



Genetically Modified Mosquitoes to Fight Against Malaria

[Source: DTE](#)

Why in News?

Djibouti, a nation in East Africa, is taking a bold step in the **fight against malaria** by deploying [genetically modified \(GM\) mosquitoes](#).

- This pilot program, launched in May 2024, marks a significant moment in the battle against this deadly disease.

Why Genetically Modified (GM) Mosquitoes for Malaria Control?

- **About:**
 - GM mosquitoes are bred in a lab with two genes: **a self-limiting gene to prevent female offspring from surviving to adulthood**, and a fluorescent marker gene for identification in the wild.
 - GM mosquitoes are **engineered to reduce the population of female *Anopheles stephensi* mosquitoes**, which are responsible for transmitting malaria.
 - By targeting the vector population, the aim is to interrupt the transmission cycle of malaria.
- **Need of GM Mosquitoes:**
 - **Surge in Malaria Cases:** Djibouti has witnessed a dramatic rise in malaria cases in recent years. An invasive mosquito species (migrated to Africa from South Asia and the Arabian Peninsula), ***Anopheles stephensi***, particularly adept at thriving in urban environments like **Djibouti City**.
 - **Limitations of Traditional Control Methods:** Existing control methods like **insecticide-treated bed nets** and indoor spraying are becoming less effective due to mosquito resistance.
- **Working Mechanism:**
 - **Targeting the Females:** The released mosquitoes are all male and carry a self-limiting gene. When they mate with female ***A. stephensi* mosquitoes**, their **offspring (which would be female) inherit the gene and are unable to survive to adulthood**.
 - Over time, this process aims to significantly reduce the overall population of female mosquitoes, thereby interrupting malaria transmission.
- **Environmental Concerns:** Some environmental groups have expressed concerns about the **potential unintended consequences of releasing GM mosquitoes into the ecosystem**.
 - GM mosquitoes **may develop unforeseen survival skills** or adaptability. Like **resistance seen in [Bt cotton](#)**, GM mosquitoes could evolve resistance to gene-editing mechanisms, posing challenges to their effectiveness.
 - Mosquitoes **contribute to pollination by consuming nectar**, which could impact plants reliant on them.
 - A decrease in mosquito populations could disrupt **local food webs and biodiversity**.

Note:

- GM mosquitoes have been successfully **used in parts of Brazil**, the Cayman Islands, Panama,

and India to control **Aedes aegypti mosquitoes**. Since 2019, over 1 billion mosquitoes have been released.

- Djibouti's initiative follows **Burkina Faso's release of GM mosquitoes in West Africa**, highlighting a growing trend in using biotechnology to combat malaria.

Malaria

- **Malaria** is a life-threatening disease caused by the **Plasmodium parasite**, transmitted through the bites of infected **female Anopheles mosquitoes**.
- It is most **common in tropical and subtropical regions**, with symptoms including fever, chills, headache, and fatigue. Severe cases can lead to organ failure, coma, and death.
- India is implementing various initiatives to control vector-borne diseases, particularly malaria. These efforts include the [National Vector-Borne Disease Control Programme](#), the [National Malaria Control Programme](#), the [National Framework for Malaria Elimination 2016-2030](#).

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World Malaria Day

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It is observed to **raise awareness** about malaria, increasing **public understanding** of malaria & promoting **prevention measures**. Malaria is a **preventable** and **treatable** disease.

Theme 2023 "Time to deliver zero malaria: invest, innovate and implement"

Did You Know?

- 247 M** New cases of malaria in **2021**
- 95%** Malaria cases in **WHO African region**
- 6,19,000** Malaria-related deaths in **2021**

Symptoms

-  High Fever
-  Chills
-  Headaches
-  Sweating
-  Diarrhoea
-  Muscle Pain
-  Nausea & Vomiting
-  Dry Cough

What should you keep in mind?

M A L A R I A

- M** Make people aware of symptoms
- A** Always use mosquito nets
- L** Long sleeve clothes- Go for protective clothing
- A** Apply Mosquito repellents
- R** Remove Standing Water
- I** Implementing and accepting GOI guidelines against malaria
- A** Avoid travelling to areas with a malaria outbreak

Read more: [Genetically Modified Mosquitoes](#)

UPSC Civil Services Examination, Previous Year Question

Q. Consider the following statements: (2017)

1. In tropical regions, Zika virus disease is transmitted by the same mosquito that transmits dengue.
2. Sexual transmission of Zika virus disease is possible.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Ans: (c)

Q. Widespread resistance of malarial parasite to drugs like chloroquine has prompted attempts to develop a malarial vaccine to combat malaria. Why is it difficult to develop an effective malaria vaccine? (2010)

- (a) Malaria is caused by several species of Plasmodium
- (b) Man does not develop immunity to malaria during natural infection
- (c) Vaccines can be developed only against bacteria
- (d) Man is only an intermediate host and not the definitive host

Ans: (b)

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