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The INSSICCA research project: INnovative Strategies to establish Safe livestock rearing systems In Chlordecone Contaminated Areas

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Context of the on-going research project

The chlorinated polycyclic ketone pesticide chlordecone (CLD, CAS: 143-50-0) was used from 1971 until 1993 in the French West Indies to fight against the banana black weevil (*Cosmopolites sordidus*). It is estimated that 255 tons of CLD have been widespread in these areas during these 22 years. The first public health concern arose in 1999 with the characterization of CLD pollution in spring and tap waters, followed in 2002 by the first report of contamination in edible roots. CLD is currently a well-known contaminant in the French West Indies, with indubitable effects on human health such as higher prevalence of prostate cancer, or delays in cognitive, visual, and motor development in young children.

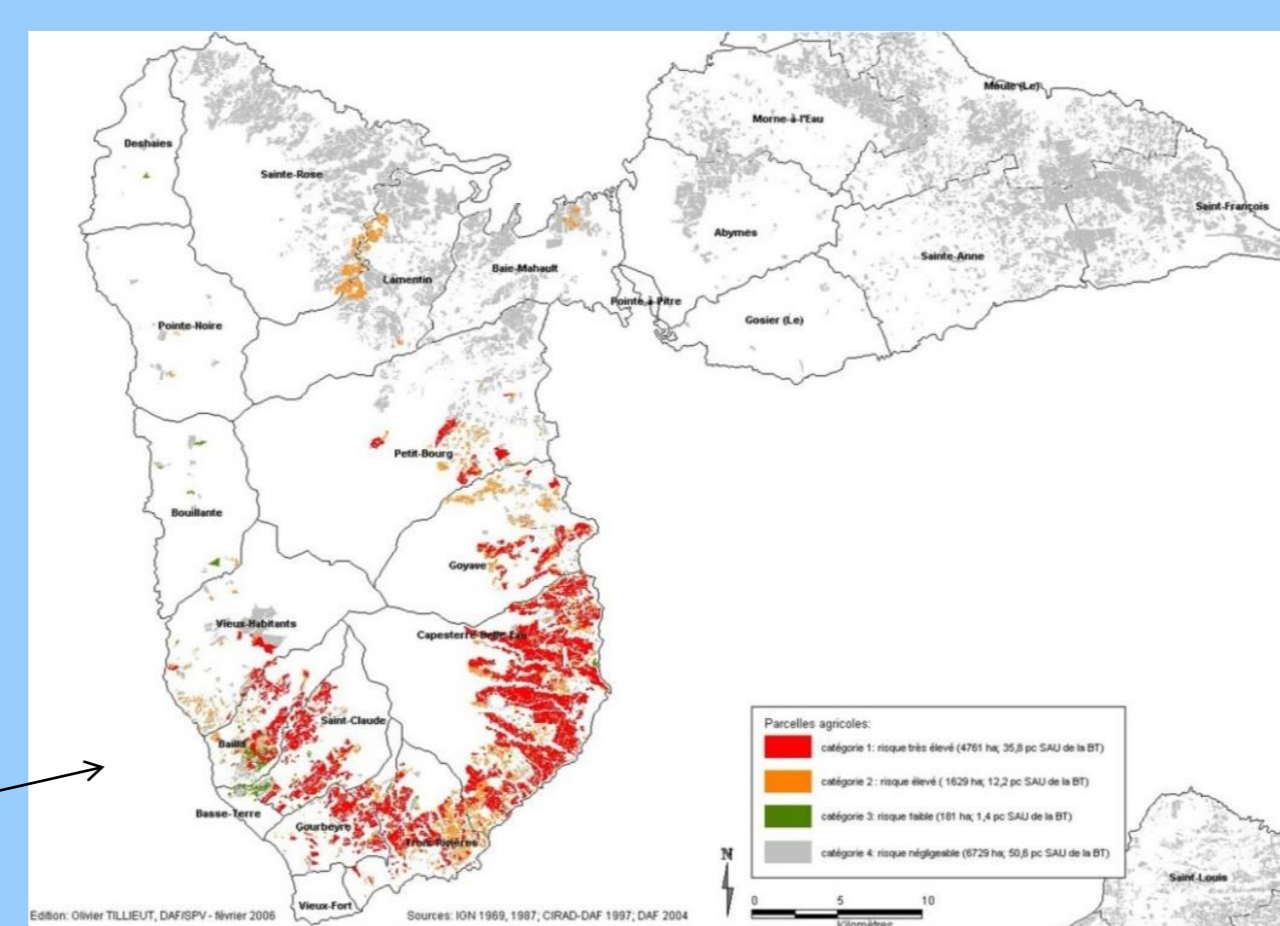
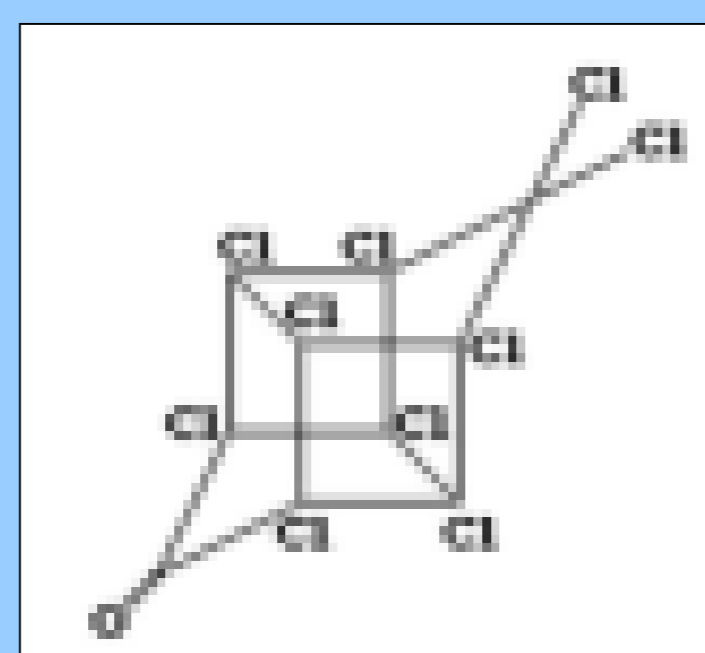
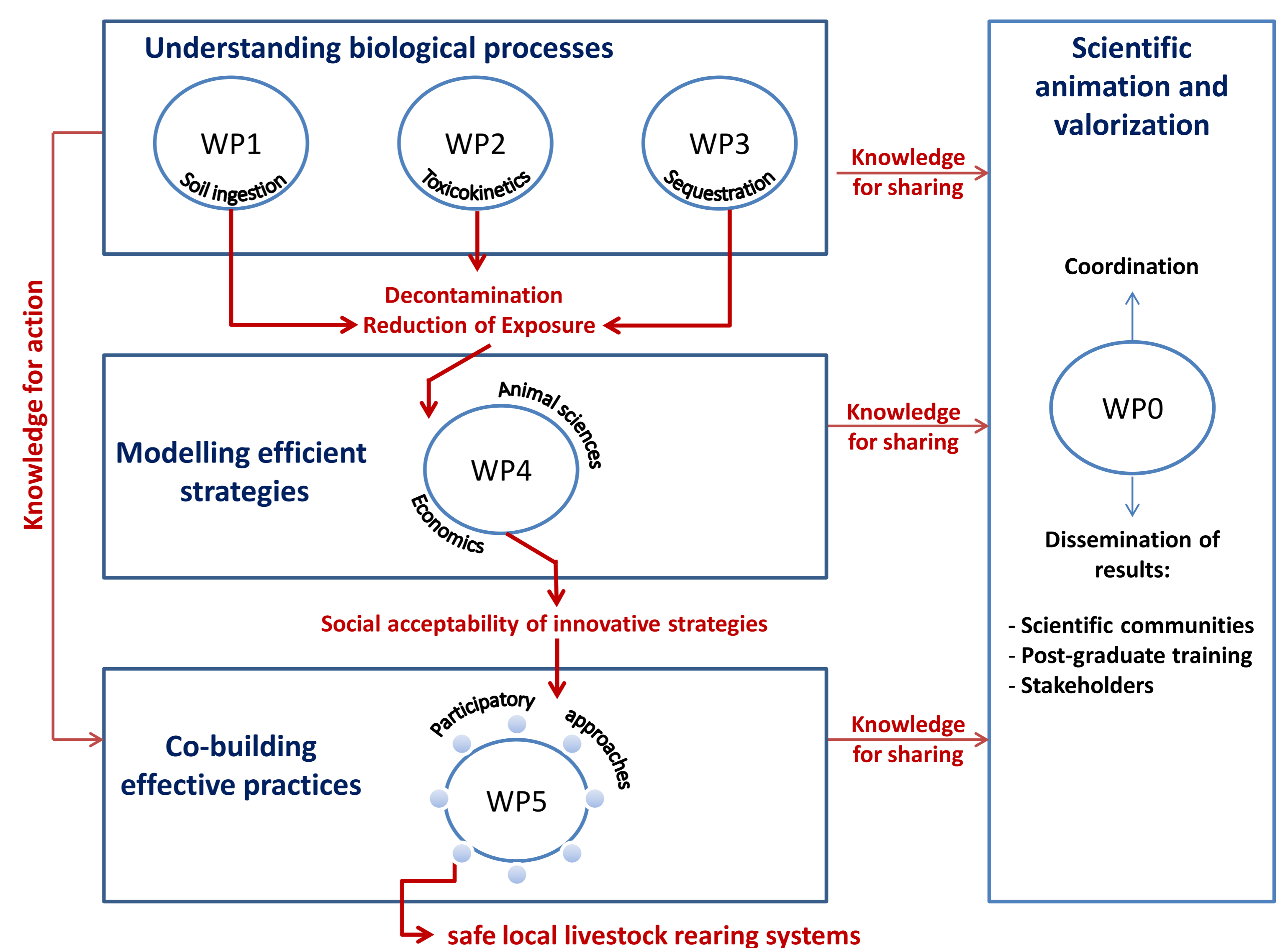
About 1/4 of the total agricultural acreage of the two French overseas departments (Guadeloupe, Martinique) are moderately to heavily polluted. As CLD is persistent in soil, the local farmers have to deal with a long-term contamination of eco- and agro-systems. Although the European regulations are protective for consumers by avoiding commercialization of contaminated products through the application of Maximum Residue Levels (MRL), there is a real need for innovative actions to prevent food contamination. The national survey plans carried out since 2008 in slaughterhouses revealed unexpected contamination of animal products. In fact, CLD residues were detected in about 1/3 of bovine carcasses which originated from CLD contaminated areas, where 6 to 9% were above the Maximum Residue Limit set by the European Union (MRL = 100 µg/kg fat, CE 839/2008).

