



ICRISAT

INTERNATIONAL CROPS RESEARCH INSTITUTE FOR THE SEMI-ARID TROPICS

Science with a human face

**From grass-root adaptation to regional drivers of change –
Mobilizing seed legacy from Earth’s warmest rainfed agriculture:
Sudano-Sahelian West Africa.**

Project Proposal submitted to: the African Climate Change Fellowship Program (START)

Implemented by: International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) – West and Central Africa Region

In cooperation with:

- Farmer Organizations in West Africa
- African Centre of Meteorological Applications for Development (ACMAD), Niger
- AGRHYMET Regional Centre (CILSS/ECOWAS), Niger
- Institut d'Economie Rurale (IER), Mali
- Savannah Agricultural Research Institute (SARI), Ghana
- Universität Hohenheim (UH), Stuttgart, Germany
- Université de Bamako (UB), Bamako, Mali
- University of Florida (UF), Gainesville, FL, USA
- University of Reading (UR), Reading, UK

June 2008

1. Proposing host institution

- 1.1 Name: International Crops Research Institute for the Semi-Arid Tropics – West and Central Africa Region (ICRISAT–WCA)
- 1.2 City and country of location: Bamako, Mali and Niamey, Niger
- 1.3 Type of institution: International Agricultural Research Center (CGIAR)
- 1.4 Primary mission of institution: agricultural research for development targeted at poor populations of the semi-arid tropics
- 1.5 Secondary missions: none
- 1.6 Main thematic areas of work: i/ Markets, Policy and Impacts, ii/ Harnessing Biotechnology for the Poor, iii/ Crop Improvement, Management and Utilization for Food Security and Health, iv/ Integrated Genetic & Natural Resource Management of Agro-Ecosystems.
- 1.7 Working languages of the institution: English, French

2. Proposal Leaders:

- 2.1 Pierre C. Sibiry Traore, Remote Sensing Scientist and Head, GIS
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- 2.2 Dr. Ramadjita Tabo, Deputy Director, West and Central Africa Region and Principal Scientist (Agronomy)
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3. Collaborating Institutions (in alphabetical order)

- 3.1 African Center of Meteorological Applications for Development (ACMAD), Niamey, Niger
Primary mission: Research for Development
Secondary mission: Information
Main thematic areas: weather and climate surveillance and prediction, information & communication technologies, climate change adaptation, technology transfer
Working languages: Arabic, English, French, Portuguese, Spanish
Principal contact person: Dr. Mohammed Kadi, mohamed_kadi@acmad.ne, kadi_metz@yahoo.com
- 3.2 Agrhymet Regional Center (CILSS/ECOWAS), Niamey, Niger
Primary mission: Information and Capacity Building
Secondary mission: Research and Development
Main thematic areas: contribute to improving food security, increasing agricultural production, improving natural resource management in CILSS and ECOWAS countries
Working languages: French, English, Portuguese

- Principal contact person: Dr. Seydou B. Traoré, s.traore@agrhyment.ne
- 3.3 Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), Bamako, Mali
 Primary mission: Agricultural research
 Secondary mission:
 Main thematic areas: multiple.
 Working languages: French
 Principal contact person: Dr. Michel Vaksmann, michel.vaksmann@ier.ml, michel@vaksmann.com
- 3.4 Institut d'Economie Rurale (IER), Bamako, Mali
 Primary mission: Agricultural research
 Secondary mission:
 Main thematic areas: Crop breeding, farming systems research, environmental sustainability, value-chain economics, etc.
 Working languages: French, English
 Principal contact person: Dr. Mamoutou Kouressy, mamoutou.kouressy@ier.ml, nanym63@gmail.com
- 3.5 Savanna Agricultural Research Institute (SARI), Wa, Ghana
 Primary mission: Research and Development
 Secondary mission: None
 Main thematic areas: Crop and soil improvement, farming systems research
 Working languages: English
 Principal contact person: Dr. Jesse B. Naab, jbnaab@africaonline.com.gh
- 3.6 Universität Hohenheim (UH), Stuttgart, Germany
 Primary mission: Higher Education
 Secondary mission: Research
 Main thematic areas: multiple. The collaboration will involve the Department of Soil Science and Land Evaluation.
 Working languages: German, English
 Principal contact person: Pr. Ludger Herrmann, herrmann@uni-hohenheim.de
- 3.6 Université de Bamako (UB), Bamako, Mali
 Primary mission : Higher Education
 Secondary mission: Research
 Main thematic areas: multiple. The collaboration will involve the Department of Geography.
 Working languages: French
 Principal contact persons : Pr. Samba Diallo, foulasamba@yahoo.fr
- 3.7 University of Florida (UF), Gainesville, FL, USA
 Primary mission: Higher Education
 Secondary mission: Research
 Main thematic areas: multiple disciplines. The collaboration will involve the Agricultural and Biological Engineering Department.
 Working languages: English
 Principal contact person: Dist. Pr. James W. Jones, jimj@ufl.edu

