



Tropentag, October 11-13, 2006, Bonn

“Prosperity and Poverty in a Globalised World—  
Challenges for Agricultural Research”

## Analysis of Diverging System Perspectives for Achieving Sustainable Agricultural Production

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### Abstract

Sustainable agricultural production provides an important contribution for improving farmer's livelihood. It also includes proper handling of pesticides to increase productivity and reduce health and environmental risks. Educational programs to improve pesticide handling have not had the expected effect. We consider that diverging system perspectives among farmers and experts hinder the implementation of sustainable agricultural production techniques. We present and discuss the potential of the Mental Model Approach (MMA) for investigating the diverging system perspectives of stakeholders and show first results from an empirical case study of agricultural production in Colombia. We adapted MMA for analysing the differences and misunderstandings between experts and farmers perspectives regarding farmers' livelihood and agricultural system dynamics. 10 experts and 10 farmers were interviewed. The questions included (i) definition of the four livelihood capitals (health, human, physical and natural capital); (ii) the relationship and dynamics among the capitals within farmer's production system; and (iii) the listing of actors in the farmer's agricultural production context. Qualitative and statistical analysis of the data provided a general system and 10 system diagrams for each group. Additionally for each person interviewed the deviation from the general “expert” or “farmer” system was determined. Finally we gained an overall view of all perceptions of the system as well as their divergences and critical tradeoffs regarding their management decisions. Our analyses showed that the system perception differed between experts and farmers in three aspects: (i) capitals definition and ranking with respect to importance for the sustainability of farmers livelihood; (ii) understanding of the system and its dynamics; (iii) importance of the agents in the farmers' agent network. These results suggest that measures solely developed by experts will not have the desired effect as they depart from a different systemic logic than the one farmers have. The comprehension of the mental models of experts and farmers could be extremely valuable for developing measures to improve farmers' agricultural production system leading to a more sustainable livelihood.

**Keywords:** Livelihood, Mental Model Approach, pesticides, sustainable agricultural production