

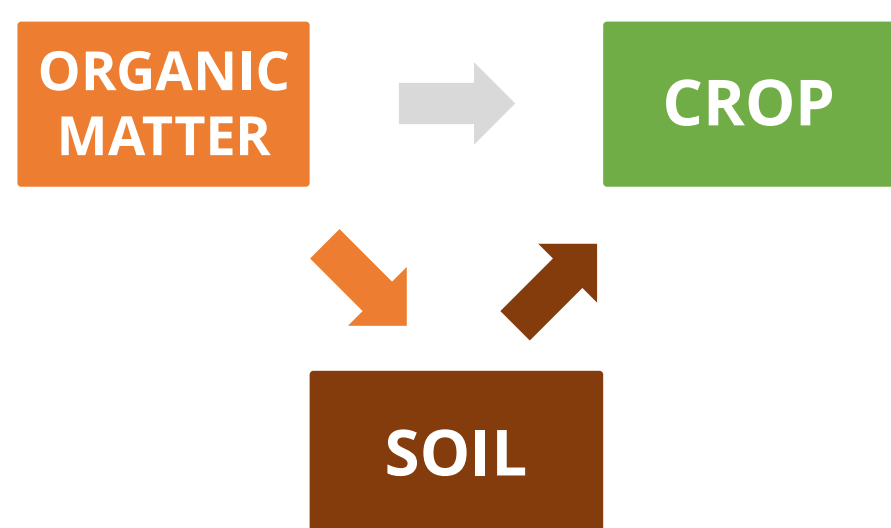


The effect of organic matter additions on soil properties and cocoa production in Indonesia

BACKGROUND

Restoring soil organic matter (SOM) levels to desirable levels can be achieved by cocoa farmers by using organic inputs.

Their effects on dynamics of SOM and have to be evaluated to make the best recommendations.



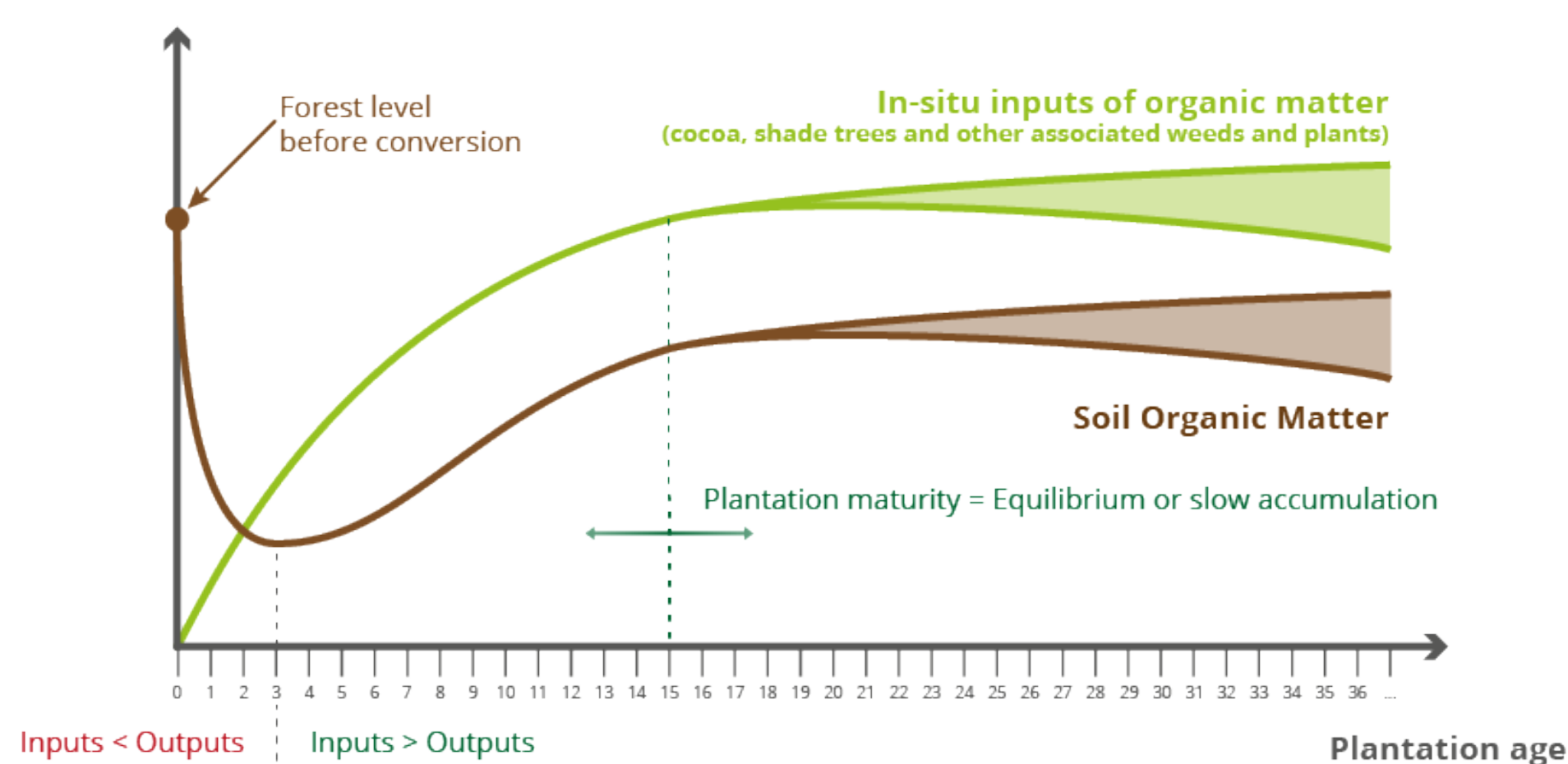
A simple conceptual diagram exploring how organic inputs influence yields (Oldfield et al., 2017)

