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AGRICULTURAL RESEARCH
FOR DEVELOPMENT

Mission Report

Implementing the Sterile Insect Technique for Integrated Control of *Anopheles arabiensis* - Phase III

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Khartoum, 2023-03-04/2023-03-09

TC Expert Mission to assist project team in data analysis

1 Terms of reference

The specific objectives of the assignment were to closely cooperate with the TO and counterparts, in order to

- Help organizing the raw data from a SIT pilot suppression trial
- Inspect the data accuracy and clean and prepare it for subsequent analysis and share this process with the counterpart
- Initiate the data analysis of the field data to measure the suppression rate and the effectiveness of the SIT strategy
- Share the code used for the analysis to enable the counterpart to clean and prepare the data for subsequent analysis

The expected output is a report including the description of the statistical methods used, the main results, and figures/graphs that can be used to prepare a scientific publication.

2 Duties performed

- Round of introductions with researchers involved in the project and authorities
  - National Liaison Officer and Assistant of Soudan to the IAEA at Soudan Atomic Energy Commission
  - Director General at the National Center for Research

  - Director and senior staff at the Tropical Medicine Research Institute

- Presentation of the experimental design, collected data sets and preliminary results, by the field operation manager of the project Dr. Tellal Ageep.
- General discussion with Dr Ageep and the project manager Prof. Badria Babiker El-Sayed.
- Transfer of data sets for examination.
- Verification of internal consistency of the data.
- Synthesis of informal data into supplementary data sets, necessary for completeness and to facilitate validation.
- Correction of identified errors in the records.
- Transfer of corrected and augmented data sets duly documented.
- Transfer of a list of free on line references and materials for building capacities in R programming language and statistics that are relevant for the project
- Transfer of all the code developed during the mission
- Introductory overview of the code structure to facilitate uptake
- Detailed clean up report.
- Initiation of analysis report. Descriptive analysis.

3 Conclusions

Mission goals have been well achieved. The collaboration was very fluid and effective. Prof. Badria Babiker El-Sayedand and Dr. Tellal Ageep were fully committed to ensure smooth cooperation.

The experimental setup is very well designed and implemented. The selected area is ideally located, with an outstanding large number of adult traps (294) as well as larval and swarm observations. Furthermore, it has been systematically carried out for almost 4 years with virtually no change in methodology. I believe that the collected data is of great scientific value.

The type of adult trap used was particularly suitable for the target species, based on previous research by Dr. Tellal Ageep. On the downside, the number of catches is relatively low since the mosquitoes are not captured but come and go daily and thus they do not accumulate over the days. Combined with a low density of the wild population, this results in a vast majority (~98 %) of these catches are 0, which makes these data very little informative in comparison with the measurement effort.

On the other hand, these observations are complemented by larvae counts and swarming, which are much richer. Ideally, the three sources of information could be modelled jointly in order to improve the accuracy of the inference.

It should also be noted that the adult traps are *clustered* into sampling units of one hectare. This has been ignored in the preliminary analyses and the grouping variable was not even present in the data set. However, this typically leads to larger standard errors and reduced information.

While Dr. Ageep played the role of field operation manager of this project, in practice, he has also been the chief data officer, the data scientist and the statistician. Despite his personal qualities, technical capabilities and the hard work that he has obviously devoted to the project, one person can only be proficient in a limited number of domains.

For future research projects, I suggest strengthening current skills in data-management, reproducible research and statistical modelling. Both by supporting training programs and also by incorporating personnel with this specific skill set into the research teams. This is possibly the most cost-effective way of improving the quality and the efficiency of the research.

The data from the phase III suppression trial of *Anopheles arabiensis* in Sudan are ready for statistical analysis.