3.8 University of Reading (UR), Reading, UK

Primary mission: Higher Education

Secondary mission: Research

Main thematic areas: multiple disciplines. The collaboration will involve the Statistical Services Centre.

Working languages: English

Principal contact person: Pr. Roger Stern, r.d.stern@rdg.ac.uk

4. Fellowship experiences to be offered

ICRISAT-WCA and its partners propose **5 fellowship experiences** aimed at improving the use and management of local agro-biodiversity to enhance resilience and agricultural intensification in changing African climates. These 5 themes will engage a variety of stakeholders (farmers, extension staff, scientists, private sector, academia, policy makers) within a participatory research-action framework and will follow an integrated genetic and natural resource management (IGNRM) approach. Ongoing and interconnected climate change adaptation projects involving ICRISAT and its partners will provide a fertile research compound, a synergistic Community of Practice, and powerful leveraging to fellows' outputs.

4.1 Injecting local adaptation knowledge amongst West African policy makers: a showcase of the value and potential of sorghum and millet landraces for climate risk management (6-month policy fellowship)

West Africa is undergoing a profound shift in millet and sorghum breeding paradigms with mainstreamed participatory plant breeding and selection. That way, rusticity and productivity traits are combined in a new generation of landrace-based ideotypes better adapted to climatic variability in smallholder farming systems. Such a shift has not permeated at the policy maker level, still heavily reliant on exogenous and/or top-down solutions for crop productivity and food security. Risks associated with reductionist approaches are likely i/ at a systems level where the 'big three' (maize, rice, wheat) receive most attention (despite being climatically more sensitive), and ii/ at the intra-specific level where productivity targets eclipse stability traits. The policy fellow will take stock of novel adaptation maps developed by ICRISAT and partner breeders and GIS experts to launch a geo-marketing offensive targeted at policy makers in West Africa. The objectives will be to demonstrate the value and potential of sorghum and millet landraces and traits for climate risk management and use it as a showcase to support bottom-up paradigms in adaptive policy design. Bioethanol-producing sweet sorghum lines will be included in this demonstration.

4.2 Confronting modern and traditional knowledge to understand the impact of climate (and climate proofing) on germplasm adoption in smallholder systems (12-month doctoral fellowship)

As the result of a long adaptation process to environmental and socio-economic conditions, landraces synthesize local knowledge on varietal preferences and selection. Such knowledge is generally not formalized by farmers, who historically inherit an empirical awareness of the value of traditional practices from a generation to the next. Often viewed as obsolete in a context of societal and climate change, landraces have

generally been poorly studied in spite of superior adaptation to climate. The doctoral fellow will execute a trans-disciplinary (anthropology, climatology) study to elucidate the impact of climate on discrepancies between farmer declarations and actions, and on apparent changes in recent attitudes towards germplasm adoption. E.g., why do farmers historically declare preference for early material when asked by scientists, yet cap adoption rates at marginal levels? And contrastingly, why is early-maturing cultivar CSM63E, developed for Sahelian conditions, recently observed to spread rapidly in the Sudanian belt, in apparent contradiction with climate trends? Are these symptomatic of changes in climate or rather in family tissue, social fabric, and rural radio infrastructure? Is the research-development continuum well synchronized with climate fluctuations?

