

SORGNET

**1st EUROPEAN AND WEST AFRICAN SORGHUM
RESEARCH SATELLITE CONFERENCE : OCTOBER 14- 15th**

The Idcard_Sorghum_Researcher Book



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Who : Myriam Adam



Country : France/Burkina Faso (/Cambodge)

Institution / Team : CIRAD, AGAP, Phénotypage et modélisation des plantes dans leur environnement agro-climatique (PhenoMEN)

3 main Research Questions:

- Cropping systems diversification
- Envirotyping
- Ideotype definition for agro-ecological systems

Platforms / tools:

- Crop models (Samara, DSSAT, APSIM)
- G*E analysis

On-going projects (locations):

- McKnight project 3F : Feeding the soil and feeding the cow to feed the people: co-designing agro-sylvo-pastoral systems in sudano-sahelian zone of Burkina Faso
- CLEMATIS: **CoLEarning with Models to Assess diversificaTion Services** West Africa
- DESIRA ASSET : Agroecology and Safe food System Transitions (ASSET) project South East Asia
- DESIRA STAR-FARM: Smart Agro-ecological Transformation of Farming Systems towards Resilience and Sustainability in Middle and Coastal Zones of the Viet Nam Mekong Delta

Who : Myriam Adam



Main partners (Target Regions) :

- INERA (Burkina Faso)
- CERAAS / ISRA (Sénégal)
- IER (Mali)
- Farmers organisation/NGO : AMSP (Burkina Faso), AMEDD (Mali)

Future challenges / Target Regions :

- Use of crop models for envirotyping (TPE definition)
- Identification of relevant plant traits to adapt varieties to future context
- Sustainable intensification of farming systems

Skills available in the team :

- Crop modelling
- Ecophysiology
- Computer science

Who : SOPHIA ALAMI



Country : FRANCE

Institution / Team : CIRAD, AGAP, Genetic and Varietal Innovation

3 main Research Questions:

- Interdisciplinary approach towards sustainable sorghum production systems
- Agroecology methodologica issues : co-construction and inter/transdisciplinarity approach
- Integrative approach to sorghum Value chains : building on diversity from upstream to downstream to ally sustainability and profitability
- **Tools :** Design and facilitation of community of networked projects based on Collective intelligence approach ;
 - Plateforme agroécologique du Niger

On-going projects (locations):

- TAE NIGER (Niger, Burkina Faso) : Tackling **methodological challenges** to design an integrative and collaborative approach for the **implementation of agroecological transition** in the context of local territories prone to ecological and social pressures
 - RUBIS (Indonesia) : **A participatory breeding initiative for resilient rubber cultivation systems** for smallholders in a context of global change.
 - Agroguayule (Occitania France) : Lift the technical and economic barriers of Guayule (natural rubber) cultivation on agricultural and urban wasteland.

Who : Sophia ALAMI



Main partners (Target Regions/Sahel) :

- INERA (Burkina Faso)
- IER (Mali)
- INRAN (Niger)
- Farmers organizations (Niger)
- Sorghum ID (Europe)

Future challenges / Target Regions :

- Building the bases for the development of an integrative approach of agroecology and co-designing of more integrated agroecological systems;
- Use of CI methods to deal with the diversity of academic and nonacademic actors interests, knowledge and empirical to develop more innovative and more consistent agroecological systems;
- The design of integrated value chains embedded in agroecology and valorizing the agrobiodiversity and the local resources

Skills available in the team :

- Genetics and genetics of population
- Breeding
- Agroecology
- Innovation engineering
- Collective intelligence tools and principles
- Bioeconomy

Who : Alain Audebert



Country : Sénégal

Institution / Team : Cirad UMR AGAP

3 main Research Questions:

- Drought adaptation
- Roots
- Phenotyping improvement

Platforms / tools:

- Ecophysiology Platform
- Cirad UAV network

On-going projects (locations):

- DESIRA Abee : breeding programs modernization : West Africa
- DESIRA FAIR : Agroecological Intensification : Sahel
- SustainSahel : Sustainable Intensification : West Africa

Who : Alain Audebert



Main partners (Target Regions) :

- CERAAS / ISRA (Sénégal)
- INERA (Burkina Faso)
- IER (Mali)
- IRD
- ICRISAT

Future challenges / Target Regions :

- Field phenotyping improvement / capacity building
- Breeding program modernization
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Skills available in the team :

- Ecophysiologicalist
- Bioinformatics
- Crop modeler

Who: Lorenzo Barbanti, Italy



Country : Italy

Institution / Team : DISTAL University of Bologna, Field crops for food
& non-food uses

3 main Research Questions:

- Resistance to salinity
- Plant ideotypes and genotypes for food, feed and non-food uses
- Sorghum role and position in cropping systems

Platforms / tools:

- Plant and crop physiology
- Growth chambers, greenhouse, experimental farm

On-going projects (locations):

- Gestfald, ways to control salinity in coastal areas of Northern Italy (regional grant)
- LIFE AgroWetlands II, recently accomplished on the same topic

Who : Lorenzo Barbanti, Italy



Main partners (Target Regions) :

- IVIA, Valencia, Spain
- Dr. Schär, Italy (private partner)

Future challenges / Target Regions :

- Seed/seedling treatments to mitigate salinity effects
- Supplemental irrigation to buffer unpredictable dry spells
- Seed early vigour to advance seeding in Mediterranean areas

Skills available in the team :

- Agronomists
- Eco-physiologists
- Experts in remote sensing and geo-statistics
- Collaboration with breeders/bio-technologists

Country : France

Institution / Team : Grain(e)s team, Agropolymer engineering & emerging technologies (UMR IATE)



3 main Research Questions:

- Dry fractionation processing of cereals pulses and their co-products
- Mechanistic approach linking intrinsic properties to structuring/destructuring processes
- Physical chemistry of interface water in granular media

Platforms / tools:

- Processing of PLANt products with Emergent Technologies (PLANET)
- Spectroscopic/imaging/biochemical analysis of materials during processing

On-going projects (locations):

- Fract&Flour for sustainable mediterranean cereals (UMR IATE, Montpellier)
- SoWallDige : Impact of cell wall on protein digestibility 2021-2023 (Inrae-France)
- Défi Blé Dur 2016-2022 (UMR IATE, Bpi France)

Who : Reine BARBAR

Main partners (Target Regions) :

- UMR AGAP - Genetics
- UR BIA – Cell Wall
- LIBio - Lorraine University – Powder hydration



Future challenges / Target Regions :

- Adapting grinding and fractionation configurations to specific constraints of mediteranean cereals and pulses
- Conception of new functional flours
- Bridging knowledge transfer between research and development by integrating participatory sciences

Skills available in the team :

- Biochemistry
- Nutrition
- Food processing and technology
- Process modelling

Who : Christian Baron christian.baron@cirad.fr



Country : France

Institution / Team : Cirad/Tetis (Territoire Environnement Télédétection Information Spatiale) <https://www.umr-tetis.fr>

3 main Research Questions:

- Simple and robust process-based crop model used by partners
- Scale issues: from field to region with a focus on family farmers
- Risk analysis of climate impacts on crops (from early warning to long term)

Platforms / tools:

- Plot & Spatialised process-based crop model: SARRA-H&O <http://sarra-h.teledetection.fr>
- Ocelet: a *domain specific language* for modelling spatial dynamics

On-going projects (locations):

- Early warning system for food security in West Africa (long-standing partnership with Agrhymet and its partners)
- AgrEco (Mali): Support Project for the Agroecological Transition in the Cotton Zone of Mali (climat adaptation, double usage sorghum)

Who : Christian Baron christian.baron@cirad.fr



Main partners (Target Regions) :

- Agrhymet regional center (Niger) & meteorological centers partners in WA
- National agricultural research centers in WA (SNRA): ISRA/CERAAS (Senegal), INERA (Burkina Faso), IER (Mali)
- National agricultural research center in Brasil: EMBRAPA
- IRD (France), Universities (Grenoble, Paris06&12, Bourgogne)
- World Meteorological Organisation (WMO)

Future challenges / Target Regions :

- Co-production of new indicators (direct/proxy) useful for crop models
- Combine different sources of spatial data in crop models
- Spatio-temporal qualification of model outputs for informational purposes at different scales

Skills available in the team :

- Crop modelling
- Computer science
- Earth observation (remote sensing)
- Artificial intelligence (data mining)

Who : Cécile Barron, France



Country : France

Institution / Team : INRAE, IATE, Grain(e)s team

2 main Research Questions:

- Structure and functional properties of plant materials (cereal grains, grass lignocellulosic biomass) in relation with their ability to be de-structured. Focus at tissue scale.
- How variability within plant material could be identified and monitored in powders

Platforms / tools:

- Processing of PLANT products with Emergent Technologies (PLANET)
- Multispectral imaging, histology

On-going projects (locations):

- GRACE (2017-2022) : Miscanthus dry fractionation and physical properties : Europe
- with AGAP : multispectral imaging to look at sorgho stem variability at tissue scale: France

Future challenges / Target Regions :

- Adapting transformation processing to face increased variability
- How to envision raw matter quality for targeted applications and functions

Skills available in the team :

- Biochemistry, Physicochemistry, interface with nutrition
- Food processing and technology, Process modelling

Who : Berger Angélique



Country : France

Institution / Team : Cirad/ UMR AGAP-institut/DARS

3 main Research Questions:

- Genetic and molecular determinism (Biomass quality, Grain quality)
- Heat recurrent stress
- Identification and functional validation of candidate genes

Platforms / tools:

- Transient transfection tools
- RNAseq analysis tools
- Cloning and CRISPR technology

On-going projects (locations):

- SOKAFI (grain quality) France
- Heat recurrent stress project France
- Nitrosorg : genetic determinism, Genomic prediction for Grain quality (Protein) France

Who : Berger Angélique



Main partners (Target Regions) :

- INRAE

Future challenges / Target Regions :

- Validation of genes network
- Heat stress molecular determinism

Skills available in the team :

- Molecular Biology engineers
- Physiologists
- Collaborators : Ecophysiologist, statisticians

Who : Abdoulaye Beye, France



Country : France, Senegal

Institution / Team : Cirad, AGAP, Diversity Dynamics, Society, Environment

3 main Research Questions:

- Genomic basis of local adaptation
- Population genetic diversity
- Evolutionary genomics

Platforms / tools:

- Population genetics
- Evolutionary genomics

On-going projects (locations):

- AdaptGrass : genomic analysis of crop adaptive diversity for two plant models (France)

Who : Nanna Bjarnholt, Denmark



Country : Denmark

Institution / Team : University of Copenhagen

3 main Research Questions:

- Specialized metabolism and biochemistry
- Sorghum genetic transformation and gene editing
- Fungal disease resistance by detoxification

Platforms / tools:

- Metabolite analyses/metabolomics (LC-MS, GC-MS)
- Metabolite imaging
- Sorghum EMS population with FIND-IT technology

On-going projects (locations):

- Glutathione transferases in specialized metabolism: Involved in dhurrin metabolism in sorghum and disease resistance in wheat (Denmark)
- Crops for the Future: Drought and disease resistance (Denmark)
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Who : Nanna Bjarnholt, Denmark



Main partners (Target Regions) :

- Ian Godwin (sorghum transformation), Brisbane, Australia
- Ana Caño-Delgado (sorghum transformation), Barcelona, Spain
- Ros Gleadow (wild sorghums), Melbourne, Australia
- Dean Riechers (herbicide safeners), Illinois, USA
- Carlsberg Research Lab (EMS population, FIND-IT technology)

Future challenges / Target Regions :

- Sorghum genetic transformation and gene editing
- Identification of relevant fungal pathogens on sorghum
- Cold tolerance, growing sorghum North of the German/Danish border

Skills available in the team :

- Biochemistry, protein expression, enzymology
- Metabolic engineering, molecular biology, RNAseq
- Analytical chemistry, including mass spectrometry imaging
- Collaborators: Protein chemistry, mass spectrometry imaging, plant pathology, protein crystallization, agronomy

Who : Bulent Uzun, Turkey

Country : Turkey

Institution / Team : Akdeniz University, Team Leader

3 main Research Questions:

- Breeding for high sugar content, biomass and plant juice
- Molecular Breeding and Variety development
- Genomic selection using NGS

Platforms / tools:

- Bioinformatics
- QTL Mapping
- Marker development and marker assisted selection

On-going projects (locations):

- QTL mapping and line breeding for high sugar content, plant stalk juice and plant height characters related to bioenergy in sweet sorghum.
- Sweet sorghum silage for biogas plants



Who : Bulent Uzun, Turkey

Main partners / Target Regions

- ICRISAT (India)
- TAGEM (Turkey)



Future challenges / Target regions :

- EU funded projects on extending sweet sorghum in Europe
- Better knowledge about advantages of sweet sorghum silage to maize.
- Sorghum for challenging droughts in temperate regions.
- Sweet sorghum for ethanol production

Team staff :

- Geneticists
- Breeders
- Agronomists
- Bioinformaticians

Who : Concetta Burgarella, Se



Country : Sweden

Institution / Team : Uppsala University, IOB, Human Evolution

3 main Research Questions:

- History of domestication and diffusion
- Diversity and adaptation
- Relationship with human history and genetics

Platforms / tools:

- Platforms: molecular genetics, ancient DNA, greenhouse
- Tools: population and evolutionary genetics

On-going projects (locations):

- CODEV: genetic diversity and relationship with human populations: Africa

Who : Concetta Burgarella, Se



Future challenges / Target Regions :

- Use of historical/ancient DNA

Skills available in the team :

- Archaeologists and anthropologists
- Population geneticists (molecular biology and modeling)
- Bioinformaticians

Who : Magdalena Buschmann

Country : Germany

Institution / Team : KWS SAAT SE & Co. KGaA



3 main Research Questions:

- Breeding of drought and heat tolerant varieties
- Stabilizing of yield
- Herbicide tolerance

Platforms / tools:

- Product management
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On-going projects (locations):

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Who : Caroline Calatayud, France



Country : France

Institution / Team : CIRAD, AGAP Institut, Adaptive Development of Rice and Sorghum

3 main Research Questions:

- Identification and functional validation of candidate genes
- Genetic and molecular determinism

Platforms / tools:

- Transient transfection tools
- RNAseq analysis tools
- Cloning and CRISPR technology
- Genotyping tools

On-going projects (locations):

- Analysis of the genes involved in the development of secondary wall France
- Nitrosorg : genetic determinism, Genomic prediction for Grain quality (Protein) France

Who : Caroline Calatayud, France



Main partners (Target Regions) :

- INRAE

Future challenges / Target Regions :

- Validation of genes network

Skills available in the team :

