भारत सरकार
विज्ञान और प्रौद्योगिकी मंत्रालय
जैव प्रौद्योगिकी विभाग
GOVERNMENT OF INDIA
MINISTRY OF SCIENCE & TECHNOLOGY
DEPARTMENT OF BIOTECHNOLOGY

सत्यमेव जयते

आज़ादी का अमृत महोत्सव

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F. No. PID-15011(11)/2/2022-PPB-DBT **Dated: 17.04.2023**

OFFICE MEMORANDUM

Sub: Guidelines and Standard Operating Procedures for Research on Genetically Engineered Insects, 2023

1. In India, all activities related to Genetically engineered organisms (GE organisms) or cells and non-GE hazardous microorganisms and products thereof are regulated as per the "Rules for the Manufacture, Use/Import/Export and Storage of Hazardous Microorganisms/Genetically Engineered Organisms or Cells 1989" (Rules, 1989) notified by the Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India, under the Environment (Protection) Act, 1986 (EPA 1986).

2. To harness the wide applications of genetic engineering in insects with the proper appraisal of biosafety concerns, to ensure safety for the organisms and environment; the "Guidelines and Standard Operating Procedures for Research on Genetically Engineered Insects, 2023" have been prepared after extensive deliberations by the expert committee constituted for this purpose and Review Committee on Genetic Manipulation (RCGM).

3. RCGM, the competent authority under Rules, 1989 of the Environment (Protection) Act, 1986 (EPA 1986)in its 252nd meeting, held on 22.02.2023, approved and recommended to notify the Guidelines and Standard Operating Procedures for Research on Genetically Engineered Insects, 2023.

4. The Department of Biotechnology hereby notifies the "Guidelines and Standard Operating Procedures for Research on Genetically Engineered Insects, 2023"

5. The Guidelines and SOPs provide a regulatory road map, and describe standard operating procedures and data requirements for conducting research with GE insects under contained facilities.

6. These Guidelines and SOPs shall be applicable to all public and private organizations involved in the research and handling of GE insects under containment from the date of notification.

7. The "Guidelines and Standard Operating Procedures for Research on Genetically Engineered Insects, 2023" is available at from www.dbtindia.nic.in and https://ibkp.dbtindia.gov.in/.

(Nitin Kumar Jain)
Member Secretary, RCGM &
Scientist 'F', DBT

DEPARTMENT OF BIOTECHNOLOGY
Ministry of Science & Technology
Government of India

Guidelines and Standard Operating Procedures for Research on Genetically Engineered Insects

2023

सत्यमेव जयते

डॉ. राजेश सु. गोखले
Dr. RAJESH S. GOKHALE

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FOREWORD

Department of Biotechnology, Government of India is delighted to release "*Guidelines and Standard Operating Procedures for Research on Genetically Engineered Insects, 2023*". This document is pertinent for enabling potential of genetic engineering in insect research to revolutionize the field of entomology, understanding of role of insects in ecosystems as well as their interactions with humans. These guidelines and standard operating procedures are intended to provide guidance on regulatory requirement and data requirement of genetic engineering research on insects under containment conditions.

These guidelines and standard operating procedures have been prepared through extensive deliberations by the expert committee constituted by DBT for this purpose, with inputs from members of Review Committee on Genetic Manipulation (RCGM), and various other experts to meet the highest global standards. Considering that genetic engineering in insect research is becoming increasingly important for a variety of applications, including pest control, disease transmission reduction, and ecological research, these guidelines are expected to streamline GE insect research under containment conditions.

I express my deep appreciation for the contribution from the Expert Committee and RCGM members in drafting and finalizing the Guidelines. I appreciate sincere and dedicated efforts put in by Dr. Nitin K. Jain, Scientist 'F' and Head Regulation, DBT in coordinating and effectively steering this initiative in a timely manner.

The Guidelines and SOPs aim to serve as a resource tool for all those involved in the research of GE insects under contained conditions. I hope this initiative would further strengthen our efforts to ensure the safe use and handling of GE insects under research.

(Rajesh S Gokhale)

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GLOSSARY

1. **Accidental Release:** Any unintended release of regulated GE insect material into environment.
2. **Contained Trial:** The handling of one or more regulated events in a single experimental station.
3. **Containment:** Encompasses safe methods (Combination of facilities, practices and procedures) for managing risk-inherent GE organisms or cells in the laboratory environment where they are being handled or maintained.
4. **Derived Products of GE Insects:** Includes silk, honey, or any other product used for pharmaceuticals, human and livestock health and nutrition.
5. **Endpoint:** An event or outcome that can be measured objectively to determine whether the intervention being studied has the desired effect.
6. **Facility In-Charge:** For the purpose of this SOP, shall be the person designated by the Permitted Party as responsible for the storage and maintenance of the regulated material.
7. **Frequency:** An expression of how common a particular gene variant is in the population.
8. **GE Mosquitoes**: Mosquitoes that have heritable traits derived through the use of recombinant DNA technology, which alter the strain, line or colony in a manner usually intended to result in reduction of the transmission of mosquito-borne human diseases.
9. **GEAC:** Genetic Engineering Appraisal Committee.
10. **Genetic Engineering:** The technique by which heritable material, which does not usually occur or will not occur naturally in the organism or cell concerned, generated outside the organism or the cell is inserted into said cell or organism. It shall also mean the formation of new combinations of genetic material by incorporation of a cell into a host cell, where they occur naturally (self cloning) as well as modification of an organism or in a cell by deletion and removal of parts of the heritable material. (Rules, 1989)
11. **IBSC:** Institutional Biosafety Committee.
12. **Insect Material:** Material containing one or more stages of the life cycle of an insect such as eggs, larvae, pupae, moths, cocoons, silk skeins etc.
13. **Introgression**: The transfer of genetic material from one organism to another through hybridization.
14. **Mark-Release-Recapture:** A method used to estimate the population size of free-living animals, including mosquitoes, and to study population survival and dispersal in space and time. For e.g. a portion of the mosquito population under study is captured, marked (usually

with fluorescent powders) and released. A portion of the population into which they are released is captured later and the number of marked mosquitoes within the sample is counted. The proportion of marked mosquitoes in the second sample enables estimation of the total number of animals in the whole population.