4.3 Scaling up a promising trait for adaptation to environmental variability: where can photoperiod sensitivity be promoted under current and changing climates? (12-month doctoral fellowship)

There is a growing belief that improved germplasm developed by research for West Africa in the past 3 decades was not sufficiently climate-proofed for smallholder conditions, which might explain persistent low adoption. Photoperiod (PP) sensitivity is one key adaptation trait that has been historically overlooked in the quest for increased productivity. It enhances simultaneous flowering of the cereals in the target region, independent of the planting date that is usually highly variable due to a scattered onset of the rainy season. PP-response has particular advantages for reducing bird damage and insect pressure and prolonging vegetative development in case of early planting, with obvious potential benefits for multi-purpose cropping (F5: feed, fodder, food, forage, fuel). This type of developmental homeostatic response (individual buffering) is widespread in sorghums and millets in the Sudanian and northern Guinean belts and probably holds considerable value for similar agro-ecologies outside present West Africa (such as Sudan and Southern Africa). Using climate databases and the DSSAT crop models recently adapted for PP response, the doctoral fellow will characterize target populations of environments for that trait, under present and changed climates, for sorghums, sweet sorghums and millets.

4.4 IGCRM solutions for productivity and stability. Wider paradigms that maximize the conciliation of local seed quality and climate adaptation with intensification targets (18-month post-doctoral fellowship)

Historically unpredictable West African climates fuel complex stress patterns through their interactions with soils and pests. Agro-biodiversity cannot be addressed in isolation of other buffer components like soils which strongly interact with climate change, notably through organic carbon and fertility. The optimal partitioning of buffering capacity between germplasm, soil and water management varies depending on farmer endowment and agro-ecology, and requires IGCRM approaches that are resolutely trans-disciplinary in nature. Soil fertility management not only helps robustness traits mitigate the negative impact of the poorer seasons; it also plays a critical role to exploit the positive opportunities of the 'better than average' seasons by unleashing the gains of introgressed productivity traits. The post-doctoral fellow will execute a ground-breaking spatial simulation study on the combined use of new climate-proofed, high yielding ideotypes, with fertilizer micro-dosing and endogenous water harvesting techniques such as the *Zai* system. The micro-dosing technology has shown its potential for increased

fertilizer use efficiency and crop productivity in sub-Saharan Africa. But considering the fragile natural resource base and in view of climate change, its sustainability needs to be elucidated. Will micro-dosing lead to soil mining and acidification, or to increased soil carbon and fertility? This study will build on activities 4.1, 4.2, 4.3 and demonstrate that technology adaptation to current environmental and socio-economic variability is a prerequisite to the longer-term goal of adjusting to societal and environmental change. It will provide insight into the future climate buffering and utilization tradeoffs needed to adjust research paradigms for sustainable production resilience and intensification.

4.5 Building African capacity to frame uncertainty in the formal, academic knowledge generation process (2-month teaching fellowship)

The complexity of climate change adaptation issues and the high levels of uncertainty associated with potential outcomes present specific and novel challenges in terms of knowledge exchange and generation. While communities at risk often lack the analytical skills to formalize their holistic knowledge (a question to be addressed in activity 4.2), academic curricula concurrently lack capacity in the probability statistics and stochastic methods required to contextualize research results. The latter continues to feed a longstanding communication gap between science and farmers. The teaching fellow will develop a trans-disciplinary MSc level training module including theoretical lectures and practical components to increase student proficiency in the use of probabilistic concepts and tools. This activity will build on existing capacity building initiatives, such as the electronic ‘Statistics In Applied Climatology’ training module (e-SIAC) developed by Univ. Reading and locally administered by ICRISAT.