- Molecular Biology engineers
- Physiologists
- Collaborators : Breeders

Who : Stephane Corn



Country : France

Institution / Team : IMT Mines Alès – LMGC Montpellier
/ Durability of eco-Materials and Structures (DMS)

3 main Research Questions:

- Mechanical behaviour assessment of plant fibres and their composite materials
- Development of model-based techniques to evaluate the viscoelastic properties and the durability of natural materials (plant fibres, wood, geomaterials)
- Design and modelling of eco-materials and structures for industrial applications

Platforms / tools:

- Mechanical and microstructural characterization (static/dynamic tests, AFM,...)
- Computational simulation to predict the multi-physical response of materials

On-going projects (locations):

- Agrobranche : Valorisation of wood branches from agroforestry in the bio-based material and chemistry sectors (France)
- ANR DEMMEFI: Post-fire structural assessment of historical buildings : modelling the actual stability of Notre-Dame de Paris (France)
- Projects on the morphological and mechanical characterization of plant fibres

Who : Stephane Corn



Main partners (Target Regions) :

- Biologists, Geneticists (INRAe, CIRAD)
- Wood Mechanics (LMGC /Bois)
- Building geomaterials (LMDC, I2M)
- Mechanics of Materials (MecaMat consortium, France)
- European network on polysaccharides ([EPNOE](#), 40 universities in Europe in various field: (physico-)chemistry, biology, mechanics)

Future challenges / Target Regions :

- Valorise in eco-friendly applications the diverse physical features of natural materials
- Build up predictive models relating the functional properties of bio-based composite materials to their microstructure
- Develop fast measurement techniques to assess the viscoelastic properties of wood and building materials

Skills available in the team :

- Mechanical characterization, measurements and design of experiments
- Multi-physical and multi-scale modelling, predictive simulation
- Microstructural analysis

Who : Pierre-Emmanuel Courty



Country : France

Institution / Team : INRAE, Agroecology, Interactions Plant Microbes

Main Research Questions:

- Transport in arbuscular mycorrhizal symbiosis
- Plant-plant interactions through common mycorrhizal networks
- Nutrient fluxes
- Transcriptomics in mycorrhizal symbiosis
- Holobiont functioning and microbial diversity

Platforms / tools:

- Genomic platform
- Bioinformatic platform

On-going projects (locations):

- Holoviti : Study of the grapevine holobiont in a decline context (2018-2022) (France)
- SymbioPea: Biological markers of mycorrhizal symbiosis in pea (2020-2022) (France)
- MicroInput : Soil microorganisms service providers improve plant phosphate nutrition (2019-2022) (France)

Who : Pierre-Emmanuel Courty



Main partners (Target Regions) :

- University: Burgundy, Toulouse, Nice (France), Pisa (Italy)
- INRAE: Bordeaux, Versailles, Nancy (France)
- CIRAD/IRD (France)
- Private partners : PremierTech, Agrico (France)
- Institute for Agricultural Engineering : Terre Inovia (France)

Future challenges / Target Regions :

- Symbiotic potential of soil microorganisms
- Prediction of emerging properties of symbiotic communities
- Engineering microbes
- Levers to act on microbial communities

Skills available in the team :

- Molecular biologists
- Microscopy (confocal, electronic)
- Mass spectrometry
- *In vitro* Cell Culture
- Bank of Glomeromycota (arbuscular mycorrhizal fungi)
- Collaborators : Geneticists, Ecophysiologicals, statisticians, Biochemists... 29

Who : Justine DANEL, FRANCE



Country : FRANCE

Institution / Team : ARVALIS – Institut du végétal, Quality and promotion,
Monogastric nutrition unit

3 main Research Questions:

- Evaluate raw materials and byproducts used in pig and poultry feed to optimize their nutritional value, improve their sanitary quality and reduce the environmental releases
- Evaluate the annual quality of raw materials through surveys (FranceAgriMer partnership)

Platforms / tools:

- Digestibility facilities for pig and poultry
- Automatic feeders for individual monitoring of feed intake in group-housed weaned piglets (in development for chickens)

On-going projects (locations):

- VALOAAVAL : evaluation of protein-rich raw materials in poultry and pig nutrition
- DIAPO : use of *in vitro* measures to predict amino acid digestibility in pig

Who : Justine DANEL, FRANCE



Main partners (Target Regions) :

- INRAe (PEGASE, BOA, PEAT ; France)
- Terres Inovia / Terres Univia (France)
- ITAVI (France)
- IFIP (France)
- FNPSMS (France)
- INTERCEREALES (France)
- Feed manufacturers, ...

Future challenges / Target Regions :

- Developp numeric tools in animal nutrition facilities
- NIRS to predict digestibility values on fresh excretas

Skills available in the team :

- Feed scientist
- Near Infra-Red Spectrometry scientists
- Collaborators : Chemists, Statisticians, Food Scientists, Agronomist, Economist

Who : Fabien DE BELLIS



Country : France

Institution / Team : CIRAD, AGAP institute, Genetic and Varietal Innovation

3 main Research Questions:

- Genetic and molecular determinism (forage quality, grain quality, drought stress tolerance)
- Developing genomic markers for breeding
- Breeding scheme and strategy optimization

Platforms / tools:

- Bioinformatics (bash, R)
- Genotyping (GPTR platform - <https://www.gptr-lr-genotypage.com/>)

On-going projects (locations):

- DESIRA Abee : breeding programs modernization : West Africa
- Nitrosorgh : genetic determinism, Genomic prediction for Grain quality (Protein) (2022-2025) : France
- Phenovigour : a new hypothesis to explain heterosis : France

Who : Fabienne Dejean



Country : FRANCE

Institution / Team : GEVES

3 main Research Questions: field experimentation

- DUS Studies for National Catalog inscription
- DUS Studies for variety protection (INOV/OCVV)
- Varieties testing and botanical description

Platforms / tools:

- 5000 m2 sorghum platform

On-going projects (locations):

- 2 identical trials: Montpellier (34) and Surgères (17)

Who : Fabienne Dejean



Main partners (Target Regions) :

- Groupement d'Intérêt Public GIP: INRAE, Ministère de l'Agriculture, GNIS
- CTPS, INOV, OCVV

Future challenges / Target Regions :

- Integration of phenotyping on field
- Successful field trials

Skills available in the team :

- Observations abilities, botanical skills

Who : Monique Deu, France



Country : France

Institution / Team : CIRAD, AGAP, Dynamics of diversity, societies and environments

3 main Research Questions:

- Domestication and gene flow with wild pool
- Spatio-temporal analysis of the crop diversity at different scales (from the field to the WA region)
- Preservation and use of diversity
-

Platforms / tools:

- Population and evolutionary genetics

Previous partners / Target Regions

- CERAAS / ISRA (Sénégal)
- INERA (Burkina Faso)
- IER (Mali)
- INRAN (Niger)
- IRAG (Guinea)

Who : Hugues de Verdal, France

Country : France



Institution / Team : CIRAD, AGAP-GIV

3 main Research Questions:

- How to design innovative breeding schemes?
- How to optimize existing breeding schemes to increase genetic gains?
- How can we contribute to the implementation of these innovative devices?

Platforms / tools:

- Quantitative genetics
- Population and evolutionary genetics

On-going projects (locations):

- Joined the team on June 1st, no project of my own right now
- Expertise in quantitative genetics of fish and chicken feed efficiency (from my past life)

Who : Hugues de Verdal, France



Main partners (Target Regions) :

- In development

Future challenges / Target Regions :

- Breeding program modernization in West Africa
- Use of "base" molecular markers for diversity management, crossbreeding verification, monitoring of major genes

Team staff :

- Geneticists
- Breeders
- Collaborators : Ecophysiological, statisticians, Material and Energy Scientists, Food and Feed Scientists

Who : Julie Dusserre, France



Country : France

Institution / Team : CIRAD / AIDA (Agroecology and sustainable intensification of annual crops)

3 main Research Questions:

- Development of diagnostic and evaluation tools to assess the functioning of cropping systems
- Varietal evaluation and identification of adaptive traits
- Analysis of ecological processes and identification of technical levers

Platforms / tools:

- Tools and methods for measuring crop functioning and indicators of nitrogen status in the field
- Simulation models of crop functioning (DSSAT, STICS)

On-going projects (locations):

- FAIR (Fostering an Agroecological Intensification to improve farmers' Resilience in Sahel), DeSIRA (Burkina Faso)
- 3F (Feeding the soil and feeding the cow to feed the people: co-designing agro-sylvo-pastoral systems in sudano-sahelian zone of Burkina Faso), foundation McKnight
- CGIAR Research Program (CRP) Grain Legumes and Dryland Cereals, Co-leader of cluster 3.1 Innovations for managing abiotic and biotic stresses (Burkina Faso)

Who : Dusserre Julie



Main partners (Target Regions) :

- INERA (Burkina Faso)
- Association of farmers AMSP (Burkina Faso)

Future challenges / Target Regions :

Intercropping as a means of agroecological intensification of sorghum-based cropping systems (Burkina Faso)

- Identification of adaptation traits of sorghum to intercropping
- Characterisation of companion plants
- Optimisation of intercropping systems

Skills available in the team :

- Agronomy and ecophysiology
- Entomology
- Biometrics and data management

Lev Elkonin



Country : Russia

Institution / Team : Federal Agricultural Research Centre of the South-East Region / Dep. Biotechnology

3 main Research Questions:

- Development of sorghum lines with improved *in vitro* digestibility of endosperm proteins;
- Investigation of male fertility restoration and development of fertility restorers for new CMS types of sorghum;
- Investigation of apomictic potentials in sorghum

Platforms / tools:

- *Agrobacterium*-mediated genetic transformation;
- Genetic analysis;
- Biochemical methods (PCR; Gel electrophoresis; *in vitro* protein digestibility)
- Microscopy
- Selection in artificial environments

On-going projects (locations):

- Editing gamma- and alpha-kafirin genes for obtaining lines of grain sorghum with improved nutritional values (2019-2021, Russia)
- Development of lines fertility restorers for new types of male-sterility-inducing cytoplasms of sorghum (Russia)
- Development of sorghum and maize lines capable of apomictic mode of reproduction (Russia)

Lev Elkonin



Main partners (Target Regions) :

- Institute of Biochemistry and Genetics, Subdivision of the Ufa Federal Research Centre of the Russian Academy of Sciences, Ufa, Russia
- Russian Research, Design and Technology Institute of Sorghum and Maize, Saratov, Russia
- Institute of Biochemistry and Physiology of Plants and Microorganisms of the Russian Academy of Sciences, Saratov, Russia

Future challenges / Target Regions :

- Understanding genetic mechanisms of male sterility and fertility restoration in new types of CMS in sorghum
- Development of new cultivars and F1 hybrids with improved feed and food value

Skills available in the team :

- Plant biotechnologists (tissue culture; agrobacterium-mediated genetic transformation);
- Geneticists (genetic analysis; PCR);
- Biochemists (protein gel electrophoresis; pepsin *in vitro* digestibility test);
- Cyto-embryologists (embryo sacs isolation; cytological analysis of ovule and pollen development)

Who : Céline GELOT – GEVES



Country : France

Institution / Team : GEVES – SEV (Secteur d'Etude des Variétés)

3 main Research Questions:

- Variety assessment for the registration on the national list (CTPS)

Platforms / tools:

- VCUS trials

On-going projects (locations):

- VCUS trials : France entière
- Nitrosorgh : genetic determinism, Genomic prediction for Grain quality (Protein) (2022-2025) : France



Main partners (Target Regions) :

- Breeders
- Arvalis
- External provider for VCUS trials
- INRAE
- CIRAD
- BIOGEVES

Future challenges / Target Regions :

- Assess varieties adapted to framework and climatic changeover (less water, higher temperatures, climate accident tahn wind...)
- Integrating Crop Growth Models

Skills available in the team :

- Varietal assesement

Who : Aude Gilabert



Country : France

Institution / Team : CIRAD / AGAP Institute / Dynamics of diversity, societies and environments

3 main Research Questions:

- Evolution of cultivated plants
- Influence of the environments on the distribution and evolution of the genetic diversity of cultivated plants

Platforms / tools:

- Evolutionary genetics
- Landscape ecology
- Bioinformatics

On-going projects (locations):

- Geographical origin of the cultivated sorghum

Who : Aude Gilabert



Main partners (Target Regions) :

- Study area: West Africa

Future challenges / Target Regions :

- Adapt landscape genomics / spacialized approaches to cultivated plants

Skills available in the team :

- Geneticists , breeders, evolutionists
- Sociologist
- Bioinformaticians



Country : France

Institution / Team : INRAE, AGAP, Phenomen team (Phenotyping and Modeling plants in their agro-climatic Environment)

3 main Research Questions:

- Understanding plant responses to drought and temperature stresses.
- Analysing plant recovery after heat or drought stress with a multi-scale approach.
- Analysing plant stress « memory » during a recurrent stress scenario (such as successive heat waves) with a multi-scale approach.

Platforms / tools:

- CIRAD greenhouse and growth chambers facilities
- AGAP Ecophysiology platform
- AGAP plant imaging platform
- AGAP Plant Biochemistry platform

On-going projects (locations):

- Mirrors : Modelling sorghum responses to repeated stresses DIGIT-BIO 2021 (with data from France, Senegal, Burkina Faso...)
- Memoleaf : Analysing the effect of recurrent cold stress during sorghum vegetative development. (France)



Main partners (Target Regions) :

- UMR EVA (Caen, France) – Plant Ecophysiologicalist
- UMR LEPSE (Montpellier, France) – Plant Ecophysiology
- GIV team in AGAP (Montpellier, France) – Geneticist, Breeders

Future challenges / Target Regions :

- Identifying heat stress « signatures » that are stored in plants during a first stress and mobilized for the next stressing event (priming and acclimation or memory).
- Improving crop models for yield prediction when plants are grown with recurrent heat waves.