15. **Non-target Organism**: Any organism that is not a direct target of an intended intervention. For GE Insects, the direct target organism is other insects of the same species in the wild population.
16. **Packaging Material:** The material used to secure regulated, genetically engineered insect for the purpose of transport and storage. Examples include egg transportation boxes, envelopes, cardboard boxes, nylon nets, and polythene bags.
17. **Permitted Party:** The sponsoring organization identified on contained trial permit issued by RCGM or GEAC who shall accept full responsibility for compliance with all terms and conditions of the permit.
18. **Phenotype:** The observable characteristics of an organism, based on genetic and environmental influences.
19. **Population Replacement (also called Population Modification, Population Alteration or Population Conversion)**: Strategies that target vector competence with the intent to reduce the inherent ability of individual mosquitoes to transmit a given pathogen.
20. **Population Suppression: (also called Population Reduction)** – Strategies that target vector density with the intent to reduce (suppress) the size of the natural mosquito population to the extent that it would not be able to sustain pathogen transmission.
21. **RCGM:** Review Committee on Genetic Manipulation.
22. **Recipient:** For the purpose of this SOP, shall be the Permitted Party, Trial In-Charge or Facility In-Charge.
23. **Regulated GE Insect:** Any insect produced through genetic engineering, including eggs and other immature stages or live material derived from that species, which has not been authorized by the Government of India for commercial release pursuant to Rules 1989.
24. **Self-limiting**: Approaches of GE insects in which the genetic engineering will not pass on indefinitely through subsequent generations
25. **Semi-field Testing**: Studies conducted under physical confinement in an outdoor cage/net-house facility
26. **Spread:** Transmission of the genetic engineered system to other individuals within an interbreeding population.

27. **Traits:** Phenotypes/inherited characteristics that result from single or multiple genes and their interactions with the environment
28. **Transport In-Charge:** The person identified by the Permitted Party as being responsible for the transport of regulated GE insect material.
29. **Trial In-Charge:** The person/scientist designated by the Permitted Party as responsible for ensuring compliance with the terms and conditions of a contained trial permit and providing information required by regulatory bodies.
30. **Trial Site Location:** The geographical location of a contained trial site e.g., address.
31. **Trial Site:** A single site where one or more trials of the same insect species are conducted in contained facilities.
32. **Vector Mosquitoes:** Mosquitoes that are able to transmit a disease-causing pathogen.

1. INTRODUCTION

In India, all activities related to Genetically Engineered organisms (GE organisms) or cells and hazardous microorganisms and products thereof are regulated as per the Rules for the Manufacture, Use, Import, Export and Storage of Hazardous Microorganisms/Genetically Engineered Organisms or Cells, 1989 (known as 'Rules, 1989') notified by the Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India under the Environment (Protection) Act, 1986 (EPA 1986).The mandate and function of Competent Authorities entrusted with the implementation of biosafety regulations under Rules 1989 are mentioned in **Annexure-I.**

With the recent advances in biotechnology, a variety of insects including mosquitoes, fruit flies, silkworms and some lepidopteran pests have been genetically engineered (GE) and are at various stages of research. Keeping pace with the international scenario in this regard, the Review Committee on Genetic Manipulation (RCGM) – Department of Biotechnology (DBT) considered the need to publish a guidance document for all stakeholders regarding the conduct of research and development (R&D) of GE insects.

The development and release of GE insects offers applications in various fields such as vector management in human and livestock health; management of major crop insect pests; maintenance and improvement of human health and the environment through a reduction in the use of chemicals; production of proteins for healthcare purposes; genetic improvement of beneficial insects like predators, parasitoids, pollinators (e.g. honey bee) or productive insects (e.g. silkworm, lac insect). Some of the methods used to develop GE insects are mentioned in **Annexure-II.**

Based on the types of applications presently envisaged, this document has been prepared for GE insects including vectors of human diseases (Mosquitoes like *Aedes aegypti*, *Aedes albopictus* and *Anopheles stephensi*), crop insect pests (e.g. pink bollworm, fruit fly species and diamond back moth) and beneficial insects (e.g., silkworm, honeybees and biological control agents like insect parasitoids and predators). It aims to specify the regulatory pathway for import, export, transfer and receive as well as for conducting research on GE insects. The document also addresses the containment requirements as well as data requirements for ensuring biosafety and trait efficacy.

2. OBJECTIVE AND SCOPE

The objective of this document is to provide guidance to applicants to enable them to understand and comply with the regulatory requirements for conducting research with GE insects under contained facilities, e.g., laboratory, cages, net houses and greenhouses.

These guidelines are applicable for material exchange and R&D of GE Insects under containment (Phase 1 and Phase 2). It provides information for all stakeholders regarding:

i. Application submission and related regulatory approval process
ii. Standard operating procedures and data requirements for safety assessment

Note: *Confined field trial is beyond the purview of these guidelines.* For confined field trials, approvals from Genetic Engineering Appraisal Committee (GEAC) and other regulatory authorities will be required.

***These guidelines do not override any other existing rules &regulations unless specified herein.*

3. OTHER APPLICABLE NATIONAL GUIDELINES/HANDBOOKS

The applicable handbook/guidelines are as follows:

i. List of infective Microorganisms corresponding to different Risk Groups, 2021.
ii. SOPs for exchange of infectious biosamples/biospecimen from Biorepository, 2021
iii. Guidelines for the Establishment of Containment Facilities: BSL2 and BSL3 and Certification of BSL3 facility 2020
iv. Handbook for Institutional Biosafety Committees (IBSCs), Third Revised Edition, September 2020.
v. Revised Simplified Procedures/ Guidelines on Import, Export and Exchange of GE organisms and products thereof for R&D purpose, 2020
vi. Regulations and Guidelines for Recombinant DNA Research and Biocontainment, 2017.
vii. Guidelines for the Safety Assessment of Foods Derived from Genetically Engineered Plants, 2008

Other relevant guidelines as issued by DBT and other regulatory agencies from time to time.

All the above-mentioned guidelines are available on https://ibkp.dbtindia.gov.in

4. PHASEWISE CATEGORIZATION OF R&D STUDIES INVOLVING GE INSECTS

The R&D of GE insects has been proposed into phase wise studies in harmony with the prescribed steps mentioned in WHO's Guidance framework for testing genetically modified mosquitoes, second edition, 2021 and first edition, 2014 (**Figure-1**).

4.1. PHASE 1 STUDIES

i. Phase 1 represents laboratory studies for efficacy and safety testing of GE insects under appropriate containment facilities and procedures. Laboratory testing under highly controlled conditions will allow a preliminary assessment of whether the GE insect demonstrates the desired biological and functional characteristics with an emphasis on trait efficacy. All such laboratory studies should follow containment levels as specified in Regulations and Guidelines for Recombinant DNA Research and Biocontainment, 2017, wherein Insect Biosafety Level (IBSL) facilities have been described. The purpose of establishment of IBSL facilities is to prevent the escape and establishment of the experimental insect into the natural environment and ensure the safety of the laboratory personnel in the facility. All life-cycle stages (eggs, larvae, nymphs/grubs, pupae and adults) should be handled within the appropriate IBSL facility.

ii. Phase 1 includes all laboratory studies/laboratory cage studies involving genetically engineered and genome edited insects.

iii. Phase 1 studies have been categorised into different categories of experiments (Category I – IV Experiments)

   a. Different levels of containment facilities have been prescribed for different categories of experiments in Section 3.5 of Regulations and Guidelines for Recombinant DNA Research and Biocontainment, 2017.

   b. IBSC to review all GE insect research carried out by an organisation. Depending upon the category of experiments, prior approval and/or permission from the IBSC and/or RCGM shall be required to initiate such experiments.

