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BOOK OF ABSTRACTS

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From Simulation Game to Early Warning System: an interactive Agent-Based Model to fight coffee rust in Central America

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RATIONALE

Coffee rust is an aggressive disease that infects all coffee plantations in the world. This fungus targets coffee leaves and spreads through release of spores. Its life cycle depends mainly on temperature and humidity. By analysing climatic conditions, coffee institutes issue warnings to producers. But due to lack of reliable data and knowledge, they tend to systematically recommend fungicide applications (chemical treatments), which are not affordable for small producers, let alone the environmental effects. Apart from biophysical factors, there is a clear correlation between rust outbreaks and socio-economic crises linked to coffee and input prices.

METHODS

To anticipate epidemics and implement prevention strategies, we designed an interactive multiplayer simulator. Based on the life cycle of rust and coffee trees, this game simulates coffee production according to climatic conditions and the treatments applied by producer agents. Intended for the coffee institutes, this game aims to generate recommendations for small producers with limited financial resources.

RESULTS

Sessions held in several countries in Central America showed wide disparities in results, even though the participants were experts in coffee and rust. By making players aware of the technical, economic and labour restrictions of small producers, participants realize that it is impossible to systematically apply fungicides. They are then obliged to rationalize their recommendations and adapt them to local conditions, which require accurate and continuous information on climate and local socio-economic context.

CONCLUSIONS& PERSPECTIVES

By highlighting the importance of communication between countries, this game aims to structure a regional network of meteorological and agricultural institutes. In order to find adaptive control strategies, it is also necessary for countries to exchange information on rust severity levels. The ABM underlying this game continues to be improved and will ultimately become a central tool of a regional early warning system. A Smartphone application will then allow customized recommendations to producers.

Keywords: Coffee rust; Agent-Based Modelling; Role-playing Games; Hybrid model; Early Warning System