5. Administrative and cost issues

5.1 Target number of fellows: 5 (five) total, distributed as:

- 1 policy fellow (in collaboration with ACMAD, Agrhymet)
- 1 doctoral fellow (in collaboration with SARI, UF)
- 1 doctoral fellow (in collaboration with IER, UH)
- 1 post-doctoral fellow (in collaboration with Agrhymet, CIRAD, UF, UH)
- 1 teaching fellow (in collaboration with UB, UR)

5.2 Preferred starting dates: January 2009

(except policy fellow: July 2009; teaching fellow: September 2009)

5.3 Estimated fellow costs (per fellow, on a monthly basis except noted otherwise):

- XOF 200,000 (housing)
- XOF 200,000 (meals)
- XOF 200,000 (other incidentals)

5.4 Hosting fees (per fellow, on a monthly basis except noted otherwise):

- XOF 30,000 (medical insurance)

XOF 50,000 (fixed costs: office space, etc.)
 XOF 100,000 (transportation)
 XOF 500,000 (post-doctoral fellows only, annual leave allowance, *per year*)

5.5 Other requirements (per fellow, on a monthly basis except noted otherwise):

XOF 900,000 (post-doctoral fellows only, children education allowance, *per year*)

6. Qualifications of the host institution

6.1 Institutional capacity

Background. ICRISAT's mandate is the improvement of rainfed farming systems in the semi-arid tropics (SAT) of the developing world. Climate variability therefore lies at the heart of ICRISAT's work. The SAT are defined by water scarcity, and today's unprecedented awareness of potential climate change impacts only increases the relevance of 35 years of dryland research to match limited and erratic resource use to the expanding food requirements of an exploding population. Since its foundation in 1972, ICRISAT has provided global research leadership to increase the productivity of rainfed agriculture which, today, provides 60% of the world's food.

A stepped-up response. Predicted climate change strongly suggests increased competition for water, curtailing the ability to achieve Millennium Development Goals and raising the specter of a worsening food security crisis. The projected negative impact of water scarcity on the expected expansion of irrigated agriculture prompted ICRISAT to advocate for substantially increased investments in rainfed agriculture (research). This position is developed in an institutional Operational Research Strategy on "Managing Current Climatic Uncertainty and Adapting to Future Climate Change" (2007-2012) where key climate change adaptation challenges are addressed through two major strategic initiatives: i/ helping farmers and their support agents cope better with current rainfall variability as a prerequisite to adapting to future climate change (short to medium term), and ii/ adapting mandate crops (sorghum, millet, groundnut, chickpea and pigeonpea) to grow in a warmer world (in the longer term). ICRISAT has concurrently partnered with a wide range of institutions in several on-going specially funded projects where integrated climate risk management approaches bring new and proven tools to bear on tactical and strategic options available to smallholders (cf. section 6.2). "What ICRISAT Thinks..." and other public awareness channels offer further testimonials of the renewed focus on climate adaptation research in ICRISAT's agenda.

A unique regional legacy. Semi-arid WCA is perhaps the most climatically sensitive and intricate region of the world, where continental effects (the strongest under the Tropics) dramatically magnify the rainfall forecasting problem. Variability in the onset of rains, which triggers a seasonal cascade of (a)biotic and socio-economic constraints, remains an unresolved prediction challenge, and WCA's climate remains unequivocally in the least predictable both at seasonal timescales and over the long term. In addition, Sudano-Sahelian West Africa is home to the warmest rainfed agriculture in the world. These

peculiarities have not only consolidated semiarid WCA into a primary center of agro-biodiversity and resilience expertise, they have also shaped modern agricultural research. This allowed ICRISAT-WCA and its partners to generate a wealth of agro-climatic and agro-biodiversity data, experience, and knowledge possibly unmatched in the whole CGIAR and available for climate change adaptation studies.