4.1.1. Categories of Experiments

Category matrix to estimate level of Category is mentioned in **Annexure-V**

4.1.1.1. Category I Experiments

This category includes insects that are model organisms, domesticated insects and other beneficial insects such as parasitoids and predators that have low flight range.

It includes maintenance, rearing and conduct of laboratory level experiments with insects as categorised below:

i. Genetically engineered insects with genes from RG 1 microorganisms and other non-pathogenic organisms provided the genetic engineering process has no, or only negative effects on viability, survivorship, host range, or vector capacity.

ii. Experiments involving insects challenged or infected with GE microorganisms that fall under RG 1.

For Category I Experiments

- **The appropriate containment facility is IBSL-1.**
- **All Category I Experiments require prior authorization from IBSC before the commencement of the experiments through submission of information in Form C1/Form D1 at Indian Biosafety Knowledge Portal (IBKP).**
- **GE insect experiments with model organism (*Drosophila melanogaster*) / maintenance of such stocks that do not involve introduction of genes from Risk Group 2 & above organism require intimation to IBSC.**

4.1.1.2 Category II Experiments

This category includes insects that have high flight range.

It includes maintenance, rearing and conduct of laboratory level experiments with insects as follows:

i. Research involving insects infected with or suspected to be infected with RG 2 microorganisms or other pathogenic organisms (RG2 and below) that may cause animal and/or human diseases.

ii. Genetically engineered insects with genes from RG 2 microorganisms and other non-pathogenic organisms provided the genetic engineering process has no, or only negative effects on viability, survivorship, host range, or vector capacity.

iii. Experiments wherein insects are challenged or infected with GE microorganisms that fall under RG 2.

For Category II Experiments

- **The appropriate containment facility is IBSL-2.**
- **All Category II Experiments require prior authorization from IBSC and subsequent approval from RCGM prior to the commencement of the experiments through submission of information in Form C1/Form D1 at IBKP.**

4.1.1.3 Category III Experiments

This category includes maintenance, rearing and conduct of laboratory level experiments with insects as follows:

i. Insects infected with or suspected to be infected with RG 3 microorganisms or other pathogenic organisms (RG 3 and below) that cause animal and/or human diseases.
ii. Genetically engineered insects with genes from RG 3 microorganisms and other pathogenic organisms (RG 3 and below).
iii. Genetically engineered insects to contain genes from RG 2 microorganisms where the genetic engineering process could positively affect viability, survivorship, host range, or vector capacity.
iv. Insects challenged or infected with GE microorganisms that fall under RG 3.

For Category III Experiments

- **The appropriate containment facility is IBSL-3.**
- **All Category III experiments require prior authorization from IBSC and subsequent approval from RCGM before the commencement of the experiments through submission of information in Form C1/Form D1 at IBKP.**

4.1.1.4 Category IV Experiments*

Experiments including maintenance, rearing and experiments with insects that are infected with or suspected to be infected with RG 4 microorganisms.

***Unless notified, genetic engineering of insects with DNA from RG 4 microorganisms and any such exotic pathogens is not currently permitted in India. Similarly, no challenge/ infection studies on insects (both GE and non-GE) with RG 4 or exotic pathogens are permitted. Applicant may refer to page 74 of Regulations and Guidelines for Recombinant DNA Research and Biocontainment, 2017.*

4.2. PHASE 2 STUDIES

Phase 2 represents studies on GE insects that are required to be done in a contained larger area with natural environment simulation. Hence, it is also called semi-field trial/ testing, e.g. large sized cages/net house/greenhouse that are placed in open fields. This phase includes experiments that may simulate the actual environmental condition on a limited scale and help to study all the parameters to confirm the adaptation of GE insects to the given environmental conditions.

- **All Phase 2 studies require prior authorization from IBSC and subsequent approval from RCGM prior tothe commencement of the experiments through submission of information in Form E1 at IBKP.**
- **Decisions on such kinds of applications shall be taken by RCGM on a case-by-case basis.**

4.3. PHASE 3 STUDIES[#]

Phase 3 represents studies on GE insects that are required to be done in confined field conditions wherein deployment/release of GE insects is done under natural conditions (confined) to evaluate their performance. These studies are designed to be of limited duration, allows recovery and destruction/decomposition of the experimental material on site.

4.4. PHASE 4 – POST-RELEASE MONITORING[#]

Post-release monitoring involves case-specific monitoring to negate or confirm risks identified during pre-release environmental risk assessment as well as general surveillance to detect unanticipated adverse effects. Therefore, it involves:

i. Surveillance regulation of GE insects
ii. Emergency control measures or mitigation steps needed.
iii. Mark-release-recapture strategies for post-release monitoring of GE mosquitoes

Note:

- **[#]Phase 3 and Phase 4 are considered confined field trials**
- **Approval of proposals relating to confined field trials is beyond RCGM purview. For confined field trials, approvals from Genetic Engineering Appraisal Committee (GEAC) and other regulatory authorities will be required.**

5. STRATEGIES OF GE INSECTS SAFETY ASSESSMENT

The safety assessment of GE insects is characterized by assessing:

i. Whether the GE insect demonstrates the desired biological and functional characteristics with emphasis on trait efficacy. Major issues to be addressed include a) stability of the transgenic strains, both genotypic and phenotypic, and b) their ability to express the transgene in a reliable and predictable way.

ii. Identification of the differences between the GE insect and its appropriately selected comparator(s) for unintended effects of the genetic modification, if any.

Data for assessment may include molecular characterisation; phenotypic characteristics (e.g., morphological, physiological and behavioural); compositional analysis as applicable and interactions between the GE insect and its receiving environments.

The risk assessment shall be carried out on a case-by-case basis, and the required information will vary depending on the type of GE insect concerned, its GE trait(s), the intended use, the potential receiving environment considering biotic and abiotic interactions, including interactions with other GE organisms already in the environment. The assessment will also depend on the type of strategy e.g. self-limiting, self-propagating, genome edited, paratransgenesis.

6. STANDARD OPERATING PROCEDURES FOR R&DOF GE INSECTSUNDER CONTAINMENT (PHASE 1 AND PHASE 2)

Standard Operating Procedures (SOPs) have been prepared to provide guidance for application submission, containment requirements, key parameters to be studied and regulatory compliance of conducting Phase 1 and Phase 2 trials of GE insects in India.

As mentioned earlier, based on applications envisaged, special considerations for SOP of GE vectors of human diseases e.g., mosquitoes, GE crop insect pests and GE beneficial insects e.g., silkworms, are provided for research including efficacy studies, maintenance and rearing, monitoring, etc. in **Annexure-III**.

6.1. PHASE 1 STUDIES

Application Submission for Conduct of R&D

Prior to initiating R&D, applicant to submit:

i. Form D1: For Research and development of GE insects in the field of Agriculture Biotechnology.

