

Issue brief¹

Issue Title	Self-limiting insect systems
Description	<p>Self-limiting insect systems are applications that are developed to reduce the numbers of disease vector or agricultural insect pests. These systems are implemented using transgenic cassettes (e.g., genetic circuits) to improve on sterile insect technique, which involved irradiating males and caused reduced fitness, increased costs and reduced effectiveness. These living modified insects involve releases of modified adult males (first generation) or encapsulated larvae or eggs (second generation), which when the modified adults mate, they do not produce insects that survive to maturity. Research is on-going to develop new systems, such as precision guided sterile insect technique (utilizing CRISPR-Cas), and applications in new insect species.</p> <p>Specific examples include the living modified insects developed by Oxitec, such as living modified <i>Aedes aegyptii</i> to control dengue and the Friendly™ Fall Armyworm for agricultural settings.</p>
Timeline (<5 years, 5-10 years, >10 years) to environmental release	<p>Field trials are ongoing (e.g., in the case of Oxitec's second generation <i>Aedes aegyptii</i> modified). Several other species are under development. Regarding other self-limiting systems, such as those based on the precision guided sterile insect technique, it was suggested that it could be within 10 years.</p>

¹ Information gathered from the members of the multidisciplinary Ad Hoc Technical Expert Group on Synthetic Biology. Descriptions complemented with publications published by the Secretariat of the Convention on Biological Diversity.

Potential impacts on the objectives of the Convention	<p>It was suggested that the potential impacts of self-limiting insects could be similar to other living modified insects aimed at reducing disease burden or controlling insect pests, such as:</p> <ul style="list-style-type: none">• Reduced disease burden and transmission of vector-borne diseases• Reduced chemical pesticide use• Control of invasive insect species• Disruption of food webs
Other considerations	<p>Due to the self-limiting nature of the modified insects, the risk assessment process could potentially be simpler compared to other modified insect applications, which could persist in the environment. However, it would be important to evaluate their potential impacts on native species. Additionally, data and information collected during evaluations of these systems could be useful for the risk assessment of other modified insects, such as those containing engineered gene drives.</p> <p>The free, prior, and informed consent of indigenous peoples and local communities would be an important element to take into account.</p>