Innovative partnerships. In the 1980s ground-breaking agro-climatic works of Drs. Sivakumar, Virmani et al. resides a solid legacy of engagement with national and regional partners which has been progressively amplified since. ICRISAT also innovates by embedding staff within the national systems, and flipping institutional paradigms upside down to tangibly accelerate capacity building. This approach provides visiting fellows with a deeper exposure to other stakeholders of the research-development continuum, and will be fully availed to ACC fellows (to be based in the IER-Sotuba Joint GIS/modeling facility). At the same time, ICRISAT-WCA offers strong leadership in the use and development of participatory research methods. Existing strong ICRISAT connections with IPCC, WMO, GECAFS and other leading think tanks on climate adaptation will provide leverage to the research work of ACC fellows.

6.2 Project experience

3 ongoing collaborative projects are cited herein, plus 1 project at the submission stage. These are intended to give a snapshot of ICRISAT and its partners' involvement in climate related projects. A constellation of other related projects is available, all of which involve at least 3 of the current proposal partners.

6.2.1 CODE-WA: Community management of crop diversity to enhance resilience, yield stability and income generation in changing West African climates (BMZ-CCAAA funded, 2008-2011; institutions: Agrhymet-ICRISAT-IER-INERA-INRAN-SARI-UF-UH)

Goal: enhance community resilience, production stability and income generation by enriching agro-biodiversity management across a climatic gradient.

Philosophy: treat environmental variability as an opportunity for production intensification and stabilization.

Activities: participatory action-research, gender-aware co-learning activities on the use of intra- and inter-specific crop diversity and NRM engage farmers, extension personnel and scientists in communities at risk in the Sahelian, Sudanian and North Guinean zones (in Burkina Faso, Ghana, Mali, Niger). Genotype \times environment \times management (G \times E \times M) interactions modeling provide insight into future scenarios and identify best options for crop diversity management under climate change.

Research questions: i/ can we improve our understanding of local climate variability and change in a way that would guide the use of existing adaptation traits and participatory breeding? ii/ does agro-biodiversity management vary across heterogeneous communities and regions, and can we characterize this variability, notably at the village and landscape scales? iii/ can a participatory evaluation of existing and new IGNRM options allow for the identification of best bet practices that would be supported by G \times E \times M interactions analysis, and an estimation of their adaptive advantage under changing climate? iv/ can target populations of environments be characterized for new adapted germplasm and NRM options, and varietal performance used to map dynamic adaptation niches under

different climate scenarios in support of adaptive seed systems on a larger scale? v/ can participatory research methods and modern information technologies be combined to accelerate top-down, transversal, and bottom-up exchange of knowledge in a way that effectively strengthens adaptive capacity in various stakeholders?

6.2.2 An aflatoxin risk early warning system to improve nutrition, health and income in West African smallholder farms (CIDA-CCLF funded, 2006-2009; Agrhymet-ICRISAT-IER-SARI-Université de Sherbrooke)

Goal: develop and institutionalize an aflatoxin risk early warning system to bridge the information gap which restrains the adoption of aflatoxin mitigation techniques, and improve nutrition, health and income in smallholder farms of West Africa.

Philosophy: The weak link preventing the mitigation of aflatoxin, a potent carcinogen, teratogen and immuno-suppressor with very high exposure rates reported in West Africa, is the lack of awareness and operational risk information systems. A custom early warning system based on satellite estimates of the well-documented drivers of aflatoxin contamination (surface moisture, temperature) should substantially improve the situation.

Activities: i/ Monitoring of surface moisture, temperature from satellite. ii/ Development of a scalable data assimilation framework for optimal estimates of aflatoxin outbreaks. iii/ participatory design of qualitative risk indicators for translation of probabilistic forecasts by farmers (local language radio narrowcasts) and development actors (flyer, internet broadcasts, with color-coded scales and maps). iv/ application of aflatoxin risk EWS with mitigation technologies, awareness raising.

6.2.3 CPWF – Project 5: Enhancing rainwater and nutrient use efficiency for improved crop productivity, farm income and rural livelihoods in the Volta Basin (2004-2010: ICRISAT- INERA-SARI-TSBF/CIAT-UNU)

Goal: Reduce poverty and improve food security, income and livelihoods of small-scale resource poor farmers in the Volta Basin.

