing the gene functions in various spheres of research in entomology[3–5] after its discovery in the free-living nematode, *Caenorhaditis elegans*[6]. In the following years many researchers envisaged the lucrative possibility of employing RNAi for field-level insect pest management. Earlier attempts on this line were not successful due to various reasons[2]. However, in 2007 researchers demonstrated the potential of RNAi in managing the highly destructive pest, *Helicoverpa armigera* Hb. (Lepidoptera: Noctuidae) by transgenic plant-mediated silencing of insect-specific *CYP6AE14* gene[7]. This gene is involved in detoxification of the otherwise toxic allelochemical, gossypol, produced by cotton plant. In a similar approach, the potential of RNAi has been shown on an equally destructive pest, *Diabrotica virgifera virgifera* LeConte (Coleoptera: Chrysomelidae) by silencing many candidate genes[8]. One of the key advantages of this technology could be its high species specificity for the target pests. But the success of this technology is also limited by sequence polymorphism for the target gene/s and variations in species-specific gene silencing mechanisms[2]. Additionally, one also has to be equally cautious on the selection of suitable insect-specific target genes or transcription factors in order to achieve a quick and long-term insect pest management without affecting other non-target organisms. Nevertheless, RNAi has opened up a new line of thinking in designing a futuristic approach which could result in paradigm shift in insect pest management strategies from the Indian perspective.

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