



# Target Malaria: Burkina Faso

## Who we are?

Target Malaria is a not-for-profit research consortium working in Africa, Europe and North America that aims to co-develop and share genetic technologies to modify mosquitoes and reduce malaria transmission. We collaborate with the Institute of Research for Health Sciences (Institut de Recherche en Sciences de la Santé – IRSS) in Burkina Faso.

## Our work

Target Malaria’s vision is to contribute to a world free of malaria.

Our approach is malaria control by mosquito control. Our aim is to reduce the population of malaria mosquitoes to stop the transmission of the disease, using gene drive technology.

We are proceeding step-by-step and our technology will not be ready for several years to come. In Africa, we have so far been working on strains of non gene drive genetically modified mosquitoes. In 2021, we concluded our work on the “sterile male” mosquito in Burkina Faso and Mali and are now working with the “male bias” in Burkina Faso. In Uganda, we have been preparing the biosafety groundwork and facility readiness. In Ghana, we are conducting *ecological studies*. In parallel, we are working in the lab in the UK to develop self-sustaining gene drive mosquitoes, that have the potential to become, in the future, a new vector control tool to fight malaria in Africa.

The ‘*male bias*’ mosquito strain is fertile and genetically modified to produce mainly male offspring (up to 95% in the laboratory). This mosquito does not carry gene drive technology.

## Context

Malaria is a major health problem in Burkina Faso. It is endemic in the whole country, with a seasonal surge from June to October.



There were an estimated **8.3 million cases of malaria** and **18,900 deaths** in Burkina Faso 2021.

(2022 World Malaria Report)

According to the Ministry of Health, the disease is one of the primary causes of consultations and hospital admissions, and responsible for 15% of deaths.

(2022 National Statistical Yearbook)



## Where we operate

Target Malaria comprises institutions in Africa, Europe and North America. The project currently works in three African countries:

- Burkina Faso: *Institut de Recherche en Sciences de la Santé (IRSS)*, Bobo-Dioulasso
- Ghana: University of Ghana, Accra
- Uganda: Uganda Virus Research Institute (UVRI), Entebbe

Researchers in the UK, US and Italy are also involved.



## Our current activities in Burkina Faso



### Insectary & laboratory

A specialist containment insectarium for level 2 arthropods (Arthropod Containment Level 2 - ACL-2) is used at the IRSS in Bobo-Dioulasso. This level of biosafety is in line with national and international guidelines to study genetically modified mosquitoes in a contained environment.

- ACL-2 insectary renovated in 2021.
- Inspected and certified to standard by the National Biosafety Agency (*Agence nationale pour la biosécurité* – ANB) in January 2022.
- Insectary team trained on biosafety and mosquito breeding methods.
- Authorisation granted to import the non gene drive genetically modified male bias mosquitoes as eggs in 2021.
- Male bias mosquito eggs were imported in March 2022.
- Male bias colony bred and maintained.
- Studies performed in a contained laboratory environment to characterise the strain and to optimise its rearing for maintenance and expansion.



### Stakeholder engagement

- Throughout all stages of the project, we obtain individual consent from the people directly affected by our research and ensure agreement from the community (in addition to regulatory approval) before implementing any activities.
- We ascertain stakeholders' knowledge and expectations to keep them informed and improve the implementation of project activities. We consider their perspective, respond to their concerns and ensure that no project activity in their village is started without their consent.
- We aim to demonstrate how the genetic approaches are a credible potential additional tool to fight malaria complementing existing tools and establish an environment suitable to its assessment.



### Entomology

Regular entomological collections at project sites to evaluate local wild mosquito populations and study their behaviours.

## Completed work: the non gene drive sterile male mosquito

In 2021, our teams concluded the first research phase involving the non gene drive sterile male mosquitoes. This strain was imported in 2016 to the IRSS where our teams conducted several studies over two years in a contained environment in the ACL-2 insectary. After obtaining the required authorisation from the regulatory authorities and

ensuring the communities' consent, non gene drive sterile male mosquitoes were released on a small scale on 1 July 2019 in the village of Bana.

The research, stakeholder engagement and regulatory objectives were all met: we established release protocols with the regulatory authorities, we obtained the communities' consent and we demonstrated that mosquitoes can safely be released and behave as expected (in this case they mated to the wild local mosquitoes and did not have any progeny).

This stage was significant in terms of knowledge transfer between all the teams involved and developing skills, as well as paving the way for the next phases of the project.

The release objectives were met, as demonstrated by the results which were shared with the regulatory authorities and different stakeholders.

We published the results of our study on the release of the sterile male mosquito in peer-reviewed scientific journals.

## Our current priority: The non gene drive genetically modified male bias mosquito

The male bias mosquito is the current phase of research in Burkina Faso. In contrast to the sterile male mosquitoes, this is a fertile male mosquito that is genetically modified without gene drive technology to produce predominantly male offspring (up to 95% when tested in the laboratory) when it mates with wild females.

To be able to begin any activity with the male bias mosquitoes, a request for authorisations for import and contained studies were submitted to the National Biosafety Agency (*Agence Nationale de Biosécurité* - ANB), which is the national regulatory institution with remit over biosafety in Burkina Faso.

The ANB approved the request for authorisation to conduct experiments in a contained environment in the ACL-2 insectary and the IRSS laboratory, Western Regional Directorate (see No. DECREE No. 2021-287/MESRSI/SG/ANB of 19 July 2021).

In accordance with the regulatory provisions, ANB also gave authorisation in December 2021 to import male bias mosquito eggs (see No. 2021/000416/ MESRSI/SG/ANB/DG).

These eggs were imported in March 2022 from our partner institution in Italy, *Polo d'Innovazione di Genomica, Genetica e Biologia* (Polo GGB). The team in Burkina Faso is studying the male bias mosquitoes in a contained environment in the insectary.

Eventually, Target Malaria's aim is to develop self-sustaining gene drive mosquitoes that have the potential to eventually become a malaria vector control tool. Our intention is to build an environment of dialogue, trust and information exchange with communities, civil society and all the stakeholders on scientific advancements.

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