Philosophy: A systems approach that integrates water and nutrient use efficiency, soil and crop management, improved germplasm together with market opportunity identification and rural agro-enterprise development, and empowers rural communities will result in significant benefits to the rural poor and the environment, which can be scaled out to wider geographic areas.

Activities : i/ Develop, evaluate and adapt, in partnership with farmers, integrated technology options that improve water and nutrient use efficiency and increase crop yields in the Volta Basin. ii/ Develop and validate methodologies, approaches and modern tools (GIS, models, farmer participatory approaches) for evaluating and promoting promising water, nutrient and crop management technology options. iii/ Improve market opportunities for small holder farmers and pastoralists, identify and assess market institutional innovations that provide incentives for the adoption of improved water, nutrient and crop management technologies that benefit different categories of farmers, especially women and other marginalized groups of farmers; iv/ Build the capacities of farmers and rural communities to make effective demands to research and development organizations, and influence policies that promote the adoption of sustainable water and nutrient use technologies; v/ Promote and scale up and out ‘best bet’ crop, water, and nutrient management strategies in the Volta Basin through more efficient information and methodology dissemination mechanisms.

6.2.4 Clues from the Landraces – positioning local knowledge on plant management of climate uncertainty at the heart of adaptive agricultural strategies (concept note approved for full proposal development, at submission stage to IDRC-CCAA for 2008-2011; institutions: Agrhyment-AMEDD-ICRISAT-IER-INERA-SARI)

Goal: allow West African rainfed production systems to benefit more from the selection processes undergone by local populations over generations in order to increase their resilience to climate change.

Philosophy: generations of West African farmers have preserved specific traits in local sorghum and millet varieties (also known as “landraces”), which enhance community resilience in variable, unpredictable climates, and also hold promise for future adaptation to global changes.

Activities: i/ Take stock of the climate and plant legacy and confront traditional and modern knowledge to uncover adaptation mechanisms between landrace traits, indigenous knowledge and climate patterns of variability and unpredictability, from a smallholder’s perspective. ii/ Through participatory selection and multi-local trials conducted using existing pools of landraces and derived germplasm (ideotypes), enrich stakeholders’ assessment of varietal performance (yield components) through co-learning tools. iii/ Extend learnings from participatory multi-local trials with GxExM modeling and GIS to defined climatic scenarios, selected target traits and environments (TPE) in support of improved breeding programs, adaptive seed systems and policies. iv/ strengthen the adaptive capacity of stakeholders with novel communication structures, vertical farmer exchanges, degree and non-degree training of young African professionals, and participation in a Community of Practice involving partners across sister projects.

6.3 Publications record: see annex A

6.4 Experience hosting fellows during the past 5 years: see annex B

7. Qualifications of collaborating institutions

7.1 African Centre of Meteorological Applications for Development (ACMAD), Niger

Institutional capacity. ACMAD was established 1987 in Niamey, Niger by UNECA and WMO to assist 53 African countries with weather and climate predictions for various development applications (agriculture, water resources, health). ACMAD also develops, coordinates and assists in the implementation of climate-related, continental level projects such as RANET, THORPEX, AMMA, DecCoCast/EUMETSAT, PUMA, ClimDev Africa (upcoming AEWACS project). ACMAD produces seasonal precipitation forecasts through the PRESA regional forums for applications in hydrology, agriculture and food security and is involved in high-level policy making, such as the action plan on vulnerability of natural and socio-economic systems to climate variability and change in West Africa (in partnership with ECOWAS, UNECA and CILSS). For adaptation to climate change, ACMAD is a key data and advisory provider, a key source of expertise for climate scenario definition and interpretation, and a key contributor to public awareness and education. ACMAD partners include the National Meteorological and Hydrological Services (NMHS) of the 53 African States, sub-regional economic

groupings (SADC, ECOWAS, IGAD, CEMAC, IOC), sub-regional specialized institutions (DMC Harare, ICPAC Nairobi, NBA, AGRHYMET,...), international research centers (ICRISAT, NOAA, IRI, CIMMS, ECMWF, EUMETSAT, UKMO, Météo France, IRD, INM Spain,...), UN system agencies (WMO, FAO, WHO, UNEP, UNDP...).