   Form C1: For Research and development of GE insects in the field of human and animal health Biotechnology.

ii. If GE insects need to be transported for conducting R&D, applicant to fill Form B1/B3/B5/B7 for import/export/transfer/receive as applicable.

iii. All the applications must be duly deliberated and recommended by the IBSC. Copy of the IBSC minutes to be attached with the application.

- **Depending upon the category of experiments, IBSC can grant permission prior to the commencement of the experiments or forward it to RCGM for approval.**
- **All activities shall be conducted in appropriate Insect Biosafety Level (IBSL) facilities as specified in Section 3.5 of Regulations and Guidelines for Recombinant DNA Research and Biocontainment, 2017.**

6.2. PHASE 2 STUDIES

6.2.1. Prior to initiating R&D, applicant to submit Form E1with the following information:

i. Whether research is to be conducted in cages/nethouse/greenhouse or multi-location contained trials.

ii. Chronology of approval(s) accorded so far by the IBSC for the proposal under investigation.

iii. Chronology of approval(s) accorded so far by the RCGM for the proposal under investigation:

   a. If GE insects intended for use in containment have been procured from any organisation outside the country, a copy of the Import Permit obtained from RCGM (and /or DPPQ&S as the case may be) and Exchange Permit obtained from RCGM if the GE insects have been procured from any organisation within the country, shall be attached with the application.

iv. Information regarding the status of approval in the country of origin and status of trial/use in other countries, if any, to be attached.

v. Trait(s) for which applied for

vi. Information on the unmodified insect species:

Taxonomy (original strain used for modification), distinguishing characteristics, hotspot areas of the species in India

vii. Information on the GE insects:

a. Description of the GE insect:

Scientific name of the insect, introduced trait in GE insect, origin or source of the introduced genes, status of trial/use in other countries (if any), Unique Identifier (if applicable), function of the gene/s, purpose of the transformation, life stage at which genes to be inserted with methodology, life stage of GE insect to be used at release.

b. Information on specific laboratory line(s) or colony(ies) of the GE insect:

Pedigree map of the GE insect (providing information about the number of generations of rearing colonies), history of global use, methods to distinguish the GE insect from non-GE insect (molecular, morphological, or other methods), toxicity and allergenicity of the inserted genetic trait as applicable, zygosity status of progenies with the inserted gene.

c. Description of the Donor Organism:

Common name, scientific name, taxonomic classification, size of the genetic material, size of the gene inserted into the recipient, intended function of the gene(s) introduced into the recipient, genetic components from the donor organism

d. Molecular Characterization of Transgene(s):

Characterization and description of the inserted genetic material, number of insertion sites, description of the organization of the genetic material at each insertion site, sequence data of the inserted material and flanking regions, identification of open reading frames within the inserted DNA or contiguous genome

viii. Details of Trait Efficacy studies

ix. Information on the Facility design (cage/net house/greenhouse):

General principles of facility design to be provided for controlling the risk of laboratory escape into the environment. Information /details to be provided on material/mesh to be used for containment in the cage/net house/greenhouse; ground and ceiling to be prepared; description of containment unit along with

the distance between two cages; whether the net used has the standard aerodynamic, radiometric and mechanical properties; simulation of the natural environment inside the contained facility and its maintenance; measures adopted to protect the cages from the intrusion of unwarranted entry of human or animals.

x. Information about the Trial in-charge responsible for experiments.

xi. Information about the Trial Site:

a. Number of sites: Total number of trials as well as sites selected for Phase 2 studies to be decided on a case-by-case basis.

b. Details of Trial Site/s:

Details including trial size, GPS coordinates; details of ownership and agreement; rationale for site selection including information on population of wild species at the trial site. Other details required are - weather parameters such as temperature, humidity and rainfall, presence of control sites, timing and duration of trials.

xii. Purpose of the trial

xiii. Information on the level of training/ awareness of the field/ground staff involved in conduct and handling of material of Phase 2 trial; protective measures to be adopted by workers involved.

xiv. Nature and type of data to be collected:

In this regard, key parameters to be considered are evaluating the fitness of GE insects as well as the unintended effect(s) if any (**Annexure-IV**).

a. Expressed substances:

Gene product (e.g. protein or RNA), function of the gene product, phenotypic description of the new trait, level and site of expression of the gene product in GE insect

b. Confirmation of intended effects:

Evidence supporting the function of any modifications to the amino acid sequence or post-translational modification, evidence of stable inheritance.

c. Biological parameters of the GE insect:

Information about phenotypic stability of the inserted trait; life history parameters in comparison to non-GE insects like mating ability, flight limits, oviposition rate, relative longevity of each phase at various temperatures, virus transmission comparison if applicable, level of

susceptibility to insecticide(s) in practice for control of the wild type insect species, population size, age structure and/or sex ratio; behavioural resistance; biochemical parameters, e.g. hatching rates, survival age, mating patterns, behaviour, male biology, population size and structure, mechanisms of population regulation, fitness and phenotypic effects of colonization and mass production; other parameters as required to establish the efficacy and biosafety e.g., rate of suppression and replacement, respectively, against wild types, potential for toxicity and allergenicity of the inserted genetic trait.

Note: Above mentioned parameters are general, therefore, applicant shall choose appropriate parameters as per the experimental insect on a case-by-case basis.

xv. Storage of GE Insects:

a. The Permitted Party/Facility In-Charge must ensure the suitability of all storage facilities/rearing area(s) prior to accepting consignments of GE insects.
   - A storage area including a rearing facility must be a fully enclosed space and must be secured by a proper sized net/glass. If present, any windows must be closed and locked.

b. Training to be provided to the personnel handling the GE material.

c. Access to the storage facility for the purpose of inspection shall be provided to regulatory officials/monitoring committees upon request.

xvi. Transportation:

Information regarding the distance between laboratory and trial site; description regarding how GE insects will be packaged for transport; how containers and/or packaging material will be sanitized and/or disposed of after use; how containers or packets containing GE insects will be labelled; how safe custody will be ensured and the type of records that will be retained. Copies of the Record of Transport, Transport Inventory List if applicable and other accompanying documents (e.g., Insect Import Permit, MTA) must be retained by the Transport In-Charge

xvii. Introduction of Insects in the trial site:

Information regarding how insect will be introduced; whether any unmodified insect of the same or a related species will be introduced at the trial site

location; if any equipment is to be used during the introduction, explain how it will be cleaned on the trial site; describe how surplus insects will be rendered nonviable at the trial site; describe how quantities of insect introduced and any excess will be recorded.

xviii. Insecticide(s) applications if any

xix. Trial termination/disposal:

Information regarding how the trial will be terminated and excess GE insect material including experimental material disposed; whether any insect material/derived products of GE insects will be retained from the trial; storage method and storage location of retained materials, if applicable; if any equipment is to be used during the trial, explain how it will be cleaned on the trial site.

xx. Emergency plans for accidental release:

Information regarding contingency plans in the event of an accidental release of any GE insect to be provided. The plan shall include site marking, a detection survey, and immediate notification to regulatory authorities.

