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RAIZ
Resilience building through Agroecological Intensification in Zimbabwe

Date: Tuesday, 10 February 2026 at 9:00 a.m. (CET)

Venue:

https://univ-reims-fr.zoom.us/j/96898184979?pwd=bLUsG6Plps4M9Ez5FbNgMdfQfGG85V.1

Invitation to Online PhD defense for Abderrahim BOUHENACHE

The RAIZ Project through its implementing partners is pleased to invite you to the public defense of my PhD entitled:

Impacts of climate change on crop production and nitrogen use: a case study with maize under extreme rainfall events in sub-humid Zimbabwe

This PhD thesis was prepared jointly within the UMR FARE (INRAE–URCA) and the UPR AIDA (CIRAD) under the direction of Gwenaëlle LASHERMES and Rémi CARDINAEL and the supervision of Hugues CLIVOT and Sylvie RECOUS.

Members of the Jury:

1.	Lionel Alletto, Research Director, INRAE,	Reviewer
2.	Christine Watson, Professor, Scotland's Rural College,	Reviewer
3.	Shamie Zingore, Research and Development Director, APNI,	Examiner
4.	Marie Launay, Research Engineer, INRAE,	Examiner
5.	Regis Chikowo, Professor, University of Zimbabwe,	Invited

Abstract:

Intra-seasonal rainfall variability and the increasing frequency of extreme dry and wet events threaten rainfed maize production in sub-Saharan Africa. This thesis assesses the effects of rainfall regimes, nitrogen (N) fertilization, and crop residue mulching on productivity, N use, and residue decomposition under subhumid field conditions in Zimbabwe. Experiments show that intra-seasonal rainfall distribution primarily controls yield variability. Heavy rainfall events can increase yield when coinciding with drought periods, whereas mulching has limited effects on biomass, plant N uptake, and soil microclimate. Residue decomposition is strongly constrained by drought, reducing nutrient recycling. ^{15}N tracing revealed very low N recovery by maize under dry and irregular rainfall conditions, with

substantial residual N in the soil at high risk of loss. Overall, these results highlight that the effectiveness of crop management practices strongly depends on rainfall patterns, and that sustainable intensification must account for intra-seasonal variability to enhance the resilience and productivity of rainfed maize systems in sub-Saharan Africa.

Keywords: Climate change, rainfall extremes, mulch, nitrogen, sustainable intensification, sub-Saharan Africa