Insects are one of the most significant causes of vector-transmitted human diseases and agricultural pests. In fact, dengue, yellow fever and malaria transmitted by mosquitoes are still among the most serious public health problems in many tropical and subtropical regions of the world, mostly in poor and in socially underdeveloped countries.

In this issue of *Bioengineered Bugs* Zaritsky and colleagues1 communicate their progress in combating insect pests through the educated use of *Bacillus thuringiensis* ssp. *israelensis* (Bti) toxins. They describe the use of filamentous cyanobacteria, particularly Anabaena sp., expressing Cry toxins in combination with Cyt1Aa, for use in the control of mosquito larvae. The ability of cyanobacteria to grow and reproduce in water, the same environmental niche as larvae, together with their ability to float and the fact that they constitute part of mosquito larvae diet, makes them an optimal biocontrol agent. Moreover, the protection from UV-B inactivation of mosquito larvicidal Bti toxins by Anabaena pigments2 is an added benefit.

Another interesting project described by the authors is the control of mosquitoes by pollen of transgenic *Zea mays* expressing Bti larvicidal toxins. Maize pollen is a food source of mosquito larvae, especially in the case of *Anopheles arabiensis* a significant vector of malaria in Africa.3 The authors have developed transgenic maize expressing different Bti toxins in combination with the TMOF (trypsin modulating oestatic hormone) encoding gene of *Aedes aegypti*. TMOF interferes with trypsin-like mRNA in the midgut of mosquito larvae thus essentially starving them.4-6 The authors further hypothesize that TMOF would have a synergic effect with Cry and Cyt1A toxins of Bti. Therefore, reduction in larval densities around transgenic maize fields should contribute to reducing malaria incidence.

Zaritsky and colleagues are also interested in the biocontrol of species of the flat-headed borer Capnodis, a parasite of the root system of agronomically important stone-fruit trees in Mediterranean countries.7 In this study8 the authors are actively screening *Bacillus thuringiensis* strains for toxicity against Capnodis spp. The rationale underlying this approach is to discover anti-Coleopteran Cry toxin encoding genes for subsequent expression in roots of the target trees.

While selectable marker genes have been useful in enabling the generation of genetic modified organisms, traditionally these genes encoded proteins conferring resistance to antibiotics. However, given the emergence of antibiotic resistance in recent years, reasonable public safety risks exist and such antibiotic resistance genes must be removed from transgenic organisms before being considered for release into the environment.9,10 In light of these safety considerations research has lately been directed to the development of marker-free systems.10 Among them site-specific recombination is a particularly interesting system which has been successfully implemented in both plant10,11 and human cells.12,13 Zaritsky and colleagues have embraced the issue of antibiotic marker-free systems and have developed transgenic Anabaena sp. carrying Bti toxin encoding genes in a way that allows the antibiotic resistance marker to be

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removed via site-specific recombination from the cyanobacteria.

The leading entomopathogenic biopesticide *Bacillus thuringiensis* has proved over the last decades to be highly efficient and specific. Moreover, it has a long history of safe use and no resistance has been observed in nature. Therefore, the educated use of Bti toxins in different transgenic bugs as described by Zaritsky and colleagues in the current issue contributes significantly to our continued efforts to control agricultural pests and fight serious human diseases in a more environmentally friendly and sustainable fashion for the decades to come.

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