Genetic Pest Management and Society: An interdisciplinary assessment of current and emerging technologies for dengue control

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Dengue fever has been receiving increased attention from scientists and health professionals as a neglected tropical disease escalating in prevalence throughout the globe. Given the complex nature of the dengue virus and its primary mosquito vector, Aedes aegypti, several methods involving genetically engineered mosquitoes are being researched as potential solutions to issues of dengue control. However, controversies surrounding the implementation of biotechnologies in the past suggest the need to pay greater attention to the social and cultural contexts in which these technologies interact. We bring an interdisciplinary perspective to an assessment of current and emerging pest management technologies for dengue, with particular attention to the broader social, cultural, economic, and ecological settings wherein these technologies may be used. Based on our assessment, controlling the dengue virus and its primary vector will require a multifaceted approach. Control programs need to be assessed individually according to their specific context in order to be successful and sustainable. We survey multiple databases covering the fields of biology, communications, entomology, ecology, epidemiology, economics, policy, and genetics. To assist policy makers in deciding how best to ease the burden of dengue, we develop a decision tree that suggests actionable solutions to some of the complex and multifaceted issues of dengue control. Scientists, policymakers, non-government organizations, and the public are currently and will be involved in complex decisions with constantly changing variables. It is our hope that incorporating a contextually specific and interdisciplinary approach to dengue control programs will enhance the research being conducted and help inform policy decisions, thereby improving future outcomes for all involved in the process and all those affected by dengue each year.