TECHNOLOGY

Novel Anti-Malaria Strategy using Transgenic Fungi

OVERVIEW

Background

Malaria is a life-threatening infectious disease caused by parasites that are transmitted to people through the bites of infected mosquitoes. In 2008, an estimated 190 - 311 million cases of malaria occurred worldwide and 708,000 - 1,003,000 people died, most of them young children in sub-Saharan Africa (CDC). The currently available techniques to reduce the incidence of malaria include chemical pesticides and transgenic mosquitoes that cannot carry malaria. Both have their disadvantages and have not been successful in eradicating malaria. Mosquitoes are becoming resistant to chemical pesticides while genetically engineering the mosquito population has so far not been a practical or feasible solution.

Innovative Technology

Researchers at the University of Maryland along with inventors at Johns Hopkins University and Westminster University, London have developed a novel strategy to combat malaria. The researchers used transgenic fungi (Metarhizium anisopliae) to infect the mosquitoes carrying the malaria parasite (Plasmodium falciparum) and achieved 70%-90% reductions in the number of mosquitoes carrying malaria, and parasite mortality rates as high as 98% in some cases. This technique ensures that the host specificity is not compromised and environment contamination is avoided. The most significant outcome of an application of this approach will be a reduction of human disease as a result of interrupting transmission of the target parasite.

Advantages

1) The Metarhizium anisopliae fungus causes infection in insects and is not harmful to humans
2) Unlike chemical pesticides this technique does not cause resistance in the mosquitoes
3) Instead of killing the mosquito quickly, potentially leading to the development of resistant mosquito strains, this technique kills the parasite or drastically reduces its number
4) A simple spraying technique is required to allow the fungi to enter through the mosquito's cuticle or skin and directly deliver the transgenic elements to reduce the parasitic numbers.

Applications

1) The transgenic fungi may be sprayed where mosquitoes are typically found, or applied in baited traps, on bed sheets or walls.
2) The technique can be used in insecticide-resistance management or integrated vector management because fungal infections act synergistically with various insecticides and the fungi are equally effective against insecticide resistance and insecticide susceptible mosquitoes.
3) This technology may be used in controlling other mosquito-borne parasitic infections like Filariasis and Dengue.
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Additional Information

INSTITUTION

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PATENT STATUS

Patent(s) pending

LICENSE STATUS

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EXTERNAL RESOURCES

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