Skills available in the team :

- Developmental biology
- Ecophysiology
- Crop Modelling,
- Statistical modelling, Machine learning

Who : Alexandre Grondin



Country : Senegal

Institution / Team : IRD, UMR DIADE, Cereal Root Systems team

3 main Research Questions:

- Root ideotypes for crop adaptation to low input environments
- Genetic determinants controlling root architectural and anatomical traits
- Root and shoot coordination improved water use

Platforms / tools:

- Quantitative genetics
- Functional genomics
- Field root phenotyping
- Greenhouse and field water use phenotyping

On-going projects (locations):

- PlastiMil: Root plasticity in pearl millet (France-Senegal)
- Anatomics: Genetic determinants of beneficial root traits for drought tolerance (UK, France, Senegal)
- GenMil: Development of a structure-function model for pearl millet (USA, France, Senegal)
- ICARUS: transpiration restriction to improve crop adaptation to future climate (France, India, Senegal)

Who : Alexandre Grondin



Main partners (Target Regions) :

- CERAAS / ISRA (Sénégal)
- ICRISAT (Niger and India)
- University of Nottingham (Senegal)
- University of Penn State (Senegal)

Future challenges / Target Regions :

- Develop high-throuput field phenotyping tools
- Develop and stabilize diverse genetic materials (BBNAM)
- Introduction of QTLs for better water and nutrient acquisition/use into breeding programs

Skills available in the team :

- Physiologist
- Modellers
- Geneticist

Who : Frédéric GUEDJ



Country : France

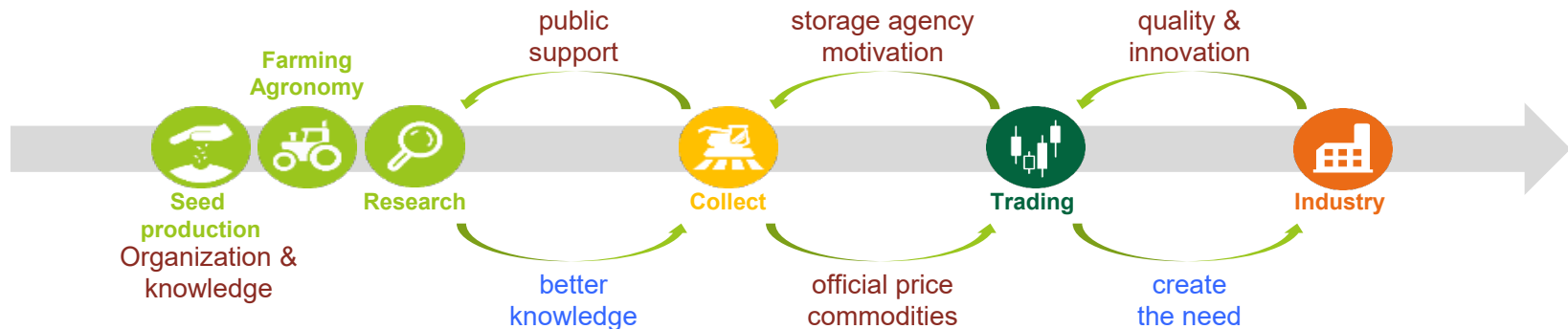
Institution / Team : Lidea Seeds // Market Sorghum Development Manager

Description: Marketing, communication, portfolios, connexion between market and research, market analyses & strategy, close to processors (increase knowledge of producers) and agronomy (increase knowledge of farmers)

Territory: Europe (and World)

SORGHUM STRATEGY IN EUROPE

- Build an “European sorghum organize chain” - Main targets:
 - Stimulate processors (industry) by better knowledge of the usages & local outlets initiatives to secure the European chain
 - Motivate storage agencies (by increase production) & traders (official Sorghum price commodities) to push by real needs
 - Explain key cultivation stages to farmers (Best Farmers cultivation knowledge)
 - Develop image as Lidea Sorghum expert & use Sorghum-ID promotion
 - Develop/link with research public initiatives (INRA, CIRAD, ARVALIS...)



Who : Bettina I.G. Haussmann

Country : Germany

Institutions / Team : University of Hohenheim, McKnight Foundation Collaborative Crop Research Program, KWS Saat SE & Co. KGaA

3 main Research Areas:

- Heterotic grouping and hybrid breeding
- Low-P adaptation
- Participatory plant breeding

Platforms / tools:

- Selection strategy
- Farmer Research Networks

On-going projects (locations):

- West Africa Community of Practice of the McKnight Foundation Collaborative Crop Research Program (Mali, Burkina Faso, Niger), with various projects including research on sorghum
- **Seeds for Zambian Incomes and Livelihoods (SeZIL, Zambia)**, includes maize, sorghum, sunflower and legumes
- Single-cross hybrid prediction using distinct mating designs for sorghum product development in Kenya



UNIVERSITY OF
HOHENHEIM

COLLABORATIVE
CROP RESEARCH
PROGRAM

McKNIGHT FOUNDATION



Who : Bettina I.G. Haussmann



Main partners (Target Regions) :

- West Africa: ICRISAT, IER, INERA, INRAN, FUMA Gaskiya, Mooriben, ULPCD, AMSP, other farmer organizations, SMIL
- Zambia: KWS Saat, ZARI, Good Nature Agro, HAFL
- Kenya: KWS Saat, ICRISAT, Agventure

Future challenges / Target Regions :

- Breeding for agroecological transitions/ ag-Systems-oriented breeding
- Yield stability in variable and changing climates
- Public –private partnerships and smallholder-inclusive seed business models

Skills available in the team :

- Quantitative genetics and selection theory
- Participatory breeding / participatory variety selection approaches

Who : Eugénie Hébrard



Plant
Health
Institute
Montpellier



Country : France

Institution / Team : IRD, PHIM, Virus/Cereal Interactions in Tropical Agroecosystems

3 main Research Questions:

- Epidemiosurveillance (Detection, Diversity, Evolution)
- Viral ecology (Co-infection, Reservoirs, Vectors, Agricultural Practices)
- Contribution to resistance screening and durability (Molecular Mechanisms of Virulence/Adaptation)

Platforms / tools:

- molecular lab / serological and molecular detections (including HTS)
- greenhouses / inoculations and experimental evolution

On-going projects (locations):

- CRP GLDC (Burkina Faso)
- MOPGA post-doctoral contract (Togo)

Who : Eugénie Hébrard



Plant
Health
Institute
Montpellier



Main partners (Target Regions) :

- INERA - LMI Patho-Bios
- Togo - ITRA

Future challenges / Target Regions :

- Emergence and Prevalence of viral diseases
- Host range specificity and Interactions of cereal viruses
- Resistance durability and Viral adaptation

Skills available in the team :

- virology and phytopathology
- epidemiology and phylodynamics
- resistance genetics

Who : Sylvie Jaffuel



Country : France

Institution / Team : CIRAD, AGAP, Phenomen team (Phenotyping and Modeling plants in their agro-climatic Environment)

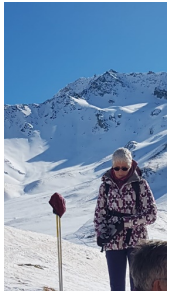
3 main Research Questions:

- Understanding anatomical structure of cell wall and responses to drought
- Analysing link between Anatomical, Biochemistry and Biomass end uses
- Analysing anatomical roots sorghum variability link to different soil statut (Aerenchym formation)

Platforms / tools:

- CIRAD greenhouse and field
- AGAP Ecophysiology platform
- AGAP plant imaging platform
- AGAP Plant Biochemistry platform

Who : Sylvie Jaffuel



Main partners (Target Regions) :

- UMR IATE (Montpellier, France) – Plant Biochemistry
- IGPB (Versailles, France) – Plant Biochemistry
- GIV team in AGAP (Montpellier, France) – Geneticist, Breeders
- DAR team in AGAP (Montpellier, France)-Geneticist

Future challenges / Target Regions :

- Characterize the principal anatomical traits link to biomass ends use
- Identify the relation between the different scales (cell, organ and plant level)
- Improving crop models for biomass prediction and ends use
- Characterize the biology of roots sorghum associated to different environments

Skills available in the team :

- Developmental biology
- Ecophysiology
- Crop Modelling

Who : Laurent LAPLAZE



Country : France

Institution / Team : IRD, UMR DIADE, Team Cereal Root Systems (CERES)

3 main Research Questions:

- Identification of root traits (including microbiome interactions) for improved yield and resilience to abiotic stress in cereals
- Genetic mechanisms
- Link between root traits and forage and seed quality

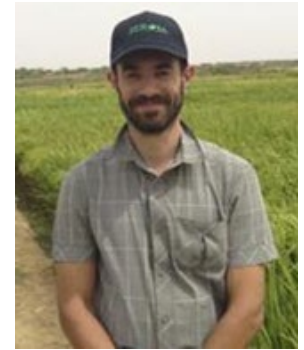
Platforms / tools:

- Phenotyping platform
- Histology/cell biology
- Modelling incl. gene regulatory networks

On-going projects (locations):

- ANR RootAdapt: root traits & tolerance to stress, France and Senegal
- ANR PlastiMil: root architectural & anatomical traits plasticity, France & Senegal
- Anatomics: Genetics of root anatomical & architectural traits, Senegal

Who : Laurent LAPLAZE



Main partners (Target Regions) :

- CERAAS / ISRA (Senegal)
- Université Cheikh Anta Diop (Senegal)
- University of Nottingham (West Africa)
- Pennsylvania State University (West Africa)
- CIRAD (West Africa)

Future challenges / Target Regions :

- Target root & rhizosphere traits in crop breeding, West Africa

Skills available in the team :

- Root development
- Root – microbe interactions
- Ecophysiology/phenotyping
- Modelling

Who : Florian Larue



Country : France

Institution / Team : CIRAD, AGAP, PhenoMEn

3 main Research Questions:

- Definition of environmental stress typologies by crop modeling
- Identification of target adaptive traits to be mobilized for crop breeding
- Integrating Crop Growth Models with Genome-to-Phenotype models

Platforms / tools:

- Crop models : Ecomeristem, Samara, STICS, DSSAT
- Deep Learning

On-going projects (locations):

- DESIRA Abee : breeding programs modernization : West Africa

Who : Florian Larue



Main partners (Target Regions) :

- CERAAS / ISRA (Sénégal)
- INERA (Burkina Faso)
- INRAN (Niger)

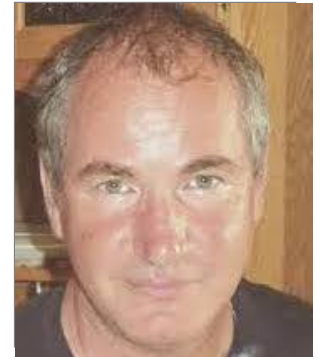
Future challenges / Target Regions :

- Model assisted ideotype definition
- TPE analysis according to biotic/nutritionnal stresses
- Deep Learning x Crop Growth Models

Skills available in the team :

- Ecophysiology
- Crop modelling
- Computer science/Mathematics/Statistics
- Phenotyping
- Biochemistry

Who : Christian Leclerc, France



Country : France

Institution / Team : Cirad, Agap – Crop diversity dynamics, societies, and Environments (DDSE team)

3 main Research Questions:

- How farmers knowledge and practices contribute to shape crop genetic diversity ?
- How crop diversity management related to other aspects of the social life (economical, juridical, or political)
- How social anthropology can help developing operational interdisciplinary approaches of crop diversity management and conservation

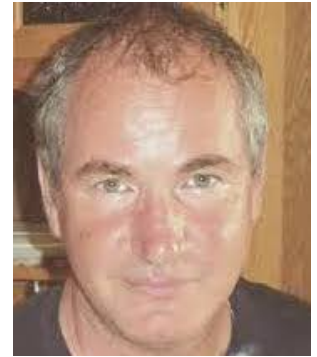
Platforms / tools:

- R statistic & mapping tools

On-going projects (locations):

- Seed attach – farmers' seeds as perceive by farmer - Senegal
- Cowpea square – farmer based participatory breeding program - Niger
- Dynaversity – Genbank management and crop diversity dynamics - Europe
- Paie – Farmer organisation and agroecology - Niger

Who : Christian Leclerc, France



Main partners (Target Regions) :

- African Farmers organisations : AOPP (Mali), FUGPN-Mooriben (Niger), Fuma Gaskiya, RSPSP (Niger), RSPSP (Senegal)
- African National organisations : ISRA/CERAAS (Senegal), IER (Mali), INRAN (Niger), INERA (Burkina-Faso)
- Academic partners : CNRS, INRAe, IRD, Université Dan Dicko Dankoulodo de Maradi (Niger)

Future challenges / Target Regions :

- Monitoring crop diversity dynamics in space and time
- Crop distribution modelling based on social factors

Skills available in the team :

- Farmer variety and crop diversity inventory using free listing method
- Cultural consensus approach
- Ethnographic survey

Who : Nicolas Le Moigne



Country : France

Institution / Team : IMT Mines Alès – Polymers, Composites & Hybrides

3 main Research Questions:

- Plant selection and their key properties for material applications
- Processing of plants into polymer and composite materials
- Development of bio-based composite (micro)(nano)structures

Platforms / tools:

- Processing tools for (bio-based) polymers and composites
- Microstructural, physico-chemical, thermal and mechanical characterization tools

On-going projects (locations):

- Agrobranche : Valorization of wood branches from agroforestry in the bio-based material and chemistry sectors (France)
- ProActif: flax shives based products for functional injectable thermoplastic composites (France)
- Projects on the morphological and mechanical characterization of plant fibres
- Projects on the processing of lignocellulosic and (micro)algae based composites

Who : Nicolas Le Moigne



Main partners (Target Regions) :

- Biologists, Geneticists (INRAe, CIRAD)
- Biotechnology (CEA Cadarache)
- Biomass processing / grinding (FRD, IATE)
- Private partners : Atelier LUMA, ERANOVA (France)
- European network on polysaccharides ([EPNOE](#), 40 universities in Europe in various field: (physico-)chemistry, biology, mechanics)

Future challenges / Target Regions :

- Valorizing biomass from efficient and sustainable farming systems (agroforestry, biotechnology)
- Defining key characteristics and properties of plants in relation with ideotypes for the development of bio-based materials
- Optimizing processing strategies to build-up eco-friendly bio-based materials

Skills available in the team :

- Materials science
- Materials processing
- Physics / Physico-chemistry
- Mechanics

Who : Valérie Lullien-Pellerin



Country : France

Institution / Team : INRAE, IATE, senior scientist & Grain(e)s team leader, INRAE national expert group on cereals

3 main Research Questions:

- Relationships between grain structure/hardness-biochemical tissue composition, process behavior and flour/semolina properties
- Influence of genotype and environmental effects
- Optimisation of nutritional quality through processing

Platforms / tools:

- Biochemical analysis/tissue markers
- Processing through the PLANET platform

On-going projects (locations):

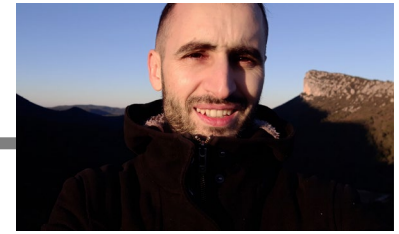
- InnoFood Africa H2020 (VTT, Finland leader) working on African cereal grains & pulses with European & African partners (South Africa, Uganda, Ethiopia, Kenya)



Team staff :

