



# Résilience et adaptations des agricultures. Transition agroécologique et souveraineté alimentaire.

4<sup>ème</sup> édition de la Conférence  
Intensification Durable

23 - 25 avril 2024 UCAD (CIGASS), DAKAR, SÉNÉGAL



**S2-23**Communication orale

## **Co-designing legume-based agroecological practices with smallholders in Soudanian zone of Burkina Faso**

Bagagnan Abdoul Rasmane (1\*), David Berre (2), Heidi Webber (3,4), Hamado Sawadogo (5\*), Katrien Descheemaeker (1)

1: Plant Production Systems, Wageningen University and Research, P.O. Box 430, 6700AK Wageningen, Netherlands

2: CIRAD, UPR AIDA, Montpellier, France

3: Leibniz-Centre for Agricultural Landscape Research (ZALF), 15374 Müncheberg, Germany

4: Institute of Crop Science and Resources Conservation, University of Bonn, Bonn 53115, Germany

5: Institut National de l'Environnement et de Recherches Agricoles (INERA), Burkina Faso

Poor soil fertility combined with limited access to fertilizers, leading to soil depletion, causes serious challenges to agriculture in Soudanian zone of Burkina Faso. To face these challenges, this study aims at co-designing agroecological practices. It specifically assesses the agronomic performance of various legume-based diversification options for cropping systems, in both controlled and on-farm settings. We used an iterative approach following the Describe-Explain-Explore-Design (DEED) cycle to co-conceive, test, and co-evaluate agroecological options. We explored the use of farm typologies to distinguish farmers' differing levels of resource endowment and if that altered the suitability of the agro-ecological options. Based on observations from the experimental trial, farmers had the possibility to adapt a cropping system in their own field, and the same agronomic indicators were monitored. The Describe (diagnostics workshop), Explain (demonstration trial), Explore (co-evaluations) and Design (prototyping workshop) activities were conducted for three years, in 2021, 2022 and 2023 in two communities (Nagreonkoudogo and Tanvousse) of the semi-arid zone. The trials of the first year consisted of a randomized Fisher plot of six treatments with four repetitions. One additional treatment was added each year after the prototyping workshop, resulting in eight treatments for the third year. The treatments of the first year included sole cropped sorghum (*Sorghum bicolor* L. Moench), sole cropped cowpea (*Vigna unguiculata* (L.) Walp), 2\*2 lines sorghum-cowpea intercropping, traditional sorghum and cowpea intercropping (intra poquet intercropping), sole cropped *Mucuna* *rajada* and short fallow with *Crotalaria* (*Crotalaria retusa* L.). The land equivalent ratio (LER), an indicator of the added value of intercropping over sole cropping was computed yearly. The results vary by year and across site. The intercropping was not always beneficial over the three years in the two sites with the traditional intercropping performing better than the 2\*2 lines intercropping in general. These agronomic results were compared to farmers' own perspectives in a co-evaluation stage by considering the top three ranked options. Co-evaluation was done through field visit followed by voting at the maturity of cowpea (first co-evaluation) and at the maturity of sorghum (second co-evaluation). During the second year, none of the intercropping options was among the top three according to farmers' ranking in Tanvousse while in Nagreonkoudogo, the 2\*2 lines intercropping was ranked first during the first co-evaluation and second during the second co-evaluation. For the first and second co-evaluation of the third year, only traditional intercropping was ranked third in Nagreonkoudogo. In Tanvousse, only the 2\*2 lines intercropping was ranked second. Adaptations made by individual farmers with respect to the treatment of the trial in their own farm included changes in the number of rows (5%), using improved seed in local cropping system (15%), increased sowing density (55%), reduced sowing density (45%), reduced number of weeding (60%). The highest ranked options were different across communities and co-evaluation periods. Farmers' ranking of the intercropping options were not solely driven by yield expectation emphasizing the heterogeneity of farmers' socio-economic constraints.

Mots clés : Co-design; prototyping; co-evaluation; controlled trial; farmers'trial; adaptations