Relationship with ICRISAT. As full members of the Niamey-based Platform of Regional Institutions for the Environment and Meteorology (PIREM), ACMAD and ICRISAT have developed a lively collaboration alongside other members (Agrhymet Regional Centre, Niger Basin Authority, CRESA, CERMES and EAMAC). ACMAD and ICRISAT are active partners in the DGCD-Belgium funded project on improving Sahelian smallholder livelihoods with bio-economic decision support tools (2003-08: <http://www.padniger.net>), notably on extension of climate information through rural radio technologies, and expect to launch together in 2009 an expanded second phase including both Mali and Niger. ACMAD and ICRISAT are currently teaming up to include added-value forecast products, such as aflatoxin early warning advisories, in the outputs of the upcoming African Early Warning and Advisory Climate Services (AEWACS) project, to be funded by the French Global Environmental Fund (FFEM).

7.2 Agrhymet Regional Centre (CILSS/ECOWAS), Niger

Institutional capacity. The Agrhymet Regional Centre (ARC) was created in 1974. It is a specialized institute of the Permanent Interstate Committee for Drought Control in the Sahel (CILSS) composed of nine member States. ARC is an interstate public institute with a legal status and financial autonomy. It has an international status and is based in Niamey, Niger. Recently, ARC has received an expanded technical mandate covering the entire CILSS and ECOWAS member countries. Its primary objectives are to contribute to achieve food security and increased agricultural production in the CILSS member States, and to improve natural resource management in the Sahelian region by providing training and information to development stakeholders and partners in agro-ecology taken as a whole (agro-climatology, hydrology, crop protection...). Over the years, ARC has asserted itself as a regional Centre of Excellence in: i/ training officers from Sahelian countries and elsewhere, ii/ regional agro-meteorological and hydrological monitoring, iii/ agricultural statistics and crop monitoring, iv/ regional databases, v/ management and dissemination of information on natural resource monitoring across the Sahel, vi/ documentation on agro-meteorology, crop protection, environmental monitoring, desertification, NRM, etc; vii/ maintenance of meteorological instruments and electronic equipment; viii/ strengthening interstate co-operation by sharing methodologies and technologies. Accordingly, the expertise of officers of the Centre is increasingly sought-after by bilateral and multilateral organizations (USAID, FAO, WHO, IRD, CIRAD, ...). ARC also takes part, in conjunction with the CILSS system, in international meetings on food security, sustainable development, natural resource management and desertification control. ARC's expertise is solicited worldwide, as evidenced by the many consultancies assigned to it by public and private sector organizations concerned mainly with food security, water control and desertification control.

Relationship with ICRISAT. Agrhymet Regional Centre (ARC) has been a steady collaborator of ICRISAT for over 30 years. Several research support staff of ICRISAT-WCA have received training at ARC, and likewise several ARC staff have enrolled in

degree training as part of joint research projects with ICRISAT. Numerous research projects associate both institutions, more so since ARC's secondary mission includes research for development activities. Past and current fields of common endeavor include climate data analysis, development and application of statistical and mechanistic crop models (DHC, DSSAT), remote sensing for land use change detection, development of added-value early warning advisories, regional mapping of varietal adaptation and performance, etc. As major custodians of climatic and biological data, ARC and ICRISAT enjoy sustained levels of data exchange. ICRISAT and ARC also share a network of research and training partners, such as the U.S. Geological Survey – Eros Data Center, with which they regularly organize joint training workshops on the use of geospatial technologies.