- Biochemists and Physico-chemists
- Process ingeniors

Who : Hamza Mameri



Country : France

Institution / Team : INRAE UMR IATE - Soft Matter Engineering (I2M) ,
(<https://umr-iate.cirad.fr/en/research-teams-pages-under-construction/i2m/presentation>)

Research Questions:

- Link between protein composition, properties -structure and functionality
- Mechanism(s) of protein assembly and breakdown
- Impact of processing on nutritional quality of plant proteins in food matrices

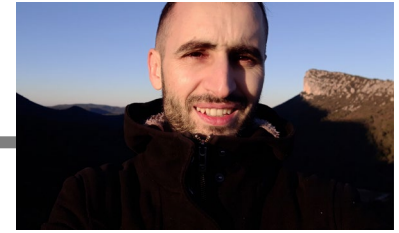
Platforms / tools:

- Plant proteins biochemistry, nutri-functional quality (digestibility)
- Protein biochemistry and physical-chemistry
- Processing of PLANt products with Emergent Technologies Planet

On-going projects (locations):

- SoProDige: Impact of germination process on *in vitro* protein digestibility, (Abdelbost PhD Thesis 2018-2022; Inrae-France)
- SoWallDige : Impact of cell wall on protein digestibility 2021-2023 (Inrae-France)
- Fract&Flour for sustainable mediterranean cereals, 2021-2022 (MSA-France)
- Nitrosorgh: genetic determinism of grain and protein quality (2022-2025, CASDAR France)

Who : Hamza Mameri, France



Main partners (Target Regions) :

- UMR AGAP – Genetics, Imaging
- UR BIA Nantes – Cell Wall biochemistry
- UMR BPMP Montpellier – Proteomics
- UNIRIO (Brasil) – Metabolomics
- Synchrotron Soleil- Protein structure & physico-chemistry
- Eurosorgho (private partner)



Future challenges / Target Regions :

- Guidance of a desired process for a targeted protein functionality
- Improve nutritional quality (proteins)
- Stimulate the development of functional sorghum based foods

Skills available in the team :

- Protein biochemistry, biophysics and physical-chemistry
- Soft matter processing
- Polymer science
- Nutrition
- Numerical simulation

Who : Christian Mertz, France



Country : France

Institution / Team : CIRAD/QualiSud

2 main Research Questions:

- Safe and nutritional quality
- Processing optimization

Platforms / tools:

- Agrifood technology platform
- Physico-chemical characterization laboratory

On-going projects (locations):

Who : Christian Mertz, France



Main partners (Target Regions) :

- Senegal: ITA

Future challenges / Target Regions :

- Africa: promote use of new varieties

Skills available in the team :

- Product quality evaluation: safety, sensory, biophysical & nutritional
- Process modelisation and optimisation

Who : Christian Mestres, France



Country : France

Institution / Team : CIRAD/QualiSud

2 main Research Questions:

- Identifying biophysical traits related to sensorial quality
- Developing/improving grain processes (germination, fermentation...)

Platforms / tools:

- Agrifood technology platform
- Agrifood products physico-chemical characterization laboratory
- Sensorial analysis laboratory

On-going projects (locations):

- Optigerm: Benin/France, processing optimisation of grain germination

Who : Christian Mestres, France



Main partners (Target Regions) :

- Benin: UAC/FSA
- France: Sté Nutrinat

Future challenges / Target Regions :

- Africa: optimize « low-tech » processes adapted to processors conditions and to consumer demand for increasing sorghum market

Skills available in the team :

- Product quality evaluation: safety, sensory, biophysical & nutritional
- Process modelisation and optimisation

Who : Philippe Nacry



Country : France

Institution / Team : INRAE B&PMP, Aqua team

3 main Research Questions:

- Root developemnt under droughth (Arabidopsis ad maize)
- Coordination of root developement and water uptake and transport
- Local and long distance signalling controlling adaptive root development to water deficit

Platforms / tools:

- *In vitro* and hydroponics root phenotyping facilities
- water uptake and transport

On-going projects (locations):

- MIRGA ANR project (France)
- HyArchi (France)
- ReSomsec (France)
-

Who : Philippe Nacry



Main partners (Target Regions) :

- IJPB, IPS2, AGAP, UMR Agroecologie (France)
- U Nottingham (UK)
- Helmholtz Zentrum München (Germany)

Future challenges / Target Regions :

- Gene networks and Root functional characterisation
- Integration at whole plant level
- Modelling

Skills available in the team :

- Plant physiology,
- Root functional characterisation
- Transcriptomics, genetics
- Cellular and sub cellular Imaging
- Water fluxes modelling

Who : Justus Nelle



Country : Kenya

Institution / Team : KWS/Uni Hohenheim

3 main Research Questions:

- Breeding for Cold Tolerance
- Breeding for brewing quality
- Heterotic pool development for East Africa

Platforms / tools:

- Genotyping platform
- High throughput tannin assay
- MAS

On-going projects (locations):

- Phd Heterotic pool development for East African Highlands
- ISIDORE-Variety screening for Diageo
- Line development

Who : Justus Nelle



Main partners (Target Regions) :

- KWS
- Uni Hohenheim
- ICRISAT
- Diageo
- Agventure
- NASECO
-
-

Future challenges / Target Regions :

- Southern Africa
- Food grade sorghum
- Registration

Skills available in the team :

- Breeding
- Seed Production
- Field Trialing
- Molecular Breeding (Germany)

Who : Boris Parent



Country : France

Institution / Team : INRAE, LEPSE, MAGE team (Modelling and Analyses of interactions Genotype x Environment)

Research Question:

Impact of the intra- and inter-specific diversity in contrasted environments

- Ecophysiology and Modelling of plant responses to stresses (drought and heat)
- Phenotyping the genetic diversity (intra / inter-specific) (maize/ sorghum / wheat/ ...)
- Predicting the impact of the genetic diversity

Platforms / tools:

M3P phenotyping platforms

PhenoDyn

PhenoArch

Modelling platforms (APSIM_{maize}, Sirius Quality (wheat), Sirius maize)

On-going projects (locations):

- SolAce (H2020, Europe) Solutions for improving Agroecosystem and Crop Efficiency for water and nutrient use
- Amazing (ANR, France) New maize cultivars: Integrated approach from genomics to breeding



Main partners (Target Regions) :

- Université Catholique de Louvain (UCL, Belgique) : Root phenotyping and Aquaporins
- UMR AGAP (Montpellier, France) – Plant Ecophysiology
- DIAPHEN (Montpellier) et Pheno3C (Clermont, France) Field phenotyping

Future challenges / Target Regions :

- Predicting realistic ideotypes (maize) of dynamic controls of transpiration
- Comparing Sorghum and Maize phenotypic spaces of plant responses to drought and heat stresses and propose inter-specific ideotypes

Skills available in the team :

- Phenotyping
- Ecophysiology
- Crop Modelling



Country : France

Institution / Team : INRAE, IJPB, Germination Physiology, and Plant Observatory platform

3 main Research Questions:

- Genotype and environment interaction on plant metabolite contents
- How to efficiently extract, analyze and treat different plant samples to obtain reliable metabolomic data
- Seed germination and plant dehydration tolerance in relation with biosynthesis genetics of ABA and other hormones

Platforms / tools:

- Plant Observatory platform : MS-based Metabolomics, phenotyping, growth cabinets, proteomics

On-going projects (locations):

- MetSpé SPS: Specialized metabolites of seeds and plants, including sorghum (France)
- PPR SUCSEED: Identification of innovative alternatives for seed protection (France)
- ANR KABAGRAPE: Control of potassium transport in grape berry by abscisic acid (France)



Main partners (Target Regions) :

- Universities of Paris-Saclay, Nantes, Bordeaux /INRAE (France)
- CIRAD/INRAE AGAP (France)
- Nestlé (France)
- LVMH (France)
- University of Brussels (Belgium)
- University of Padova (Italy)

Future challenges / Target Regions :

- Further identification of biomarkers
- Integration of multi omics data

Skills available in the team :

- Metabolomics
- Geneticists
- Physiologists
- Cytologists

Who : David Pot, France



Country : France

Institution / Team : CIRAD, AGAP, Genetic and Varietal Innovation

3 main Research Questions:

- Ideotype definition for different value chains
- Genetic and molecular determinism (Forage quality, Grain quality, drought stress tolerance)
- Breeding scheme and strategy optimization

Platforms / tools:

- Quantitative genetics
- Population and evolutionary genetics

On-going projects (locations):

- DESIRA Abee : breeding programs modernization : West Africa
- Nitrosorgh : genetic determinism, Genomic prediction for Grain quality (Protein) (2022-2025) : France
- Phenovigour : a new hypothesis to explain heterosis : France
- Integration of Ecophysiological and Genetic models : France

Who : David Pot, France



Main partners / Target Regions

- CERAAS / ISRA (Sénégal)
- INERA (Burkina Faso)
- IER (Mali)
- Niger (INRAN)
- Private partners : RAGT2N, Eurosorgho
- Material and Energy partners (CEMEF, C2MA, INRA LBE)
- Food / Feed : SELMET, IATE

Future challenges / Target regions :

- Integrating Crop Growth Models and Genome To Phenotype models for better prediction
- Phenomic selection and integration with Genomic prediction and GWAS
- Breeding program modernization

Team staff :

- Geneticists
- Breeders
- Collaborators : Ecophysiologist, statisticians, Material and Energy Scientists, Food and Feed Scientists



Country : France

Institution / Team : CIRAD, LSTM (Tropical and Mediterranean Symbioses Lab), Montpellier

3 main Research Questions:

- Plant domestication, breeding and symbiotic compatibilities
- Legume seeds varieties and endophytic microbiotes
- Nodulation process in tropical legumes

Platforms / tools:

- General microbiology
- Histo/cytology, microscopy
- Microbial molecular characterization
- Plant responses to microbial inoculation (phytotrons, greenhouses)

On-going projects (locations):

- Mycarom : Mediterranean aromatic plant seeds and their endophytic microbiote
- Biological Resources Centre : Microorganisms for Plant Productivity (CRB Mi3P)
- CRP Grain Legumes / Dryland Cereals



Main partners (Target Regions) :

- LCM /ISRA, Dakar, Senegal
- EMBRAPA Seropedica, Brazil
- James Hutton Institute, Dundee, Scotland

Future challenges / Target Regions :

Subsahelian Africa: cereals/legumes associations

Skills available in the team: LSTM offers a series of platforms ranging from general microbiology (laminar flow hoods, autoclaves, growth chambers...), *in vitro* or greenhouse plant tests (laminar flow hoods, phytotrons, greenhouses), microtomy, histology, microscopy, molecular biology, markers, characterization, on 800 m² of lab facilities, in Montpellier Baillarguet Cirad Campus, with a team of 38 permanent people.

Who : Louis-Marie Raboin



Country : France

Institution / Team : CIRAD/PERSYST/AIDA/Prose

3 main Research Questions:

- Sorghum genetic diversity and integration into the cropping system
- Genetic diversity of plants to be included in sorghum-based cropping systems
- Participatory design of cropping systems mobilizing this biodiversity

Platforms / tools:

- Gampela experimental station, Gonsé participatory evaluation platform
- SPIR Platform INERA Farakouba

On-going projects (locations):

- 3F Mcknight/ Burkina Faso
- DESIRA Fair, Abee/ Burkina Faso
- CRP GLDC/ Burkina Faso

Who : Louis-Marie Raboin



Main partners (Target Regions) :

- AMSP (farmer organisation)/ Burkina Faso
- INERA / Burkina Faso
- Université de Ouagadougou/ Burkina Faso
- IRSAT/ Burkina Faso
-

Future challenges / Target Regions :

- Access to plant genetic resources (inter and intra specific) for cropping system diversification
- Characterization of short, medium and long term services and dis-services of plants and plant combinations

Team staff :

- agronomists
- breeders
- pathologists et entomologists

Who : Jean-François Rami



Country : France

Institution / Team : CIRAD, AGAP, Dynamics of diversity, societies and environments

3 main Research Questions:

- Genetics of complex traits
- Marker assisted breeding
- Data management

Platforms / tools:

- Data/information: BMS, Gigwa, Sorgit
- NIRS
- R/shiny applications and packages

On-going projects (locations):

- DESIRA Abee (Senegal, Niger, Burkina Faso)
- SMIL Sawagen (Senegal, Niger, Burkina Faso, Togo)
- Sorghum genomics toolbox (Senegal, Ethiopia, India, US)

Who : Jean-François Rami



Main partners (Target Regions) :

- CERAAS / ISRA (Sénégal)
- INERA (Burkina Faso)
- IER (Mali)
- INRAN (Niger)
- Integrated Breeding Platform (international)
- Colorado State (USA)
- Private partners : RAGT2N, Eurosorgho

Future challenges / Target Regions :

- Breeding for complex systems (agro-ecology)/ West Africa
- Implementation of modern tools in breeding programs/ West Africa

Skills available in the team :

- Geneticists, Breeders
- Social anthropologist, Political science
- Computer scientists

Who : Fred Rattunde



Country : Germany

Institution / Team : University of Wisconsin-Madison

3 main Research Questions:

- How to integrate breeding for- and with-smallholder farmers, achieving genetic gains at scale, and contributing to agro-biodiversity?
- How to organize breeding and seed-dissemination to respond to local/individual needs and operate at scale?
- How to optimize breeding through gender-inclusion

Platforms / tools:

- Quantitative genetics
- Linking technology and social-innovations

On-going projects (locations):

- Consultant – Seeds4Resilience Project (Crop Trust and Genebanks in Kenya, Ethiopia, Kenya, Nigeria, and Zambia)

Who : Fred Rattunde



Main partners (Target Regions) :

- West and Central Africa
- National Agricultural Researchers
- Farmer Organization Representatives
- International Researchers
- Social Scientists

Future challenges / Target Regions :

- Linking germplasm users and genebanks
- Eastern and Southern Africa
- Latin America

Skills available in the team :

- Genetics
- Communication/Social-science

Who : Frédérique Richaud



Country : France

Institution / Team : CIRAD, AGAP, DARS

3 main Research Questions:

- Transformation optimization for gene validation

Platforms / tools:

- Sorghum cell culture and regeneration
- Sorghum transient and stable transformation tools
- Histology tools

On-going projects (locations):

- SOKAFI- grain quality

Who : Frédérique Richaud cirad



Main partners (Target Regions) :

- INRAE

Future challenges / Target Regions :

- Validation of gene network

Skills available in the team :

- Molecular biology engineers
- Physiologist
- Collaborators breeders

Who : Matthieu RIGAL, France



Country : France

Institution / Team : CRT CATAR / Laboratoire de Chimie Agroindustrielle

3 main Research Questions:

- Development of agro-refining strategic pattern
- Development of new method of destructuring and transforming biomass
- Development of new ways of biomass valorisation

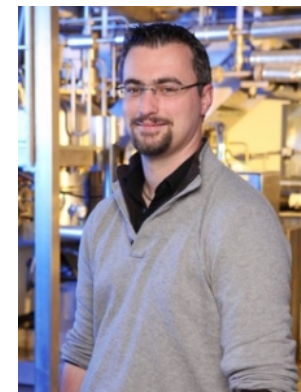
Platforms / tools:

- **Laboratory to industrial size tools** for agro-refining and chemical transformation of agromolecules
 - Technological hall (2400 m²)
 - Demonstration hall for industrial tools (production of pre-series of agromaterials) (1200m²)
- **High-tech analytical** park for the monitoring and characterization of agro-products

On-going projects (locations):

- **Biomass fractionation and valorisation** : SAVASCO (*Intereg POCTEFA- FR & ES*), SEA2LAND (*H2020, northern europe*), VMP (*ADEME, FR*), CyclAlg (*Intereg POCTEFA- FR & ES*)
- **Agromaterial development** : Bioplast, FertilWastes (*Intereg POCTEFA- FR & ES*)
- **2nd generation Energy process** : BabEtReal (*H2020-World*)
- **High value agromolecules extraction** : B2V (*Readynov - FR*), NewCocagne (*Feder, FR*)

Who : Matthieu RIGAL, France



Main partners (Target Regions) :

- CRT CATAR (FR)
- LCA (and his AGROMAT platform) / INRAE / INPT (FR)
<https://www6.toulouse.inrae.fr/lca/>
- Institut Carnot 3BCAR (FR)
<https://3bcar.fr/>
- Biotechnology partners: INSA/TBI (FR), NEIKER (ES)
- Energy and ACV partners: APESA (FR), CENER (ES)
- Food partners: AZTI (ES)
- Lots of Private partners :
 - Raw material : Ovalie Innovation, CCES, Lin avec l'autre, Fibre Excellence...
 - Agro-material : Vegeplast, Authentic Materials, LUMA, AB7...
 - Agromolecules : Berdoues, Bois Valor, ITERG, Graine de Pastel...
 - Process : Clextral...