6.2.2. Following the completed review, authorization of the Phase 2 trial will be granted. The authorization letter shall contain detailed terms and conditions to be followed by the applicant. The terms and conditions are mentioned in **Annexure-VI.**

6.2.3. During the trial, following are to be maintained:

i. A display board has to be placed outside each Phase 2 establishment and the following items are to be included on the display board with the Trial-in-charge's name and contact details - Permit number from the regulatory authority; trial initiation date; duration of the trial

ii. Visitors register: Trial-in-charge is required to maintain abound record book containing the details of visits

iii. Photographs of trials: Minimum of 3-4 photographs of the experimental facility are required to be taken from a distance sufficient to indicate the experiment in a single photograph

6.2.4. Building public awareness and confidence through extensive dialogues about the benefits and risks should be carried out before implementing the strategies that involve the end-user communities.

6.2.5. Monitoring of Contained trials of GE insects:

A Central Compliance Committee constituted for the purpose shall visit and inspect the trial site as per requirement (before initiation of the Phase 2 studies, during the experiments and at the time of termination of the trial).

6.2.6. Compliance Adherence:

i. The Permitted Party and all other agents acting on behalf of the Permitted Party must comply with these SOPs.

ii. Information Submission of Preparation/Construction of Outdoor Contained Facility*:* RCGM/GEAC shall be informed in writing within 7 working days of preparation/construction of cages/net house etc. at a trial site.

iii. No regulated GE insect material from the contained condition is permitted to enter into the environment.

iv. Compliance Records i.e. Records of contained trials, including activities related to the trial site, cleaning of equipment, transportation, disposal, storage, termination and corrective action if any, shall be maintained by the Permitted Party and shall be made available to RCGM/GEAC or the designated monitoring agencies upon request.

v. In situations where it becomes known that there has been non-compliance with the terms and conditions of the trial permit due to any reasons, the Permitted Party must inform RCGM immediately by telephone and positively within 24 hours in writing. RCGM will provide the Permitted Party with the appropriate course of remedial action. The corrective actions should be appropriately recorded as explained in the subsequent sections.

6.2.7. Applicant shall submit a trial report in Form F3 to RCGM within 3 months after termination of Phase 2 trial. The trial report must summarize the completed trial, including methods, observations, data and analysis of any effects of the GE insects on plants, non-target organisms, or the environment.

Annexure-I

MANDATE AND FUNCTION OF COMPETENT AUTHORITIESAS DEFINED UNDER RULES 1989

Competent Authorities	**Mandate and Functions**
Recombinant DNA Advisory Committee (**RDAC**)	The RDAC functions in Department of Biotechnology (DBT) and shall review developments in biotechnology at national and international levels and shall recommend suitable and appropriate safety regulations for India in recombinant research, use and applications from time to time.
Institutional Biosafety Committee (**IBSC**)	The IBSC is constituted by an occupier or any person including research institutions, handling hazardous microorganisms/ genetic engineered organisms {at Research & Development (R&D) level}. The occupier or any person including research institutions shall prepare, with the assistance of the IBSC, an up-to-date on site emergency plan according to the manuals /guidelines of the RCGM and make available copies to the DLC/SBCC and RCGM/GEAC. IBSC is the nodal agency within an organization for implementation of the biosafety regulatory framework. IBSC is solely responsible: i. For implementation of biosafety regulations at the institution level and ii. For evaluation of applications/ reports submitted by the organisation related to rDNA technology work involving the GE organisms and non-GE hazardous microorganisms.
Review Committee on Genetic Manipulation (**RCGM**)	RCGM functions in the DBT to monitor the safety related aspects in respect of on-going research projects and activities involving genetically engineered organisms/hazardous microorganisms. It shall bring out Manuals of guidelines specifying procedure for regulatory process with respect to activities involving genetically engineered organisms in research, use and applications with a view to ensure environmental safety. RCGM shall lay down procedures restricting or prohibiting production, sale, importation and

	use of such genetically engineered organisms of cells as are mentioned in the Schedule of Rules, 1989.
Genetic Engineering Appraisal Committee (**GEAC**)	The GEAC functions in the MOEF &CC and is responsible for approval of (i) activities involving large scale use of hazardous microorganisms and recombinants in research and industrial production from environmental angle. (ii) proposals relating to release of genetically engineered organisms and products into the environment including experimental field trials. The GEAC or any person/s authorised by it shall have powers to take punitive action under the Environment (Protection) Act.
State Biotechnology Coordination Committee (**SBCC**)	SBCC review periodically the safety and control measures in the various installations/institutions handling genetically engineered organisms/hazardous microorganisms. SBCC have powers to inspect, investigate and take punitive action in case of violations of statutory provisions through the Nodal Department and the State Pollution Control Board/Directorate of Health &/ Medical Services.
District Level Committee (**DLC**)	DLC monitor the safety regulations in installations/institutions engaged in the use of genetically modified organisms/ hazardous microorganisms and its applications in the environment. DLC/or any other person/s authorized in this behalf shall visit the installation engaged in activity involving genetically engineered organisms, hazardous microorganisms, formulate information chart, find out hazards and risks associated with each of these installations and coordinate activities with a view to meet any emergency. DLC shall also prepare an off-site emergency plan for field trials. DLC shall regularly submit its report to the SBCC/GEAC.

While the RDAC plays an advisory role, IBSC, RCGM and GEAC are involved in regulatory and approval functions. SBCC and DLC are responsible for monitoring the activities related to GMOs at state and district levels, respectively.

Annexure-II

EXAMPLES OF METHODS USED TO DEVELOP GE INSECTS

Genetic Engineering Technology	Process Brief	Insects	Strategy
RIDL (Release of Insects with Dominant Lethal Gene)	Introduction of a dominant lethal gene and a marker gene (DsRed2) in the mosquitoes that causes mortality in offspring in the absence of tetracycline.	*Aedes aegypti*, pink bollworm, Mediterranean fruitfly, diamond backmoth and olive fruitfly	Population suppression
Homing Endonuclease Gene (HEG)	HEGs are naturally occurring 'selfish genes' or 'parasitic genes' that are engineered to cut a sequence in the DNA in the middle of an essential gene of the mosquito genome, thereby disrupting its function.	*Anopheles gambiae*	Population suppression
Wolbachia based control	Deliberate infection of mosquitoes with *Wolbachia* to cause the following: a. Feminization of Genetic males – Infected males develop as either females or infertile pseudo females b. Reproduction of infected females without the males c. Male killing - males are killed during larval development d. Cytoplasmic incompatibility – Inability of uninfected females to reproduce after mating with infected males Deliberate infection in parasitoid wasps with *Wolbachia* for pest management in Agriculture Parthenogenesis-inducing *Wolbachia* infection in parasitoid wasps can lead toa higher population growth rate due to the reproductive advantage afforded by *Wolbachia*	*Aedes aegypti*, *Aedes albopictus*; *Anopheles* spp.	Population suppression and/or replacement Pest population suppression
CRISPR-Cas	Highly efficient CRISPR-Cas9 based gene-drive system containing anti-parasite genes transformed in the germ line of the male	*Anopheles stephensi*	Population suppression/ gene drive

	mosquitoes which on mating with wild type female result in introgression of the entire drive elements into the off springs that become incapable of disease transmission.		system
MEDEA (Maternal Effect Dominant Embryonic Arrest) based Gene drive	MEDEA involves a selfish gene composed of a toxin and an antidote. A mother carrying Medea will express the toxin in her germline, killing her progeny.	*Drosophila*	Population replacement/ gene drive
RNAi	Introduction into the silkworm germline, the vectors carrying short sequences of four essential BmNPV genes in tandem, either in sense, antisense or in an inverted-repeat arrangement. The transgenic silkworms carrying the inverted repeat containing transgene showed stable protection against high doses of baculovirus infection.	*Bombyx mori*(silkworm)	Disease tolerance