Objectives of the research project

Overall, this research project aims towards evaluating the local animal production systems in terms of livestock exposure to CLD, characterizing the bioavailability of CLD, its behavior and biotransformation in the animal organism, and establishing innovative strategies to bind CLD via dietary non absorbable substances in order to avoid its absorption.

On the basis of the results obtained, safe local livestock rearing systems will be proposed in agricultural areas historically contaminated by CLD, and assessed in terms of economical efficiency and social acceptability (figure 1). This project has the objective to contribute to the "Development of sustainable and innovative production systems to ensure safe food for consumers".

Figure 1. General diagram of the project organization



Preliminary results

In tropical conditions, **ingestion of soil is far from being negligible** but it can be modulated by the forage offer in order to reduce livestock exposure to CLD. Regarding the **potential to bind CLD** in order to limit its absorption, the most promising results are obtained when activated carbon is added and maturated into contaminated soil. Where such approaches cannot be applied, there is a remaining **potential to decontaminate the animals** by applying a depuration period: CLD half lives in the organism are currently established. Such results are of great importance and will allow in a near future to establish innovative safe local livestock rearing systems in agricultural areas historically contaminated by CLD.

Partners and Funding

The partners of this project (INRA URZ Guadeloupe, Université Antilles Guyane Covachim, Université de Franche Comté, LCE, Université de Liège CART-LEAE, Université de Paris Dauphine, LEDa, Université de Lorraine UR AFPA) thank the French ANR (Agence Nationale pour la Recherche) and Préfecture de la Martinique for financial support.