Future challenges / Target Regions :

- Support SMEs in their innovation and technology transfer project around green chemistry, biomass chemistry and the valorization of agro-resources
- Integration of new technologies developed by researchers

Skills available in the team :

- Chemists and Agrochemists (*fractionnation and extraction, green chemistry, agromaterials,...*)
- Analytical chemists
- Engineers and research engineers

Who : Eric Scopel, France



Country : France

Institution / Team : CIRAD, Agroecology and Sustainable Intensification of Annual Crops (AIDA RU)

3 main Research Questions:

- Multicriteria analysis of agroecological cropping systems (annual crops)
- Co-design of agroecological cropping systems (annual crops), participatory research
- How to support local actors engaged in agroecological transitions

Platforms / tools:

- MEANS/TAPE/GTAE assessment tools
-

On-going projects (locations):

- FAIR Desira project on enhancing agroecological intensification : Sahel
- PACTE (AFD) project on Agroecological territorial development : Tunisia
- Viability (CGIAR) project on socio economic assessment of AE systems : Africa
- Avaclim (GEF) project on agroecological initiative in dry zones: Africa, Latin America, India

Who : Eric Scopel, France



Main partners (Target Regions) :

- ISRA and Enda Pronat (Senegal)
- INERA (Burkina Faso)
- IER (Mali)
- DG-ACTA, INAT (Tunisia)
- NGOs international (Gret, AVSF, Cari, Agrisud, ACF) or local FO (AOPP Mali, AMSP Diobass Burkina Faso....)

Future challenges / Target Regions :

- Reintroduction of Biodiversity (legumes, Trees) into the systems
- Optimization of crop/livestocks interactions
-

Skills available in the team :

- Agronomy, Agroecology, IPM
- Breeding for AE systems,
- Crop modelling and statistic analysis
- Geospatial analysis and Knowledge management

Who : Rod Snowdon



Country : Germany

Institution / Team : Justus Liebig University Giessen, Department of Plant Breeding

3 main Research Questions:

- Accelerating sorghum breeding progress using genomics tools and data
- Optimising genome-based implementation of genebank diversity
- Sorghum breeding for adaptation to for Central Europe

Platforms / tools:

- Contrasting field stations in central Germany
- Genome analysis, genomic selection
- Automated large-container drought screening and imaging facilities
(*DroughtSpotter XLL*)

On-going projects (locations):

- PEGASUS: Prediction and Exploitation of Genebank Accessions – a Study in Ugandan Sorghum (JLU Giessen, Uganda)
- SorgEnloS: Breeding of locally-adapted grain sorghum hybrids with improved juvenile and reproductive stage cold tolerance (JLU Giessen)
- Optimising genomic selection for striga resistance (ICRISAT Kenya, JLU Giessen)

Who : Rod Snowdon



Main partners (Target Regions) :

- Private partners (breeding companies) in Germany
- University of Queensland, Australia
- ICRISAT, Kenya
- Uganda National Genebank / Makerere University

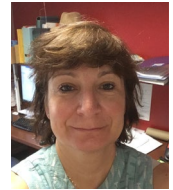
Future challenges / Target Regions :

- Genomic selection for cold tolerance
- Genome-based establishment of heterotic groups
- Establishing sorghum as an alternative to maize in Central European cropping systems

Skills available in the team :

- Genetics, genomics, phenomics, bioinformatics, breeding

Who : Nancy Terrier



Country : France

Institution / Team : INRAE, AGAP, Development and Adaptation of Rice and Sorghum

main Research Questions:

- Molecular determinism of grain quality including
 - Protein Digestibility and Content
 - Specialized metabolism
- Impact of (recurrent) thermic stress on grain quality

Platforms / tools:

- Genomic platform
- Biochemical Platform (PPB)
- Imagery platform (PHIV)
- Bioinformatic platform

On-going projects (locations):

- MetSpé Specialized Metabolites (2020-2023): High-throughput metabolomics
- SoWall-Digest: impact of grain cell-wall on protein digestibility (2021-2023): France
- Nitrosorg : genetic determinism, Genomic prediction for Grain quality (Protein) (2022-2025) : France

Who : Nancy Terrier



Main partners (Target Regions) :

- Food science, protein biochemistry: IATE (France)
- Saclay Plant Science: Metabolomics, Specialized Metabolism
- Cell-Wall biochemistry: BIA
- Composition analysis: SELMET
- Private partners : RAGT2N, Eurosorgho (France)
- Feed : BOA, PEAT, ITAVI

Future challenges / Target Regions :

- Making the link between sorghum users and quality of raw material
- Understanding molecular mechanisms involved in metabolic pathway leading to grain quality to facilitate selection programs
- Sorghum transformation at higher rate

Skills available in the team :

- Molecular Biologists
- In Vitro Cell Culture
- Collaborators : Geneticists, Ecophysiolegists, statisticians, Biochemists...

Who : Gilles Trouche



Country : France

Institution / Team : CIRAD, AGAP Institute

3 main Research Questions:

- Assessment and mobilization of genetic diversity
- Breeding for adaptation to abiotic stress and enhanced quality
- Optimization of participatory breeding schemes

Platforms / tools:

- Quantitative genetics
- Breeding methods

On-going projects (target crops; locations):

- AFAFI-Sud (sorghum, pearl millet and grain legumes; Madagascar)
- SARITEM (rice; Guinea)
- « Saint-Michel Attalaye » (sorghum, Haïti)
- ImpresS ex post study case (sorghum, bean; Nicaragua)

Who : Gilles Trouche



Main partners (Target Regions) :

- INERA BFA
- IRAG Guinée
- FOFIFA, CTAS, GRET Madagascar
- FECODESA, INTA Nicaragua
- semenciers sorgho France
- ...
-

Future challenges / Target Regions :

- Mobilizing sorghum functional diversity for Climate change adaptation and mitigation and agro-ecological transition

Team staff :

- Geneticists, ecophysiologists, agronomists
- Impact analysts, economists and innovation developers

Who: Ralf Uptmoor



Country : Germany

Institution / Team : University of Rostock, Department of Agronomy

3 main Research Questions:

- Adaptation of sorghum to Central European growing conditions
- Improving abiotic stress tolerance
- Nutrient uptake and utilization efficiency
 - Focus on phosphorus starvation tolerance

Platforms / tools:

- Quantitative genetics (GWAS, genomic selection)
- Integrating crop models with genome-wide prediction
- Root phenotyping

On-going projects (locations):

- No sorghum projects for the moment

Who: Ralf Uptmoor



Main partners (Target Regions) :

- University of Gießen, Department of Plant Breeding
- KWS Seed SE
- Leibniz Institute of Plant Genetics and Crop Plant Research (IPK), Gatersleben, Germany
- Cairo University, Department of Genetics

Future challenges / Target Regions :

- Improving drought tolerance
- Gnome based crop modeling

Skills available in the team :

- Quantitative genetics (GWAS, genomic selection)
- Plant and soil analysis with focus on phosphorus
- Crop physiology (e.g. enzyme activities, root growth and development)



Country : FRANCE



Institution / Team : GEVES - Secteur d'étude des Variétés (SEV)

3 main Research Questions:

- Variety assessment for the registration on the national list (CTPS)
- Variety assessment for national (INOV) and European PBR (CPVO)

Platforms / tools:

- VCUS trials
- DUS trials

On-going projects (locations):

- DUS trials : Le Magneraud (17) et Montpellier (34)
- VCUS trials : France entière
- Nitrosorgh : genetic determinism, Genomic prediction for Grain quality (Protein) (2022-2025) : France



Main partners (Target Regions) :

- Breeders
- Arvalis
- External provider for VCUS trials
- INRAE
- CIRAD
- BIOGEVES
- Counterparts offices –(Germany, Spain, Netherland) and CPVO.



Future challenges / Target Regions :

- Assess varieties adapted to framework and climatic changeover (less water, higher temperatures, climate accident tahn wind...)
- Integrating Crop Growth Models

Skills available in the team :

- Phenotypic observations
- Varietal assesement
- Genotypic analysis

Who : Vincent Vadez



Country : France

Institution / Team : IRD / CERES

3 main Research Questions:

- Optimizing water use efficiency
- Predicting crop fitness to varied environmental conditions
- Exploring intensifying options and trade-offs

Platforms / tools:

- Capacity to do trials in controlled environments, lysimeters, irrigated fields
- mini-lysimetric platform with 3D scanner imaging

On-going projects (locations):

- MOPGA-ICARUS project (Montpellier – Senegal)
- France-CGIAR collaboration (One-CGIAR reform)
- IRD-ICRISAT collaboration on crop simulation
-

Who : Vincent Vadez



Main partners (Target Regions) :

- ISRA-CERAAS (Senegal)
- Phenospex Ltd
- Hiphen Ltd
- ICRISAT
- EiB
- UC Davis
-

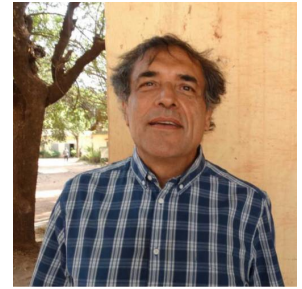
Future challenges / Target Regions :

- Optimizing water use efficiency beyond the crop level (watershed / regional scale)
- Sustainable intensification
-

Skills available in the team :

- Crop modelling
- Ecophysiology
- Image analysis

Who : Michel Vaksman



Country : Mali

Institution / Team : CIRAD, AGAP, Genetic and Varietal Innovation

3 main Research Questions:

- Sorghum breeding
- Climate adaptation
- Agroecological intensification

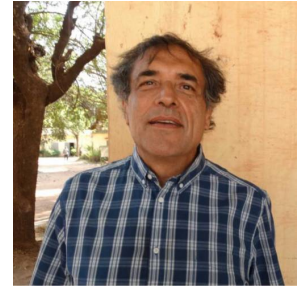
Platforms / tools:

- Crop modeling (CERES, SAMARA ...)
- Quantitative genetics

On-going projects (locations):

- DESIRA Abee and DESIRA Apsan: breeding programs in West Africa
- DESIRA Fair : agroecological intensification in West Africa
- AgrEco : crop modeling in Mali
- CRP-GLDC - Breeding climate resilient sorghum varieties for sustainable intensification in Mali

Who : Michel Vaksman



Main partners (Target Regions) :

- IER (Mali)
- CERAAS / ISRA (Sénégal)
- INERA (Burkina Faso)
- Niger (INRAN)
- Universities (Mali)
- Farmers' organizations and NGOs (Mali)

Future challenges (West Africa) :

- Breeding for climate resilience (Photoperiod sensitivity)
- Breeding for sustainable intensification (dwarfism, tillering)
- Breeding for grain and stover quality

Skills available in the team :

- Geneticists
- Breeders
- Ecophysiologists

Who : François Vasseur



Country : France

Institution / Team : CNRS, CEFE, ECOPAR

3 main Research Questions:

- Diversity of functional traits within plant species
- Rapid evolution of plant ecological strategies
- Phenotypic determinants of hybrid vigor

Platforms / tools:

- Functional ecology
- Biogeography
- Genomics

On-going projects (locations):

- AraBreed: experimental evolution in *A. thaliana* (France-Germany)
- Phenovigour: a new hypothesis to explain heterosis (France)

Who : François Vasseur



Main partners (Target Regions) :

- LEPSE (INRAE, France)
- MPI of Tuebingen (Germany)
- Stanford University (USA)
- AGAP (INRAE-CIRAD, France)
- Université de Lyon (France)
- University of Frankfurt (Germany)
- GQE (INRAE, France)

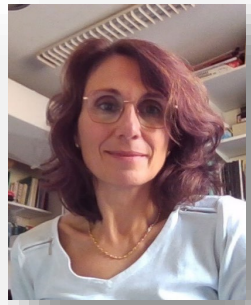
Future challenges / Target Regions :

- Integrate models from functional ecology and evolutionary mechanisms (intraspecific studies)
- Eco-evolutionary feedbacks and niche construction
- Phenomic selection and integration with Genomic prediction and GWAS

Skills available in the team :

- Functional ecology and macroecology
- Biogeography
- Ecophysiology

Who : Christèle Vernière



Country : France



Institution / Team : IRD, UMR QualiSud, équipe Alimentation et Nutrition aux Suds

3 main Research Questions:

- dietary strategies to fight micronutrient deficiencies in at risk populations
- food resources and nutrition
- food processing (cereals, legumes, ...)