Annexure-III

STANDARD OPERATING PROCEDURES FOR GE MOSQUITOES, CROP INSECT PESTS AND BENEFICIAL INSECTS

1. For Phase I of GE Mosquitoes, Crop Insect Pests and Beneficial Insects:

All SOPs to follow Insect Biosafety Levels (IBSLs) as specified in Section 3.5 of Regulations and Guidelines for Recombinant DNA Research and Biocontainment, 2017.

2. For Phase 2 trial of GE Mosquitoes, Crop Insect Pests and, Beneficial Insects

2.1 Based on data generated during Phase 1 studies, the following information is to be provided:

2.1.1 **<u>For GE Mosquitoes</u>**

A. *GE Insect Characterization and Trait Efficacy*

i. Information about GE mosquitoes.
The biology of unmodified insects and the method of creation/production of GE mosquitoes.

ii. Characterization of the modified construct in detail.

iii. Information about the donor organism.
The description about the source of genes, with their scientific names.

iv. Potential for toxicity and allergenicity of the inserted genetic trait

v. Gene expression in homozygous and heterozygous progenies in GE strain

B. *Biological Studies*

i. Life span comparisons between GE and wild-type strains.
The life span of males and females, net reproductive rate and mean generation time of GE mosquitoes compared with wild-type.

ii. Mating competitiveness between GE strains and wild-type strains.

iii. Methods of discriminating GE mosquitoes within a wild population after release

iv. Stability and effectiveness of the transgene and the consequences of incomplete or partial transgene function

v. Interactions between GE and wild-types mosquitoes over several generations

vi. Rate of spread of a transgene in laboratory cage populations
vii. GE mosquitoes release simulations for large indoor cages
viii. Modelling effects anticipated in wild populations
ix. Determination of Efficacy endpoints of GE mosquitoes
x. Pathogen carrying and transmission ability of local strains and GE strain studies (based on the technology used in GE mosquitoes)

2.1.2 **<u>For GE Crop Insect Pests and Beneficial Insects</u>**

Data to be generated on molecular characterization and biosafety aspects as per regulatory requirements for consideration by regulators. It may include data generation on all or some of the above parameters as applicable which may be decided by the regulators case-by-case. For agricultural insect pests, parasitoids and predators, the mesh size of cages should be chosen based on the size of the insect under study, to prevent its escape and the roof should be permeable to sunlight.

2.2 Following information related to Phase 2 trial should be provided

2.2.1 **<u>GE Mosquitoes</u>**

A. Trial Site:

To be selected such that there is nil possibility of movement of escaped GE mosquitoes to other unintended areas.

B. Baseline studies:

Baseline entomological data based on the type of insect and target trait, may be collected as applicable. Following to be included: details of mosquitoes including number during trial and no. of generations to be studied for GE and non-GE mosquitos shall be recorded for each cage. Source of food for insects to be provided e.g. rabbit for *Anopheles stephensi*.

C. Cage Description:

i. A detailed description of the cage along with the distance between the two cages, its isolation from inhabitants; distance from the laboratory; cage material and mesh to be used, ground and ceiling to be prepared; its isolation from nearby inhabitants should be provided.
ii. Details of simulation of the natural environment inside the cages and its maintenance.

iii. Details to be provided on: measures to protect the cages from the intrusion of unwarranted entry of humans or animals; procedures for detection of potential escapes of mosquitoes to the open environment. Ovitraps at different locations and Mosquito Traps are to be distributed on the ground around the cages.

D. Experiment Protocol:

i. The large field containment unit based experiment protocol shall also include procedures for the detection of potential escapes of mosquitoes to the open environment. Ovitraps at different locations and Mosquito Traps should be distributed on the ground around the containment unit platform.

ii. Data requirement: Following parameters to be studied in Phase 2

a. Base line studies as applicable.

b. Mating competitiveness against mosquito strains having a wild genetic constitution

Detailed description of actual number and ratios of GE male/female to wild-type male/female mosquitoes; percentage mating with statistical analysis should be provided.

c. Frequency of GE insects that express the desired characteristic and the level of expression in total population to be ascertained.

Appropriate insect traps should be used for collecting insect samples. The GE insects should be identified for the desired gene through PCR technique. These data should be correlated to determine the frequency of GE mosquitoes that express the desired characteristic. The rate of spread of a transgene in cage populations containing wild mosquito isolates to be recorded and compared with Phase 1 predictions.

d. For population suppression and replacement strategies, the rate of suppression and replacement respectively against wild types in cage trials is to be provided.

e. Mass rearing of both wild-type and GE mosquitoes shall be carried out in similar large field containment. The weekly data on wild-type mosquito population should be monitored and included in the report.

f. Parameters to be studied in Phase 2 may include egg hatching rates, survival age, mating patterns, behaviour, male biology, population size and structure, mechanisms of population regulation, fitness and phenotypic effects of colonization and mass production and other

parameters as required to establish the efficacy and biosafety. This will help in development of appropriate contained semi-field systems to improve understanding of the biology of (GE) mosquitoes.

E. Community Engagement:

i. Building public awareness and confidence through extensive dialogues about the benefits and risks should be carried out before implementing the strategies that involve the end-user communities.

ii. Necessary approval should be obtained from the state agencies and local civic bodies like Municipal Corporations, Nagar/Village panchayats.

F. Tenure of Trial:

The trial may be conducted for two seasons. Further, the trial should be repeated for the second year or as per suggestions from the RCGM in case the data generated and results differ from the proposed endpoint or laboratory studies.

G. Monitoring:

Frequent monitoring of the inside and outside of the cage should be done for presence of i) GE mosquitoes ii) Mosquito predators and vertebrate insectivores iii) Blood hosts for mosquitoes and iv) Other non-target vectors, and reported.

H. Training:

The research personnel to be well trained and prepared in advance for handling and carrying out experiments on GE insects in the laboratory as well as outdoor trials. Only full time and regular personnel who have proper training shall supervise the different experiments on GE mosquitoes. Information about the training provided to the personnel handling the GE insects and experiments to be furnished along with the application submission to RCGM.

