

WP4. Data integration and designing solutions for resilient rubber cultivation systems for smallholders in a context of climate change

Coordination: Arini Wahyu Utami (UGM), Fetrina Oktavia (IRRI), Pascal Montoro (CIRAD)

This work package WP4 aims at integrating project data from WP1, WP2 and WP3, and designing both planting packages, experimental network and tools for further establishment and monitoring of on-farm trials. Data integration and solutions designing will follow a step-by-step process throughout the life of the project with all stakeholders.

Through a participatory approach initiated in WP1 with all categories of stakeholders, both needs, requirements and local knowledge will be analysed in connexion with the capacity of rubber-based agroforestry and monospecific plantations studied in WP2. This will lead to identify crop/varieties and cropping system ideotypes for more resilient rubber cultivation systems in smallholdings. The relevant traits characterized in the *Hevea* germplasm (WP3) and intercrop species will be selected for a theoretical design of replanting packages. A Kobocollect tool will be developed to be able to monitor the upcoming on-farm trial.

4.1 Progressive data and knowledge integration throughout the project

Specific meeting sessions will be organized between work package participants and representatives of stakeholders throughout the project in order to integrate progressively the outputs and identify new questions to be studied during the project or to be implemented in another step.

The meeting sessions will be held consecutively to the Bi-annual Project Workshops. The WP leaders will be in charge to summarize and share with other project participants the conclusions of their own WPs and the status of the integration of data. The preliminary conclusions may lead to iteration of research activities.

Multivariate analyses of socioeconomics, agronomic, genetic data will be conducted by an Indonesian Master student for the development of scenarios (packages, trials network, smallholders' candidates, etc.). The tentative scenarios will be presented and discussed at the second multilateral workshop.

4.2 Second Multilateral Workshop on Data integration and designing solutions for resilient rubber cultivation systems for smallholders in a context of climate change

This Workshop will be organized by IRRI at the Sembawa RC in November 2022 or March 2023 when sufficient information will be obtained from WP1, WP2 and WP3. The stakeholders and project researchers will present their results and scenarios in plain language. Live language translation will be provided for English and Indonesian.

The aim of this WS will be to identify the scenarios that would answer the demand of stakeholders, consider the impact of local socio-economy and environment on the pattern of rubber plantations, and determine the rubber clone and cropping system ideotypes for further on-farm large-scale trials.

After the general presentations of the WP results and the presentation of scenarios, working sessions will be organized to establish the theoretical design of replanting packages (rubber

genotypes, intercrop species and varieties, agronomic practices), theoretical statistical design for on-farm large-scale trials, and specifications for on-farm data collection.

4.3 Development of KoboCollect system for the formalization of on-farm data collection.

A digital system (KoboCollect) will be used for data collection in farmers' fields and their storage in a FAIR database, as well as performing an automatic reporting.

. This task will be conducted with the contribution of a Master student to be recruited in France (major in communication technology with skills/interest in agronomy/plant breeding /rural survey or major in plant breeding with good skills in communication technology). A Master student based in Montpellier supervised by a Cirad's researcher (AA Saïdou, UMR AGAP) will carry out desk studies and will interact through regular meetings with the researchers in Montpellier and skype meeting with Indonesian partners to define the variables of interest. The task will consist in the following activities:

- Development of data collection forms with involved scientists.
- Implementation of the forms into KoboCollect system Create a Kobocollect account into the Cirad KoboCollect platform. Set electronic forms based on the variables defined in activity a); Set the specific parameters for quality control (mandatory questions, data validation parameters...)
- Making a pilot test of the developed tool, validation of the forms, and set up KoboCollect in the android tablets. Making a pilot test of data filling and data upload and checking outputs and correct implementation of the parameters.
- Training and on-farm test of the data collection and analysis. The training modules will be prepared in Montpellier and teach in Indonesia (3 days of seminar and 3 days of field test). Data extraction and analysis will consist of a process from data extraction in csv and/or Excell format, cleaning and check of data quality using R scripts. An online supervision and support for the on-farm test of data collection will be performed from Montpellier.

4.4 Sharing and dissemination of co-constructed solutions

The project outputs and co-constructed solutions with all stakeholders will be shared at the Indonesian and regional levels.

In addition to the multilateral workshops, a summary concept-note in appropriate plain language for each Indonesian stakeholder will be sent by post-mail to the different organizations (Ministry of Agriculture, Ministry of Forestry, NGOs, producers' associations, etc.) and disseminate on the project website.

A position paper will draft to summarize the project conclusions in a scientific journal as well as International Conference such as the IRRDB Conference, the International Rubber Conference or World Forestry Congress.

Based on multilateral discussion especially with funding agencies, a new proposal will be submitted for funding further on-farm field trails.