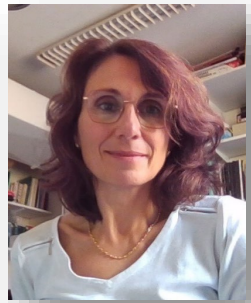
Platforms / tools:

- Population surveys
- Micronutrient determination and food analysis (ICP-OES, HPLC, ...)

On-going projects (locations):

- PAFAN (Niger) : Projet d'Appui à la Fortification des Aliments au Niger
- ARBOPOLIS (Cameroun) : Renforcer les moyens de subsistance, la sécurité alimentaire et nutritionnelle en Afrique Centrale via la valorisation d'arbres fruitiers locaux

Who : Christèle Vernière



Main partners (Target Regions) :

- Université Abomey-Calavi Faculté des Sciences Agronomiques (Bénin),
- IRSAT-DTA (Burkina Faso)
- GRET (Professionnels du Développement Solidaire (ONG France / international)
- Université Abdou Moumoudi, Niamey (Niger)
- UMRs DIADE, MOISA

Future challenges / Target Regions :

- Sub-saharan Africa

Skills available in the team :

- Nutrition, food consumption surveys, food biochemistry
- ICP-OES, HPAEC, HPLC
- Food fermentation
- Molecular biology

Who : Denis Vile



Country : France

Institution / Team : INRAE, LEPSE, MAGE team (Modelling and Analyses of interactions Genotype x Environment)

Research Question:

Analysis of the phenotypic space of wild and cultivated species and its plasticity to multiple edapho-climatic and biotic conditions.

Deciphering the genetics of plant tolerance to combinations of abiotic stresses, especially water deficit and high temperature, in interaction with other abiotic (light, CO₂, Zn) and (PGPR, viruses) factors.

Platforms / tools:

M3P phenotyping platforms
PHENOPSIS

On-going projects (locations):

- Evolutionary responses of plants to environmental changes through the lens of ecological theories: an experimental test using the model species *Arabidopsis thaliana* (ARABREED). ANR-DFG. France, Allemagne.
- Plant adaptation to calcareous soil upon climate change (CALCLIM). Agropolis Fondation. France



Main partners (Target Regions) :

- UMR CEFE (Montpellier, France) – Functional Ecology
- UMR GDEC (Clermont-Ferrand, France) – Wheat ecophysiology
- UMR AGAP (Montpellier, France) – Plant Ecophysiology

Future challenges / Target Regions :

- Comparing phenotypic spaces of plant responses to multistresses using wild and cultivated genetic variation to propose realistic ideotypes.

Skills available in the team :

- Phenotyping
- Ecophysiology
- Statistics

Who : Vladimir Sikora

Country : Serbia

Institution / Team : Institute of Field and Vegetable Crops Novi Sad



3 main Research Questions:

- Evaluation of sorghum germplasm
- Breeding for quantitative and qualitative traits
- Herbicide tolerance breeding

Platforms / tools:

- Quantitative genetics
- Agronomy

On-going projects (locations):

-
-
-
-

Who : Vladimir Sikora



Main partners (Target Regions) :

-
-
-
-
-
-
-

Future challenges / Target Regions :

- Phenotypic characterization of sorghum germplasm
- Evaluation of breeding techniques
- GxExM interaction

Skills available in the team :

-
-
-

Who : Kirsten vom Brocke



Country : France

Institution / Team : GIV

3 main Research Questions:

- Variety development (rice, sorghum millet)
- Evaluation and optimisation of participatory and decentralised, early generation testing and breeding schemes
- seed systems

Platforms / tools:

- on-station and on-farm breeding schemes and experiments
- quantitative genetics
- Participatory evaluation and communication tools

On-going projects (locations):

- AU: EcoAfrica/Zinc Biofortification/CRP Rice Madagascar (upland rice variety development)
- EU: AFAFI SUD, Madagascar (Sorghum, millet and cowpea variety evaluation and development)
- MUSE: AMUSER, Madagascar (rice variety mixtures)
- CG (Ciat): Zinc-biofortification

Who : Kirsten vom Brocke



Main partners (Target Regions) :

- FOFIFA (NARS Madagascar)
- GRET (NGO France)
- CTAS (NGO Madagascar)
- CIAT
- FIFATA (OP Madagascar)

Future challenges / Target Regions :

- Millet and sorghum breeding schemes
- Upland rice breeding and seed systems and GxE
- Cereal/legume systems

Team staff :

- Farmers, OP and NGOs
- Geneticists, statisticians
- Ecophysiologist, Agronomists
- enthomologists, phytopathologists

Who : Walter de Milliano and Francis Okot



Country : The Netherlands and Sierra Leone

Institution / Team : Maatschap de Milliano-Meijer
African Seed Company

3 main Research Questions:

- Sierra Leone Sorghum farming system and sorghum trait preferences by farmer
- Genetic diversity of Sierra Leone Sorghum
- Exotic sorghum lines evaluation in Sierra Leone (Trait Introduction e.g. TGW>20g)
- Improvement Photoperiod sensitive long day for Sierra Leone
- Hybrids with adapted A-lines

Platforms / tools:

Conventional Plant Breeding

- ✓ Survey
- ✓ Introduction, Selection, Hybridisation, Multi-location testing and variety registration
- ✓ Multivariate analysis
- ✓ Gametocide

Who : Walter de Milliano and Francis Okot



On-going projects (locations):

- Testing phenotypes Mali, Collection prepared by G.Trouche CIRAD, and ICRISAT Mali- Lunsar, ACCI UKZN South Africa, ultra-early Dutch sorghums with resistance to *Striga hermonthica*
- Variety Registration trial (Multi-location testing of short and long cycle sorghum)
- Testing segregation for day length – Oostburg
- Development of sorghums out of *Sorghum mageritiferum*

Who : Walter de Milliano and Francis Okot



Main partners (Target Regions) :

- African Seed Company (Sierra Leone)
- Maatschap de Milliano-Meijer
- ACCI, University of Kwa-Zulu-Natal
- Research Department and Seed Division Sierra Leone

Future challenges / Target Regions :

- Developing adapted hybrid sorghum for Sierra Leone
- Increasing sorghum yields through introduction of new varieties in Sierra Leone.
- Reaching more farmers through variety demonstration plots and field days
- Improved sorghum Netherlands with long day tolerance and cool growing conditions at sowing and after flowering

Skills available in the team :

- Prof.Walter de Milliano
- Prof.Mark Laing
- Prof.Hussein Shimelis

Who : Eva Weltzien



Country : Germany

Institution / Team : University of Wisconsin-Madison

3 main Research Questions:

- How to integrate breeding for- and with-smallholder farmers, achieving genetic gains at scale, and contributing to agro-biodiversity?
- How to organize breeding and seed-dissemination to respond to local/individual needs and operate at scale?
- How to optimize breeding through gender-inclusion

Platforms / tools:

- Quantitative genetics
- Linking technology and social-innovations

On-going projects (locations):

- Consultant – Seeds4Resilience Project (Crop Trust and Genebanks in Kenya, Ethiopia, Kenya, Nigeria, and Zambia)
- Consultant - GREAT 2 – Makerere University (Gender-Responsive Researchers Equipped for Agricultural Transformation)

Who : Eva Weltzien



Main partners (Target Regions) :

- West and Central Africa
- National Agricultural Researchers
- Farmer Organization Representatives
- International Researchers
- Social Scientists

Future challenges / Target Regions :

- Linking germplasm users and genebanks
- Building effective Farmer Researcher Networks
- Eastern and Southern Africa
- Latin America

Skills available in the team :

- Quantitative Genetics
- Communication/Social-science
- Production System Dynamics

Who : Adrianus J Westgeest (Adriaan)



Country : France

Institution / Team : post-doc at the CEFÉ, CNRS with François Vasseur, Cyrille Violle and Denis Vile (INRAE LEPSE)



Main Research Questions:

- How did artificial selection impact trait-trait covariations?
- How do trait-trait covariations impact heterosis?

Platforms / tools:

- Phenotypic data analysis
- Experiments: field, greenhouse

On-going projects (locations):

- ERC Constraints (Montpellier, France)
- ERC PhenoVigour (Montpellier, France)

Main partners (Target Regions) :

- CIRAD (Montpellier)
- INRAE – LEPSE (Montpellier)



adriaan.westgeest@cefe.cnrs.fr

Who : Steffen Windpassinger



Country : Germany

Institution / Team : Department of Plant Breeding, Justus-Liebig-University Giessen

3 main Research Questions:

- Breeding of sorghum material better adapted to Central Europe
- Enhancements of juvenile and reproductive cold tolerance
- Development of novel, sustainable cropping systems

Platforms / tools:

- Drought stress phenotyping facility
- Climate chamber for cold stress phenotyping etc.
- 2 field stations in Germany with contrasting environment

On-going projects (locations):

- SoBinEn: Development of insect-friendly mixed cropping systems with sorghum (Germany)
- SorgEnloS: Breeding of locally adapted grain sorghum material, incl. On-farm tests (Germany)

Who : Steffen Windpassinger



Main partners (Target Regions) :

- Private partners (breeding companies) in Germany
- Agronomy departments in Germany
- Bee Research Institute Kirchhain, Germany
- University of Queensland, Australia
-
-
-
-

Future challenges / Target Regions :

- Implementation of sorghum as a novel crop in Central Europe: acceptance by farmers, agribusiness etc.
- Genomic selection or prediction for cold tolerance
- Better establishment of heterotic groups

Skills available in the team :

- Geneticists
- Bioinformatics
-
-

Who : Naushad Emmambux, Gyebi Duodu and John Taylor



Country : South Africa

Institution / Team : University of Pretoria, DSI-NRF CoE in Food Security, ARUA CoE in Sustainable Food Systems,

3 main Research Questions:

- Can sorghum be used as a wholesome food to combat diet-related non-communicable diseases
- value addition to sorghum by-product
- What is the role of sorghum bioactive compounds in health promotion?

Platforms / tools:

- Energy efficient food processing technologies
- Metabolomic profiling analytical techniques – LCMS

On-going projects (locations):

- INNOFOODS AFRICA EU project
- SMART FOODS
- USAID Feed the Future Food Processing Innovation Lab
-

Who : Naushad Emmambux, Gyebi Duodu and John Taylor



Main partners (Target Regions) :

- South Africa
- Kenya
- Senegal
- France, Finland, Netherland and Norway

Future challenges / Target Regions :

- Understanding role of sorghum food biopolymers in gluten-free foods
- Understanding sorghum starch interaction with other biomolecules for low GI sorghum foods
- Understanding the role of sorghum flavonoids in health-promotion using ex vivo and in vivo models

Skills available in the team :

- protein chemistry, starch chemistry, food material science
- Metabolomics; Polyphenol chemistry; Cell culture techniques
-

Who : Jurandir Magalhaes



Country : Brazil

Institution / Team : Embrapa Maize and Sorghum (Brazil)

3 main Research Questions:

- Aluminum tolerance, phosphorus efficiency, drought tolerance
- Genetic and molecular mechanisms underlying abiotic stress tolerance in crop species
- Strategies for deployment into breeding programs

Platforms / tools:

- Population and quantitative genetics
- Genomics, molecular biology and epigenetics
- Plant breeding

On-going projects (locations):

- Marker-assisted breeding for abiotic stress tolerance: Brazil – Embrapa/private sector
- Harnessing root biology for abiotic stress breeding via advanced assessments of root system architecture and function: Improving crop adaptation to acid soils, drought, and reduced fertilizer (N,P,K) inputs: Brazil/Canada
- Signalling pathways involved with abiotic stress tolerance: Brazil/Canada

Who : Jurandir Magalhaes



Main partners (Target Regions) :

- Global Institute for Food Security/University of Saskatchewan - Canada
- Cold Spring Harbor Laboratory - US
- Private partners - Brazil
- Integrated Breeding Platform - <https://www.integratedbreeding.net/>

Future challenges / Target Regions :

- Molecular breeding applications - Africa
- Epigenetics of abiotic stress tolerance – tropical countries
- New translational genomics approaches targeting abiotic stress tolerance – tropical countries
- Innovative approaches for deploying abiotic stress tolerance genes and regulatory factors into breeding pipelines – tropical countries
- Crop modelling and abiotic stress tolerance

Skills available in the team :

- Genetics, plant breeding and plant physiology
- Soil Science and Plant Nutrition
- Molecular biology and genomics
- Bioinformatics

Who : Rafael Parrella, Brazil



Country : Brazil

Institution / Team : EMBRAPA, Sorghum Improvement

3 Main Research Objectives:

- Sweet and biomass sorghum provide feedstock for bioenergy sector;
- Abiotic and Biotic Stress tolerance gene introgression, Phenotyping and genotyping for bioenergy traits (Productivity of dry matter, Fiber, Sugar, Cellulose, hemicellulose, lignin and calorific value)
- Breeding strategy and hybrid development

Platforms / tools:

- Quantitative and molecular genetics
- Biotic and abiotic stress tolerance;

On-going projects (locations):

- ENERGY SORGHUM (SWEET AND LIGNOCELLULOSIC BIOMASS) AS A COMPLEMENTARY CULTURE TO SUGAR CANE: DEVELOPMENT OF HYBRIDS (FOR ETHANOL 1G, 2G AND COGENERATION) USE CONVENTIONAL and MOLECULARIMPROVEMENT AND SELECTION (2018-2023): Brazil
- Development of sorghum cultivars for grain, forage and bioenergy of high yield and stability, for the Principal Brazilian production areas) (2020-2024) : Brazil
- Development of maize and sorghum inbred lines with high value traits using marker-assisted selection (2019-2022): Brazil

Who : Rafael Parrella, Brazil



Principal partners / Target regions

- BNDES (Brazil Development Bank) / (Brazil)
- Private partners : COCAMAR, COCAL, COOPerval e Nova PRODUTIVA;

Future challenges / Target regions :

- Develop sorghum hybrids with high productivity and quality for bioenergy production (ethanol, energy and biogas) and forage;
- High-Throughput Bioenergy sorghum Phenotyping (Fiber, sugar, calorific power, etc);
- Integrate conventional breeding with molecular tools (marker-assisted selection; GWS, GBS, Genetic editing);

Research Team:

- Breeders/Geneticists
- Collaborators : Molecular biology; Production/mechanization systems, Weed control; Phytopathologist, Entomologist, Chemist and others;

Contact:

- rafael.parrella@embrapa.br
- +55-31-99402-6329

Who : Kira Everhart-Valentin



Country : United States

Institution / Team : United Sorghum Checkoff Program

3 main research questions:

- Increased protein percent and digestibility; Including application and commercialization
- Waxy sorghum development and market opportunities
- Carbon sequestration/GHG emission reductions and climate change mitigation potential

Platforms / tools:

- Sorghumbase - <https://www.sorghumbase.org/>
(Not « in-house » per say, but USCP was very engaged in the development of this platform)

On-going projects (locations):

- Aquaculture nutrition and poultry growth trials (U.S.)
- Commercialization of natural beverages from sweet sorghum syrup (U.S.)
- Grain starch digestibility and waxy sorghum for baijiu and ethanol (U.S.)
- Commercialization of herbicide-tolerant hybrids (*Inzen*, *igrowth*, *Double Team*) (U.S.)
- Quantification of sustainability metrics on sorghum acres (U.S.)
- Consumer and food industry perceptions of sorghum as a primary product ingredient (U.S.)