I. Disposal and decontamination:

SOPs to be provided by the applicant for disposal and decontamination of the experimental materials including animals used for blood supply if any.

J. Report Submission

Applicant to submit a report including all parameters in Form F3.

2.2.2 GE Crop Insect Pests

A. In the case of GE crop insect pests, Phase 2 may be conducted within appropriate net-covered fields/nethouses to study the efficacy and other life cycle parameters.

Measures like pheromone traps, sticky traps, or light traps can be installed depending on the species under study to detect and trap any escaped insects.

B. GE crop insect pests must be effective in reducing crop infestation and damage. The effects can be measured in terms of entomological endpoints e.g., reduction in pest population and crop damage.

C. Assessment of technology will include data generation on all the applicable parameters as mentioned above. Suitable modifications relevant to the insect species under study may be required as suggested by RCGM. Accordingly, all the baseline data for technology assessment and related SOPs including details of technical personnel and biosafety aspects as per regulatory requirements shall be worked out and submitted for consideration by RCGM. Appropriate statistical analysis is to be applied on all the generated data.

2.2.3 Beneficial Insects

A. For beneficial insect, e.g. in the case of GE silkworm, applicant may carry out the multi-location trial at the institutional level. A separate dedicated standard rearing house is to be designated for the Phase 2 studies. All of the phase 1 parameters are to be further studied and confirmed in this phase.

B. GE beneficial insects (parasitoids and predators) must be effective in leading to increase in its own population with a corresponding decrease in pest population and crop damage. The effects can be measured in terms of entomological endpoints e.g. maintenance or increase in the population of the parasitoids and predators, with a corresponding decrease in pest population and crop damage. Non-target effects, if any, on other beneficial insects to be measured.

C. Based on the studies carried out so far, additional data needs to be generated as given below e.g., in the case of GE silkworm:

i. Management of silkworm rearing rooms for GE and non-GE stages.

ii. Parameters for data generation may include fecundity, larval survival, cocoon yield, pupation rate, cocoon weight, cocoon shell weight, cocoon shell ratio, end product assessment like filament length, filament size, raw silk and susceptibility to pests and diseases.

iii. Rearing seasons according to the hybrid selected for those regions may be decided by the RCGM members.

iv. Toxicity studies of GE silk worm life stages that are used for feeding of poultry and other animals.

D. Before commencing Phase 2 studies of beneficial insects, applicant needs to submit Risk Assessment and Risk Management (RARM) plan and on-site Emergency Plan along with the application

E. Proper monitoring is to be ensured at all stages to prevent any transfer of GE material by human intervention or the entry of predators e.g. uzi fly during silkworm rearing.

Annexure- IV

DATA REQUIREMENT CHECKLIST FOR PHASE 2 STUDIES

1.Description of the GE Insect

Information provided	**YES**	**NO**
Scientific name of the insect		
Introduced trait in GE insect		
Origin or source of the introduced genes		
Status of trial/use in other countries, if any		
Unique Identifier (if applicable)		
Function of the Gene/s		
Purpose of the transformation		
Life stage at which genes are to be inserted with methodology		
Life stage of GE insect to be used at release		
Information on specific laboratory line(s) or colony of the GE Insect		
Pedigree map of the GE insect (providing information about the number of generations of rearing colonies)		
History of global use		
Methods to distinguish the GE insect from non-GE insect* (molecular, morphological, or other methods)		
Toxicity and allergenicity of the inserted genetic trait		
Zygosity status of progenies with the inserted gene		
Additional Details, if imported		
Source of GE insect (Address of the organization/agency and contact person)		
Specifications and quantity of imported material		
Status of approval in the country of origin		
Status of trial/use in other countries, if any		

2. Description of the non-GE Insect wild type comparator

Information Provided	**YES**	**NO**
Taxonomy (original strain used for modification)		
Distinguishing characteristics		
Spatial and Temporal Hotspot of the species in India		

3. Description of the Donor Organism

This information should be provided for the donor of each transgene present in the GE Insect

Information Provided	**YES**	**NO**
Common name		
Scientific name		
Taxonomic classification		

Size of the genetic material		
Size of the gene inserted into the recipient		
The intended function of the gene(s) introduced into the recipient.		
Genetic components from the donor organism		

4. Molecular Characterization of Transgene(s)

Following information is to be provided for each transgene in the GE insect

Information Provided	**YES**	**NO**
Genetic modification		
Characterization and description of the inserted genetic material		
Number of insertion sites		
Description of the organization of the genetic material at each insertion site		
Sequence data of the inserted material and flanking regions		
Identification of open reading frames within the inserted DNA or contiguous genome of insect		
Expressed substances		
Gene product(e.g. protein or RNA)		
Function of the gene product		
Phenotypic description of the new trait		
The level and site of expression of the gene product in GE insect		
Confirmation of intended effects		
Evidence supporting the function of any modifications to the amino acid sequence or post-translational modification		
Evidence of stable inheritance		

For any information not included, please provide a rationale as to why the information is not relevant or necessary for the risk assessment of the GE insect, or what information is being provided in its place.

5. Biological parameters of the GE Insect

Information Provided	**YES**	**NO**
Information about the phenotypic stability of the inserted trait		
Life history parameters in comparison to non-GE insect		
Mating ability		
Flight limits		
Oviposition rate		
Relative Longevity of each phase at various temperatures		

Virus transmission comparison if applicable		
Level of Susceptibility to insecticide(s) in practice for control of the wild-type insect species.		

For any information not included, please provide a rationale as to why the information is not relevant or necessary for the environmental risk assessment of the GE insect or what information is being provided in its place.

Annexure-V

CATEGORY MATRIX TO ESTIMATE LEVEL OF CATEGORY

RISK GROUP	EXPERIMENTS INVOLVING	LOW FLIGHT RANGE	HIGH FLIGHT RANGE
RG 1	i. GE insects with genes from RG 1 microorganisms and other non-pathogenic organisms provided the genetic engineering process has no, or only negative effects on viability, survivorship, host range, or vector capacity.	***Category I**	**Category II**
	ii. Insects challenged or infected with GE microorganisms that fall under RG 1	***Category I**	**Category II**
RG 2	i. Insects infected with or suspected to be infected with RG 2 microorganisms or other pathogenic organisms (RG 2 and below) that may cause animal and/or human diseases.	**Category II**	**Category II**
	ii. GE insects with genes from RG 2 microorganisms and other non-pathogenic organisms provided the genetic engineering process has no, or only negative effects on viability, survivorship, host range, or vector capacity.	**Category II**	**Category II**
	iii. Insects are challenged or infected with GE microorganisms that fall under RG 2.		
RG 3	i. Insects infected with or suspected to be infected with RG 3 microorganisms or other pathogenic organisms (RG 3 and below) that cause animal and/or human diseases.	**Category III**	**Category III**
	ii. GE insects with genes from RG 3 microorganisms and other pathogenic organisms (RG 3 and below).	**Category III**	**Category III**
	iii. GE insects to contain genes from RG 2 microorganisms where the genetic engineering process could positively affect viability, survivorship, host range, or vector capacity.	**Category III**	**Category III**
	iv. Insects challenged or infected with GE microorganisms that fall under RG 3.	**Category III**	**Category III**
RG 4	Experiments including maintenance, rearing and experiments with insects that are infected with or suspected to be infected with RG 4 microorganisms.	**Category IV**	**Category IV**