AIM

To evaluate the potential of organic additions strategies to improve cocoa production by restoring optimal SOM levels.

HYPOTHESIS

It is assumed that SOM declines dramatically during the first years of cultivation. It then builds-up, following cocoa growth and reaches a plateau at plantation maturity. Later, SOM may build-up or decline, depending on the management of the plot.



A conceptual trend for the dynamics of SOM in cocoa

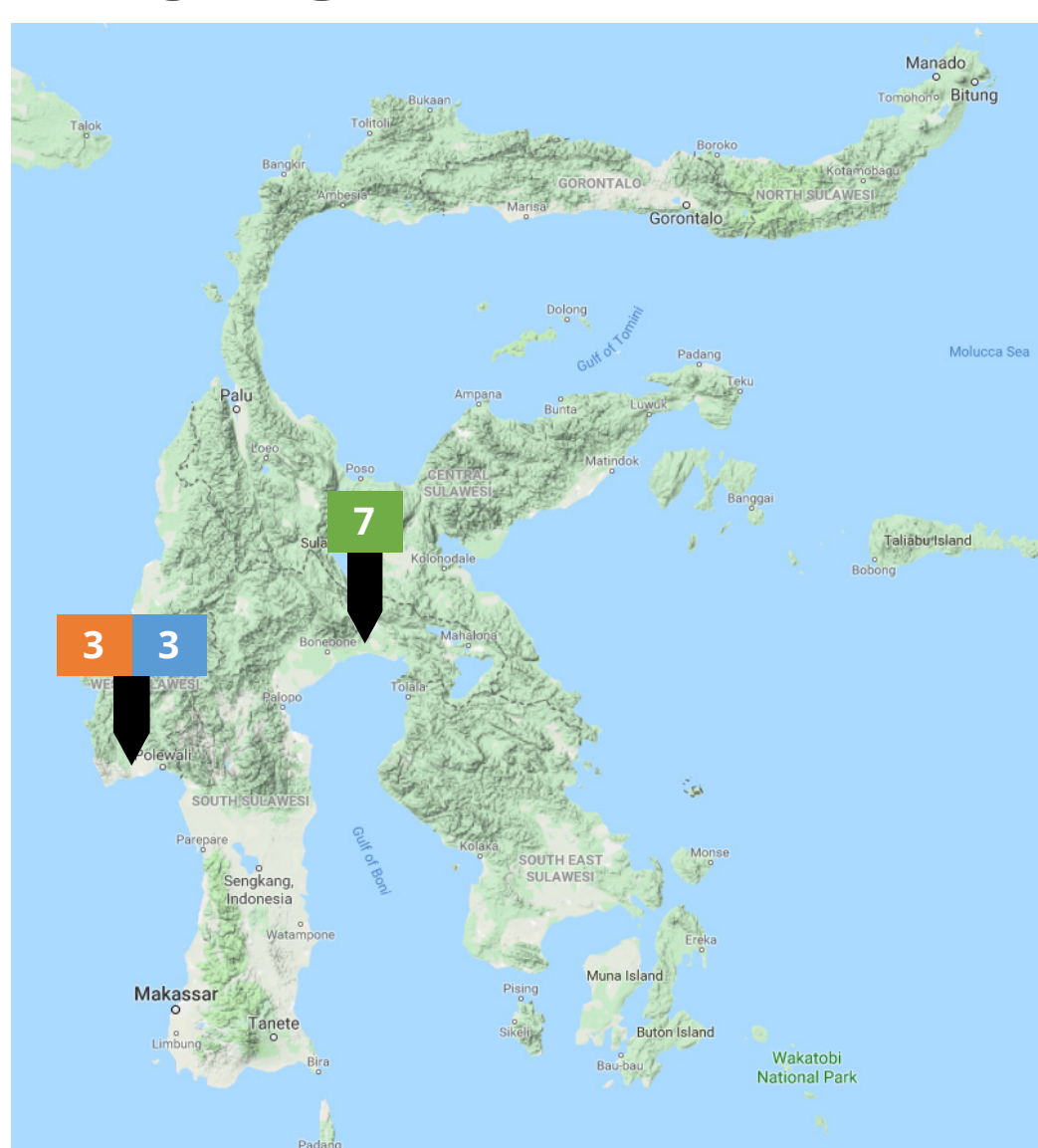
MATERIALS & METHODS

3 locations in Sulawesi:

- 13 farms visited (7 + 3 + 3)
- false time-series from 0.5 to 32 years old
- + 1 trial to study the effects on soil and cocoa production

Early analyses include:

- SOM
- total & organic soil C
- bulk density
- texture

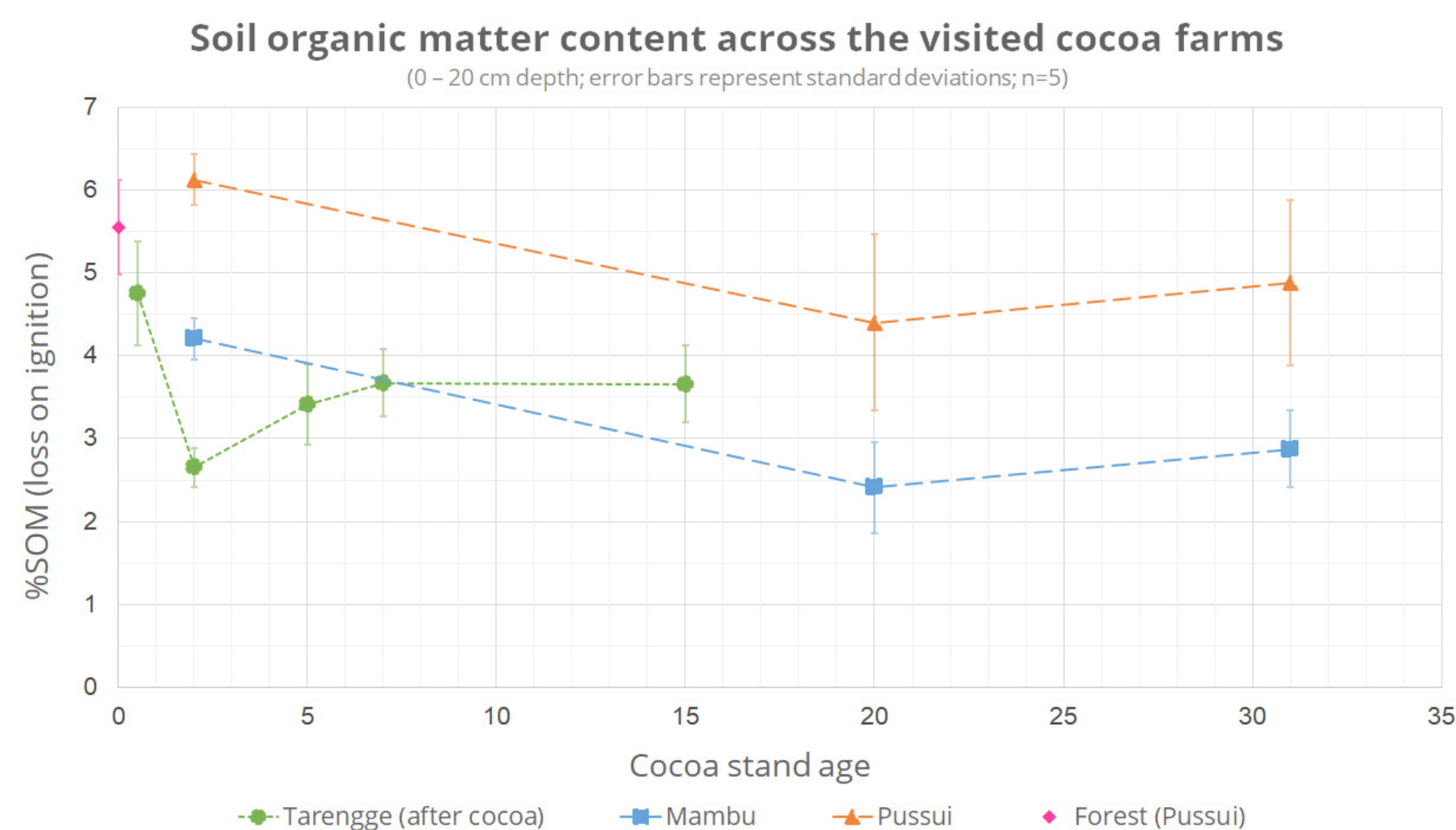


Locations of the visited cocoa farms

RESULTS

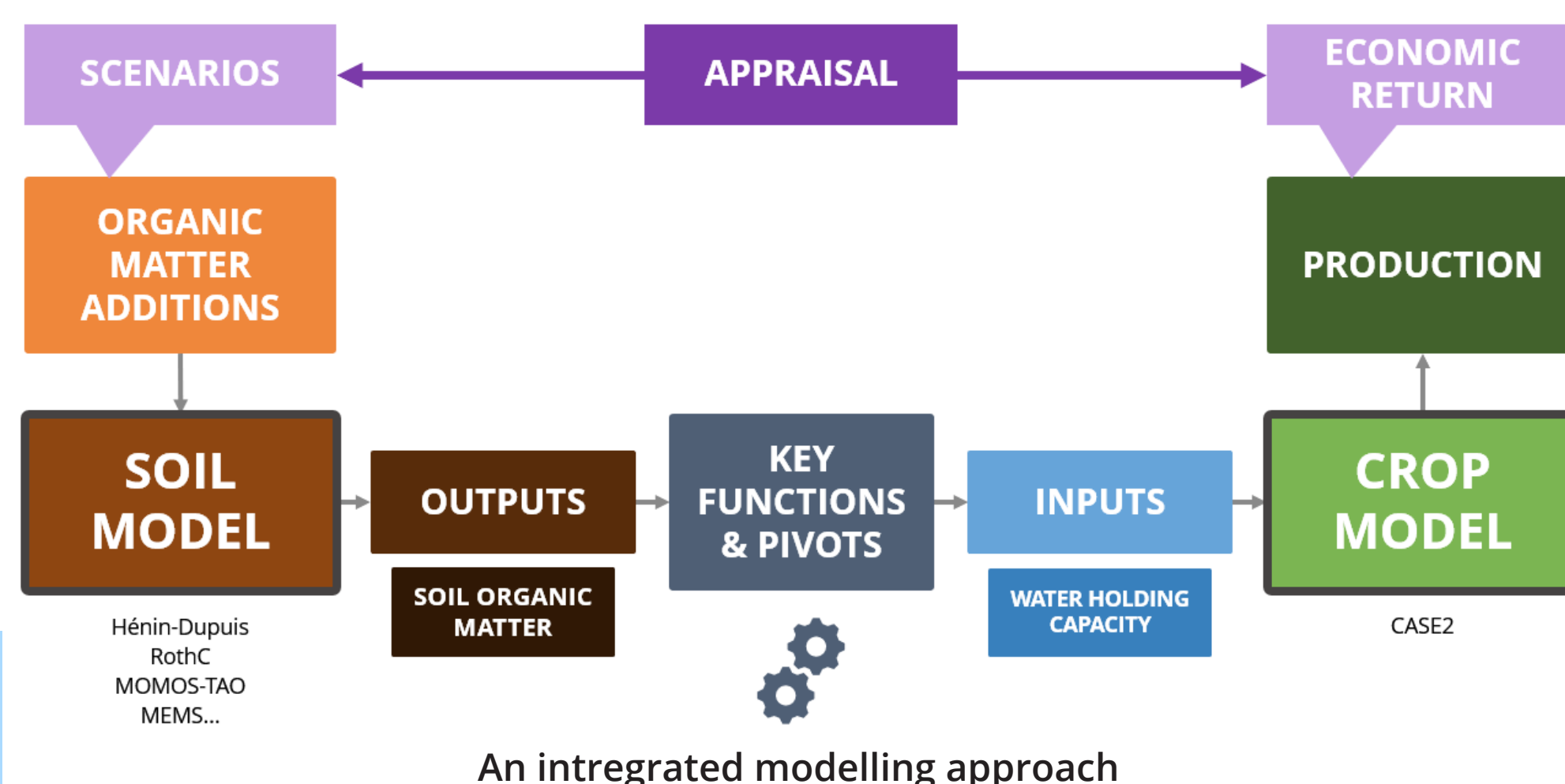
Results are consistent with the hypothesis:

- SOM declines during the first years
- Increase on the long-term but does not reach initial level



COUPLING MODELS

To assess the relationships between SOM and cocoa productivity, soils model of ncreasing complexity will be coupled to a cocoa physiological model.



The availability of soil water is one of the major determinants of cocoa productivity. Pedotransfer functions will be used to assess the influence of organic additions on soil water holding capacity. Ultimately, the incidence on yields will be estimated using the CASE2 model.

NEXT STAGES OF THE PROJECT

- Completion of a meta-analysis on SOM dynamics in cocoa
- Additional sampling campaign with complementary variables
- Experimentation and validation of models
- Formulation and evaluation of soil fertility restoration scenarios.

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