Who : Kira Everhart-Valentin



Main partners (Target regions) :

- USDA-ARS (U.S.)
- Texas A&M University (U.S.)
- Kansas State University (U.S.)
- University of California (U.S.)
- University of Georgia (U.S.)
- Texas Tech University (U.S.)
- U.S. Grains Council (U.S.)
- University of Queensland (Australia)
- Various sorghum seed, crop protection and food/ingredient companies (U.S.)

Future challenges / Target regions :

- Physiology (U.S. and international)
- Drought resilience (U.S. and international)
- Applications and demand in biofuel production (U.S.)
- Food and pet food applications (U.S. and international)

Skills available in the team :

- Market/business development specialists
- Agronomists
- Sustainability/farming systems specialists
- Communications specialists
- Collaborators: *Crop Physiologists, Quantitative Genomics, Modelers, Breeders*

Who : Mamadou Ibrahim Aissata



Country : Niger

Institution / Team : INRAN

3 main Research Questions:

- Breeding product profil
- Genetic and plant Improvement (striga tolerance, midge tolerance and drought stress tolerance)
- Breeding scheme

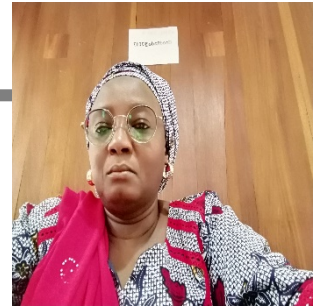
Platforms / tools:

- Breeding
- Genetics

On-going projects (locations):

- DESIRA/ ABEE : breeding programs modernization : West Africa
- SMIL: Sorghum and Millet innovation Lab: West Africa

Who : Mamadou Ibrahim Aissata



Main partners (Target Regions) :

- CERAAS / ISRA (Sénégal)
- INERA (Burkina Faso)
- IER (Mali)
- Niger (INRAN)
- CIRAD
- Kansas University
- ICRISAT

Future challenges / Target Regions :

- Breeding program modernization
- Plant Improvement

Skills available in the team :

- Geneticists
- Breeders
- Collaborators : Entomologist, agronomist
-

Who : Cheikh Ndiaye, Senegal



Country : Senegal

Institution / Team : ITA, Cereal and legumes Department

3 main Research Questions :

- Processing technologies on key phytochemicals in well designed studies
- Identification and potentials of thermal complex formations in sorghum
- Antinutrient factors and breeding profiling for micronutrient bioaccessibility/ bioavailability

Platforms / tools:

- Hub and spoke model in rural and urban areas
- Linking market led nutrition from research to stakeholders

On-going projects (locations):

- SMIL project : New product development in millet and sorghum varieties (Senegal, Niger, South Africa, United States of America)
- FPIL project: Market led nutrition on millet and sorghum based products (Senegal, Kenya, South Africa, United States of America)
- CIWA Project: Developing interesting traits using the whole value chain (Senegal, Niger, Burkina Faso, United States of America, France, India)

Who : Cheikh Ndiaye, Senegal



Main partners / Target Regions

- ISRA (Diourbel and Kaolack regions in Senegal)
- Assane Seck University (Casamance region, in Senegal)
- IER (Mali)
- Niger (INRAN)
- University of Pretoria (South Africa)
- Eldoret University (Kenya)
- CIRAD (Future projects in Center and South regions of Senegal)

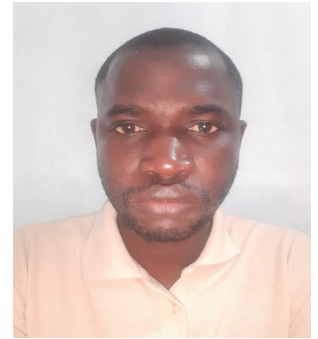
Future challenges :

- Afla safe products with potential and bioaccessible nutrients
- Processing technologies with minimum lost on key related health phytochemicals and high targeted complex compound formation
- High added value on Sorghum based products

Team staff :

- Food Scientists
- Nutritionists
- Biotechnologists
- Collaborators: Breeders, genetics, statisticians/macroeconomic analysis Bureau, Feed Scientists

Who : Cyril DIATTA, Sénégal



Country : Sénégal

Institution/Team : ISRA, CERAAS, CNRA-Programme Céréales

3 main Research questions:

- Improving sorghum adaptation, food and feed quality, and production technics
- Biodiversity, conservation and management of genetic resources
- Improving sorghum adaptation using genomics-assisted breeding

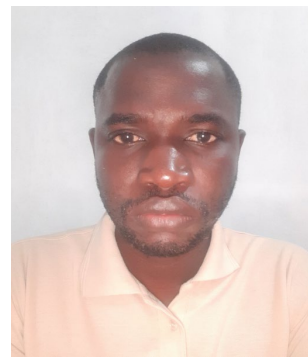
Platforms/tools:

- Breeding scheme optimization, population development and phenotyping
- Crop quantitative genomics & genomics-assisted breeding
- Ecophysiological phenotyping (*Lysimeter, Drone, Shovelomics* etc)

On-going projects (locations):

- ***DESIRA ABEE*** : *breeding programs modernization (West Africa)*
- ***SMIL-SAWAGEN***: *Improving Sorghum Adaptation using Genomics-Enabled Breeding (West Africa),*
- ***SMIL-Digest***: *Improvement of sorghum Food and Feed Value (Senegal and Niger)*
- ***SMIL-Phyto***: *Enabling Marker Assisted Selection for Sorghum Disease Resistance (Senegal and Niger)*
- ***ILCI-CIWA***: *Crop Innovations in West Africa (West Africa),*
- ***EBCA/IFAD***: *Enhancing institutional breeding capacity to develop climate resilient Crops (East and West Africa)*

Who : Cyril DIATTA, Sénégal



Main partners / Target Regions

- **National:** ITA, Senegalese universities (UCAD, UGB, UIDTT, UADB)
- **Regional:** INERA (Burkina Faso), IER (Mali), INRAN (Niger), ITRA (Togo)
- **International:** CIRAD, IRD, IBP, ICRISAT, USDA, American Universities (Texas A&M, Kansas State, Colorado State, Cornell)

Future challenges / Target regions :

- *Develop adapted dual-purpose sorghum with improved Food and Feed Value*
- *Breeding program optimization and digitalisation*
- *Implementing innovations for rapid development of adapted varieties*

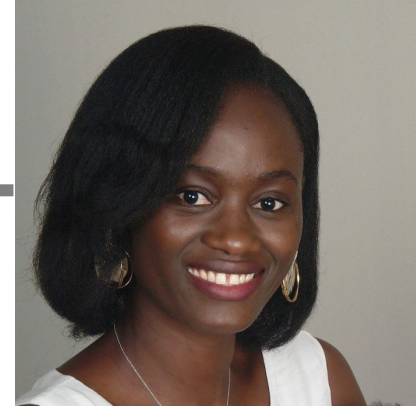
Team staff :

- Breeders / Geneticists
- Collaborators : *Ecophysiologist, Phytopathologist, Entomologist, Agronomist, Agronomist-crop modelist, Socio-economic scientist, Weed scientist, Food and Feed Scientist, Statisticians, Soil scientist etc.*

Two recent publication on sorghum

- Diatta, C., Sarr, M. P., Tovignan, T. K., Aidara, O., Dzidzienyo, D. K., Diatta-Holgate, E., Faye, J. M., Danquah, E. Y., Offei, S. K., & Cisse, N. (2021). Multi-Environment Evaluation of Tannin-Free Photoperiod-Insensitive Sorghum (*Sorghum bicolor* (L) Moench) for Yield and Resistance to Grain Mold in Senegal. *International Journal of Agronomy*, 2021, 1–12. <https://doi.org/10.1155/2021/5534314>
- Faye, J.M., Maina, F., Akata, E.A., Sine, B., Diatta, C., Mamadou, A., Marla, S., Bouchet, S., Teme, N., Rami, J.-F., Fonceka, D., Cisse, N., & Morris, G.P. (2021). A genomics resource for genetics, physiology, and breeding of West African sorghum. *The Plant Genome*, n/a, e20075. <https://doi.org/10.1002/tpg2.20075> ¹⁴²

Who : Elisabeth Diatta-Holgate



Country : Senegal

Institution / Team : ISRA-CERAAS, Genetics and Plant breeding

3 main Research Questions:

- What are the genetic mechanisms that underly key grain quality traits in sorghum?
- Using mutation breeding, how can we develop and transfer rare alleles into local germplasm for improved food and forage quality?
- How can we use modern plant breeding to provide farmers with seeds that have improved nutritional value?

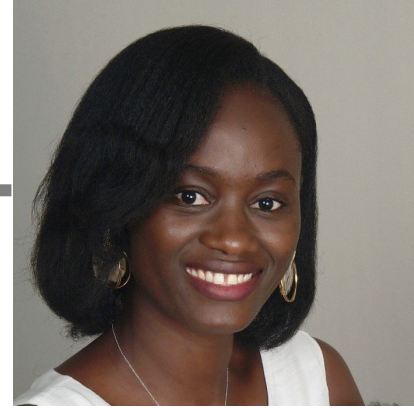
Platforms / tools:

- Genetics, molecular biology
- High throughput phenotyping for grain quality (protein digestibility)
- Biochemistry

On-going projects (locations):

- Sorghum trait deployment pipeline for improved food and feed value: **USA, Niger and Senegal**

Who : Elisabeth Diatta-Holgate



Main partners (Target Regions) :

- Purdue University, USA
- Kansas State University, USA
- INRAN, Niger
- ITA, Senegal

Future challenges / Target Regions :

- Developing a forage breeding program
- Using remote sensing data to predict hybrid & inbred performance

Skills available in the team :

- Molecular breeding and crop improvement
- Gene mapping
- Quantitative genetics
- Biochemistry
- Statistics / data analysis using R, Linux, SAS ...

Who : Arouna Dissa



Country : Mali

Institution / Team : Institute d'Economie Rurale

3 main Research Questions:

- sorghum varieties well-adapted to climate variability
- sorghum varieties well-suited for fodder production
- Sorghum varieties well-suited for processing into local beer

Platforms / tools:

- value chain and innovation platforms
- sustainable intensification frameworks

On-going projects (locations):

- Pathways to Agro-Ecological Intensification in mixed crop-livestock systems in southern Mali

Who : Arouna Dissa



Main partners (Target Regions) :

- ICRISAT (Mali)
- CORAF (West Africa)
- WUR (Mali)
-
-
-
-
-

Future challenges / Target Regions :

- Value chain development (southern Mali)
- sustainable intensification (southern Mali)
-

Skills available in the team :

- Agronomist
- Agricultural economist
- breeder

Who : Salif DOUMBIA, Mali

We need your
Picture ! Really
! Don't let this
empty or you
will be upset if
we fill it by
ourselves !

Country : Mali

Institution / Team : Institut d'Economie Rurale (IER)/ ESPGRN

3 main Research Questions:

- Which sorghum varieties are well adapted to the Sahelian zone?
- In the face of climate change, what message can be formulated for producers in the context of sorghum production?
- What is the role of producers in the development of sorghum value chains?

Platforms / tools:

- Innovation platform (Exchange of producers on new technologies contributing to the improvement of crop productivity)
- Platform for value chain actors
-

On-going projects (locations):

- Pathways to Agro-ecological Intensification of Sorghum and Millet Cropping Systems of Southern Mali (2013-2023)

-

Who : Salif DOUMBIA, Mali

We need your
Picture ! Really
! Don't let this
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ourselves !

Main partners (Target Regions) :

- IER, Mali
- Plant Production Systems, Wageningen University, Netherlands
- ICRISAT, Mali
- AMEDD, Farming Cooperatives, CMDT

Future challenges / Target Regions :

- Development of varieties adapted to climate change
- Managing climate variability
- Development of the sorghum value chain
- Development of water-stressed sorghum crop options

Skills available in the team :

- Collaborators : Agronomist and agro-economist Scientists, Food and Feed Scientists, Modeling and farming systems

Who : Fabrice BATIONO



Country Burkina Faso

Institution / Team : CNRST/IRSAT/ Department of Food technology

3 main Research Questions:

- Grain processing and their nutritional quality (micronutrient quality)
- Varieties and nutritional quality
- Climate change, food Security and sorghum in Africa

Platforms / tools:

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On-going projects (locations): None

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Who : Fabrice BATIONO



Main partners (Target Regions) :

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Future challenges / Target Regions :

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Skills available in the team :

- Food Scientists: Nutritionnists , food technologists
-
-

Who : GANYO Komla Kyky



Country : Togo

Institution / Team : ITRA, Pedology and mapping

3 main Research Questions:

- Ideotype definition through optimizing of fertilization dates
- Site-specific nutrient (N, P, K) management for crops (sorghum, maize, rice, ...) production intensification
- Modeling crop responses to intensification strategy options (sorghum responses to fertilization strategies)

Platforms / tools:

- Ecophysiology
- DSSAT (plot process based model)

On-going projects (locations):

- TG_CFS : Soil Fertility mapping and fertilizer recommendation defining for (sorghum, maize, rice, ...) : Togo
- RESADE : Agricultural resilience to salinity : Togo, Gambia, Liberia, Botswana, Namibia, Sierra Leone, Mozambique

Who : GANYO Komla Kyky



Main partners (Target Regions) :

- FOCP : Morocco
- ICBA : United Arab Emirates
- ISRA/CERAAS/CNRA : Senegal

Future challenges / Target Regions :

- Spatial analysis of soil properties, and plant N status for in-season N management
- Crop N use and water use efficiency
- Use crop dynamics model for better understanding of N*W*G interactions

Skills available in the team :

- Agronomists
- Teledetection technicians
- Breeders
- Geographers

Two recent publications on sorghum

- Ganyo K. et al. (2019) Defining Fertilization Strategies for Sorghum (*Sorghum bicolor* (L.) Moench) Production Under Sudano-Sahelian Conditions: Options for Late Basal Fertilizer Application, *Agronomy* 2019, 9(11), 697; <https://doi.org/10.3390/agronomy9110697>
- Ndiaye M. et al. (2021) Phenotypic plasticity of plant traits contributing to grain and biomass yield of dual-purpose sorghum, *Planta* (2021) 253:82
- <https://doi.org/10.1007/s00425-021-03599-z>

Who : Polycarpe Kayodé, FSA/UAC



Country : Bénin

Institution / Team : FSA/UAC, Nutrition, Food Science and Technology

3 main Research Questions:

- Natural biocolorants from sorghum
- Novel functional foods from sorghum
- (Micro)nutrients and antinutritional factors in sorghum

On-going projects (locations):

- Promoting dye sorghum cultivation to improve livelihoods in rural Benin in a context of climate change (Dyegrain)
- Optimisation and standardisation of the sorghum dye grain brewing process for sustainable beer production

Who : Polycarpe Kayodé, FSA/UAC, Bénin



Main partners (Target Regions) :

- Wageningen University, The Netherlands
- IRD Nutripass, France
- Ronfostec, The Netherlands
- Université Ouaga I Pr Joseph KI-ZERBO, Burkina Faso

Future challenges / Target Regions :

- Food processing of sorghum into Gluten free food products (bread, beer etc.)