**This category includes insects that are model organisms, domesticated insects and other beneficial insects such as parasitoids and predators that have low flight range.*

Annexure-VI

STANDARD TERMS AND CONDITIONS OF AUTHORIZATION

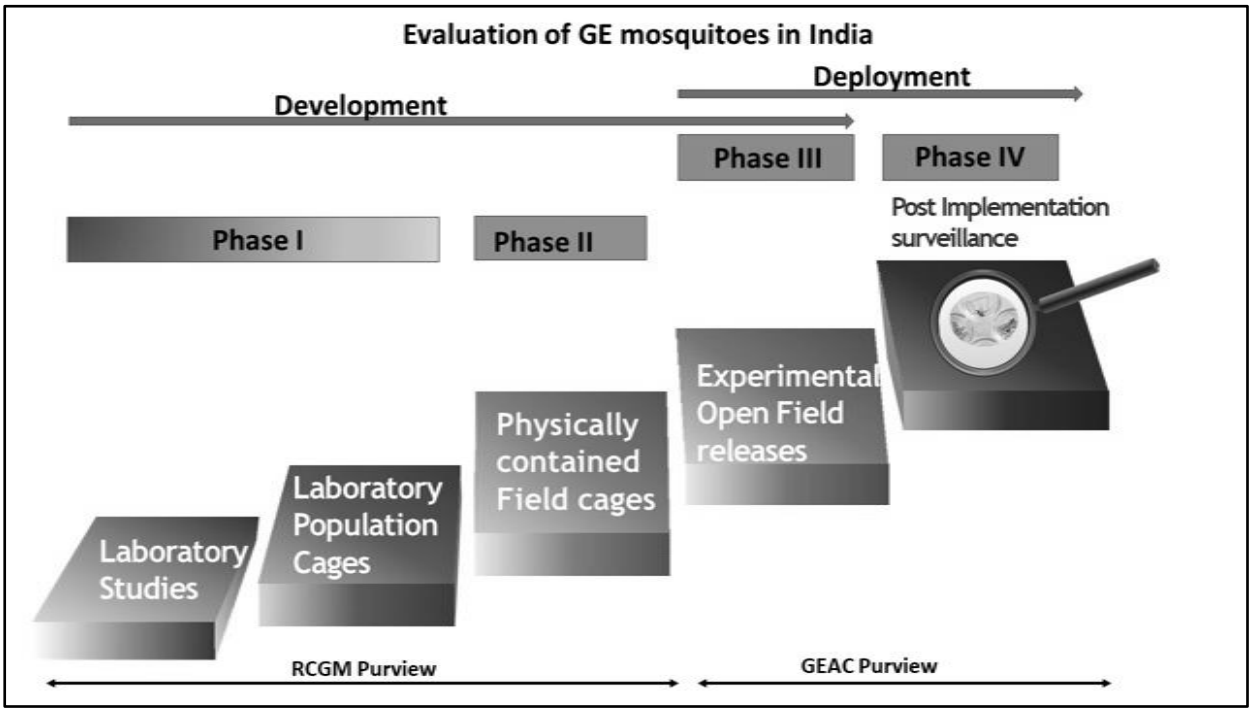
The following terms and conditions shall apply to all the trials in Phase 2 trials and shall be appended to each letter of permit:

1. The Permitted Party shall ensure that genetically engineered (GE) insect is transported in clearly identified, secure containers and kept separate from non-GE insects.
2. All packing material, shipping containers, and any other material accompanying the genetically engineered insects shall be treated or disposed of in such a manner as to prevent the dissemination and establishment of this material or any progeny into the environment.
3. In the case of accidental release or spillage of genetically engineered material during transport, the site shall be marked and monitored, and mitigation measures to recapture the GE insects should be immediately implemented. A notification shall be immediately provided to RCGM/GEAC in this regard positively within 24 hrs.
4. Any equipment or tools used during handling of GE insects shall be cleaned at the trial site prior to movement off the site.
5. All the GE insects shall be rendered non-viable after the experiments and disposed of using a method acceptable to RCGM/GEAC such as dry heat, steam heat, incineration, crushing, deep burial to one metre on the trial site, or chemical treatment.
6. The Permitted Party or Trial In-Charge must mount a Notice Board at the site of Phase 2 trial studies indicating the purpose and duration of the studies conducted and the authority under which the trials were approved.
7. No insect from the laboratory or outdoor experimental cages/net house/greenhouse should enter the human food or animal feed chains.
8. GE insects are to be retained only if requested in the application and authorized by RCGM/GEAC.
9. A record of step-wise details documenting the date and method of release, the amount of materials, the disposal of materials, the cleaning of any equipment used during release, and the method of destruction of any residual material on the trial site, shall be prepared by the Permitted Party for verification and signature by monitoring agency.
10. The Permitted Party shall notify RCGM/GEAC in writing at least 15 days in advance of conducting Phase 2 trials.

11. The Permitted Party shall submit a report summarizing the completed trial, including observations and data, methods of observation, and analysis of any deleterious effects on plants, non-target organisms, or the environment, to RCGM/GEAC within 3 months after the termination of the field trial.
12. Monitoring agencies shall be allowed access to the laboratories or field site where regulated GE Insects' material is placed and to any records relating to the transportation, storage, or use of the genetically engineered insects and related material in a contained field trial.
13. If a chemical treatment is used on the trial site that requires waiting time for safe entry, a sign must be posted at the access to the trial indicating the date and time of spraying as well as the date for safe entry. This condition is intended to protect the health and safety of monitoring agencies.
14. If the genetically engineered insects under trial are found to have characteristics substantially different from those listed in the application or any unusual occurrence/characteristic is recorded, RCGM / GEAC should be informed in writing at the earliest (not later than five days).
15. Supplementary terms and conditions of authorization specific to the genetically engineered insect species and/ or the trial site may also be included in the letter of permit from RCGM/GEAC on case- by-case basis.
16. In the event of any accidental or unauthorized escape of GE insect, the regulatory authorities are to be immediately informed, positively within 24 hrs.

Figure-1

PHASE WISE STUDIES FOR GE MOSQUITOES



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- ✓ **Expert Committee** under the Chairmanship of Dr. Gururaj Katti, Former Principal Scientist & Head, ICAR- IIRR, Hyderabad constituted by DBT for this purpose. Committee members include:
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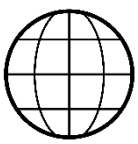

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