Skills available in the team :

- Food chemistry
- Food technology
- Human nutrition
- Feed sciences



Country : Burkina Faso

Institution / Team : CNRST/IRSAT/DTA

3 main Research Questions:

- Strategies for adding value to sorghum through processing
- Improvement of the sensory and nutritional quality of sorghum cookies
- Sorghum valorization in cookie and bread making

Platforms / tools:

- Processing/preservation of locally available foods (cookies of cereals.....)
- Formulation and production of food products using locally available resources
- Nutrition human and food

On-going projects (locations):

- FONRID cookies: Dissemination of cookie production technology

Who : Dr Laurencia OUATTARA/SONGRE, BURKINA FASO



Main partners (Target Regions) :

- IRD (France)
- CIRAD (France)
- ITA (Sénégal)
- UAC (Benin)
- Privates partners
- INERA (Burkina)
- Labiotan (Burkina)

Future challenges / Target Regions :

- To contribute to the development of the sorghum industry through the development and improvement of sorghum processing technologies
- Develop a scientific partnership on the quality of grains and industrial products derived from sorghum
- Develop and/or improve sorghum-based products for the industry

Skills available in the team :

- microbiologist, technologist, nutritionist, chemist, sociologist, economist, lawyer, technician
- PDH Director (6)

Who : Fanna Maina



Country : Niamey

Institution / Team : INRAN, Rainfed crop Department

3 main Research Questions:

- What are the genetic basis of crop adaptation
- How the genetic basis for local adaptation and farmer preferences could be used for trait discovery and marker development
- How to optimize breeding strategies for developing locally-adapted varieties using genomics (Striga resistance, drought tolerance)

Platforms / tools:

- Population genomics
- Quantitative genetics
- Molecular breeding

On-going projects (locations):

- Sorghum and Millet Innovation lab (USA, West Africa)
- ABEE-Desira (West Africa)

Who : Fanna Maina



Main partners (Target Regions) :

- Colorado State University
- Kansas State University
- ICRISAT Sahelian Center
- CERAAS/ ISRA
- INERA
- ITRA

Future challenges / Target Regions :

- Leverage genomic resources to assist breeding programs
- Develop trait-predictive markers for key adoption traits
- Optimize breeding strategies to achieve genetic gains

Skills available in the team :

- Genetics, genomics
- Physiology, Ecophysiology
- Breeding
- Agronomy
- Biotechnology

Who : Mamoudou H. DICKO



Country : Burkina Faso

Institution / Team : Université Joseph Ki-Zerbo/LABIOTAN

3 main Research Questions:

- characterize the diversity among sorghum accessions with regard to specific quality traits
- identification and testing of accessions having the best qualities for specific food uses,
- Sorghum bioactive compounds as nutraceutical for human health

Platforms / tools:

- Proximate composition analysis
- Product processing and sensorial analysis

On-going projects (locations):

- Processing and industrial valorization of local foods such as cereals, including sorghum, University of Uppsala, RABIO TECH/ISP/IPICS (Burkina Faso), 2019-2024
- The Netlinks program on enhancing health, Queen Elizabeth grant (Burkina Faso), 2021-2023
- Optimization use for alcoholic beverages and child-meal products, national grant (Burkina Faso) , 2020-2021

Who : Mamoudou H. DICKO



Main partners (Target Regions) :

- DTA/IRSAT/CNRST, Burkina Faso
- University of Ghana, Ghana
- University of Eldoret, Kenya
- University of Nigeria, Nsukka, Nigeria
- Private partners: SODEPAL, GERIEL
- Purdue University, USA

Future challenges / Target Regions :

- Sorghum phenolic compounds as anti-HIV and other viruses
- Screening of sorghum policosanols
- Selection of sorghums for poultry feed formulation

Skills available in the team :

- Geneticists
- Food Biochemists
- Food microbiologists
- Food technologists (grain quality assessment)
- Immunologists
- Nutritionists
- Natural compounds chemists

Who : Nerbéwendé SAWADO, Burkina Faso UJKZ



Country : Burkina Faso

Institution / Team : Université Joseph KI-ZERBO/Equipé Génétique et Amélioration des Plantes

3 main Research Questions:

- Exploring of Genetic diversity of underexploited or neglected crops
- Genetic and molecular determinism off traits of interest (Forage quality, Grain quality, drought stress tolerance)
- Breeding scheme and strategy optimization

Platforms / tools:

- Quantitative genetics
- Population and evolutionnary genetics

On-going projects (locations):

- Selection of genotypes of sweet grain sorghum
- Research of QTLs responsible of sweet taste of grain of sweet grain sorghum

Who : Nerbéwendé SAWADOGO, Burkina Faso UJKZ



Main partners (Target Regions) :

- INERA, IRSAT (Burkina Faso)
- ITRAD (Chad)
- ICRISAT (Mali)
- USDA Lubbock (USA)
- ITRA (Togo)
- CIRAD Montpellier

Future challenges / Target Regions :

- Creation non-photoperiodic varieties of sweet grain sorghum;
- Development of varieties of sweet grain sorghum with high nutritional value;
- Selection/creation of dual use genotypes of sweet grain sorghum
- Development of drought tolerant varieties of grain sorghum from sorghum genotypes identified in Chad;
- Integrating Crop Growth Models and Genome To Phenotype models for better prediction
- Integration with Genomic prediction and GWAS Breeding program modernization

Skills available in the team :

- Geneticists, Breeders
- Collaborators : Ecophysiologist, statisticians, Food and Feed Scientists, botanists and systematists , plant pathologists

Who : Ardaly Ousseini, Niger



USAID
FROM THE AMERICAN PEOPLE

Country : Niger

Institution / Team : INRAN-NIGER Sorghum breeding program

3 main Research Questions:

- Breeding for drought, *striga* and midje tolerance
- Development of new breeding product profil (BPP) and implementation of gender aspect in a breeding process
- Marker assisted selection (MAS)

Platforms / tools:

- Striga collect and store
- Experimental fields
- BMS tools

On-going projects (locations):

- Sorghum and Millet innovation Lab (SMIL) : Sorghum and Millet improvment
- Desira ABEE : INRAN Niger Breeding program modernisation
- RED SAAC : Transfert of technology

Who : Ardaly Ousseini, Niger



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Main partners (Target Regions) :

- CERAAS / ISRA (Sénégal)
- INERA (Burkina Faso)
- IER (Mali)
- University of Maradi (Niger)
- KSU university (USA)
- FUMA GASKIA (Seed compagny-Niger)
- AINOMA (Seed compagny-Niger)
- INTERTEK (SWEDEN)

Future challenges / Target Regions :

- Breeding program modernisation
- Irrigation system modernisation
- DNA extraction and PCR materials
- Capacity bulding

Team staff :

- Agronomist
- Phytopalogist
- Geneticist

Who : Ousmane SANOGO, Mali



Country : Mali

Institution / Team : Institut d'Economie Rurale (IER)/ ESPGRN

3 main Research Questions:

- Which sorghum varieties are well adapted to the Sahelian zone?
- In the face of climate change, what message can be formulated for producers in the context of sorghum production?
- What is the role of producers in the development of sorghum value chains?

Platforms / tools:

- Innovation platform (Exchange of producers on new technologies contributing to the improvement of crop productivity)
- Platform for value chain actors
-

On-going projects (locations):

- Pathways to Agro-ecological Intensification of Sorghum and Millet Cropping Systems of Southern Mali (2013-2023)

Who : Ousmane SANOGO, Mali



Main partners (Target Regions) :

- IER, Mali
- Plant Production Systems, Wageningen University, Netherlands
- ICRISAT, Mali
- AMEDD, Farming Cooperatives, CMDT

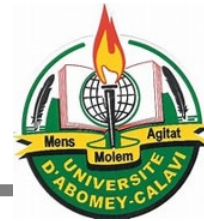
Future challenges / Target Regions :

- Development of varieties adapted to climate change
- Managing climate variability
- Development of the sorghum value chain
- Development of water-stressed sorghum crop options

Skills available in the team :

- Collaborators : Agronomist and agro-economist Scientists, Food and Feed Scientists, Modeling and farming systems

Who : Thierry Tovignan, Benin



Country : Benin

Institution / Team : University of Abomey-Calavi, Department of Genetics Biotechnology/Laboratory of Genetic Resources and Molecular Breeding

3 main Research Questions:

- Drought adaptation in sorghum
- Nutrients uptake in sorghum
- Bacterial disease resistance in tomato

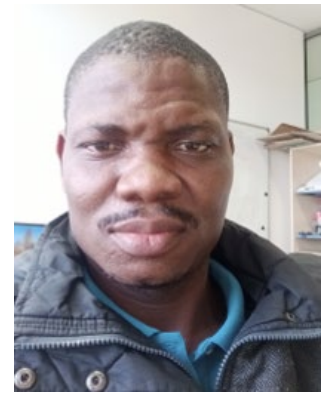
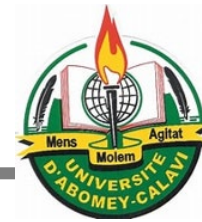
Platforms / tools:

- Molecular genetics
- Plant breeding
- Plant physiology
- Plant biotechnology

On-going projects (locations):

- Compost fertilization in sorghum, Benin
- Farmer's management of bacteria wilt disease on tomato, Benin
- Drought adaptation mechanisms: Physio, Transcriptomics, Giessen Univ, Germany

Who : Thierry Tovignan, Benin



Main partners (Target Regions) :

- CERAAS / ISRA (Sénégal)
- WACCI, Univ Ghana, Legon
- WordVeg Center, Benin
- Justus Liebig Univ., Giessen, Germany

Future challenges / Target Regions :

- Apply genomic tools in drought resistance of sweet sorghum
- Fine Phenotyping of Physiological basis of drought adaptation
- Genetic basis of bacterial (*R. solanacearum*) resistance in tomato

Skills available in the team :

- Plant breeders
- Crop Geneticist
- Plant Physiologist
- Plant Pathologist

Who : Amadou Jean Baptiste SORY, Burkina Faso



Country : Burkina Faso

Institution / Team : INERA Burkina Faso - Traditional Cereal Program, sorghum component, PhD student in the Genetic and Varietal Innovation Team (CIRAD/AGAP Institut/GIV)

3 main Research Questions:

- Develop new drought resistant/tolerant sorghum genotypes with good grain and forage productivity
- Genetic and molecular determinism (Forage quality, Grain quality, drought stress tolerance)
- Interactions between forage quality, grain production and staygreen genes
- Breeding scheme and strategy optimization

On-going projects (locations):

- DESIRA Abee : breeding programs modernization : West Africa (PhD Student)

Who : Amadou Jean Baptiste SORY, Burkina Faso



Main partners / Target Regions

- CIRAD (France)

Future challenges / Target regions :

- Breeding program modernization
- Development of sorghum genotypes incorporating Staygreen and Striga resistance QTLs
- Development of sorghum lines for the resistance to anthracnose
- Modeling and mapping of different known QTLs in sorghum

PhD directors names :

- Pr Sawadogo Mahamadou (PhD director)
- Dr Barro/Kondombo Clarisse Pulchérie (PhD Co-director)
- Dr Pot David (PhD Co-encircle)

Who : Korotimi Thera



Country : Mali

Institution / Team : IER, biotechnology laboratory

3 main Research Questions:

- Genetic and molecular determinism (sorghum stem and grain quality)
- Identification and validation of drought resistant and productive mutant lines of sorghum
- Develop improved sorghum lines for dual-purpose chain value and test with farmers' and agro-breeders partners

Platforms / tools:

- classical quantitative genetics, molecular genetics and population genetics
- Near infrared spectroscopy (NIRS/SPIR)

On-going projects (locations):

- APSAN: Improving Crop Productivity and Climate Resilience for Food and Nutritional Security : Mali
- AIEA: Improving resilience to drought in Rice and Sorghum through Mutation Breeding : Mali
- FCRIT: Genetic improvement of sorghum forage value : Mali

Who : Korotimi Thera



Main partners (Target Regions) :

- CIRAD / Montpellier (France)
- ICRISAT / (Mali)
- CERAAS / ISRA (Sénégal)
- INERA (Burkina Faso)
- Private partners : Camara semence

Future challenges / Target Regions :

- Implementation of high-throughput measurement chain for stem quality
- Modelization and establishment of above-ground biomass
- Development and study of isogenic lines
- Modernization of selection programs and enhancement of the seed system

Skills available in the team :

- Geneticists
- Breeders
- Ecophysiologicalist
-

Who : COULIBALY Wahauwouélé Hermann



Country : Côte d'Ivoire

Institution / Team : Université Nangui Abrogoua

3 main Research Questions:

- Immuno-stimulation properties of sorghum beer
- Non-*Saccharomyces* yeast strains to improve aromatic quality sorghum beer
- Valorization of sorghum draff pressing juice for the production of biotchanol
statisticians

Platforms / tools:

- Only the small equipment

On-going projects (locations):

- Regarding sorghum: None
- Post-doc researchs (Fellowships Eugen Iobescu): Probiotics for fishs: Romania

Who : COULIBALY Wahauwouélé Hermann



Main partners (Target Regions) :

- Université des Sciences Agronomiques et Médecine Vétérinaire (USAMV), Bucarest, Roumanie

Future challenges / Target Regions :

- *In vivo* tests on therapeutic virtues of sorghum beer (Côte d'Ivoire)
- Semi-production industrial of sorghum beer (Côte d'Ivoire)

Skills available in the team :

- Biotechnologist and microbiologist
- statisticians, animal biologist, chemistry, doctor, nutritionist
- Brewers