7.3 Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), Bamako, Mali

Institutional capacity. CIRAD's 2008-2012 strategic vision outlines six strategic lines of research for the Institute: i / help invent ecologically intensive farming systems to feed the world, ii/ analyze the conditions for the development of biofuels and ensuring that they benefit people in developing countries, iii/ innovate to make food accessible, varied and safe, iv/ foresee and manage risks of infectious diseases linked to wildlife and domestic animals, v/ support public policies aimed at reducing structural inequality and poverty, and vi/ understand better the relationships between agriculture and environment and between human communities and nature better, for sustainable rural areas. All strategic priorities are subject to climate's influence to a large extent, and climate adaptation research is naturally embedded in these undertakings. For example, CIRAD is leading or co-leading important donor-funded projects seeking to improve plant and cropping systems adaptation to a changing climate baseline through an enhanced utilization of local biodiversity. Such is the case of the (2003-2007) FFEM-funded project on preserving agro-biodiversity of sorghums in Mali (in partnership with IER and ICRISAT), recently approved for a second phase (2008-2011), or the (2008-2011) BMZ-CCAAA funded project on developing rice and sorghum crop adaptation strategies for climate change in vulnerable environments in Africa (involving IER and UH). A considerable amount of local agro-biodiversity data required for such projects originates within the CIRAD-IER-ICRISAT group at IER-Sotuba.

Relationship with ICRISAT. CIRAD has a long history of association with ICRISAT, especially in WCA. From 1989-97 the partnership entered a new phase following the integration of a team of CIRAD scientists into ICRISAT's sorghum improvement program based at Bamako, Mali. During that period as many as 30 joint research projects were implemented within 4 sub-programs of CIRAD each headed by a CIRAD scientist, involving varied disciplines: breeding, entomology, pathology, weed science, production systems, socio-economics. Since 2000, CIRAD's Dr. Clerget is working on sorghum plasticity at ICRISAT-Bamako. The same year, ICRISAT won a grant from the French AGROPOLIS for collaboration with CIRAD-CA scientists on a sorghum biotechnology project on transgenic sorghums to control stem borers. An ongoing project on environmental risk management of genetically engineered sorghums in Mali and Kenya (2005-08) is also implemented jointly by CIRAD and ICRISAT. Numerous other collaborative endeavors associate CIRAD and ICRISAT, including the Desert Margins

Program (DMP). Since 2000, a tight climate and crop modeling oriented collaboration has developed between Drs. M. Vaksman (CIRAD) and P.C.S. Traoré (ICRISAT), both based at IER-Sotuba, leading to several highly complementary donor funded projects.

7.4 Institut d'Economie Rurale (IER), Mali

Institutional capacity. IER, created in 1960, is Mali's National Agricultural Research System with the mission to contribute to improving land productivity following research paradigms tailored to the needs of the rural smallholders, to preserve the natural resource base, to increase food security and farmers' income, and to ensure a sustainable rural development, the rural sector being an integral part of the national economic growth. To carry out its mission, IER has set up a dynamic partnership with national, international organizations, farmer organizations, universities, NGOs, extension services, agro-industries / agro-dealers and the private sector. A number of climate adaptation projects are implemented from IER's agro-climatology unit, headed by Dr. Mamoutou Kouressy. The institute is among the strongest and most diversified NARS in West Africa, and boasts a long experience on aspects of plant adaptation to climate variability and change, notably in sorghums and millets. A considerable number of visiting fellows have transited through IER. IER is also unique in French-speaking Africa, having benefited from the largest number of USAID-sponsored higher degree trainings in the USA – resulting in a large English speaking proficiency across its program heads.

Relationship with ICRISAT. Collaboration dates back to ICRISAT's establishment, and has intensified over years. Prior to the construction of ICRISAT's Samanko station, ICRISAT was hosted by IER on the Sotuba campus. IER and ICRISAT are a good example of balanced NARS-IARC partnership, with original mechanisms for joint activity planning and monitoring. In 2000, IER and ICRISAT initiated a different kind of partnership at the request of IER. The initial objective was to develop IER's capacity in the use of GIS, modeling and remote sensing tools for agricultural research, and to lay the base for a regional research laboratory specialized in coupled bio- and geomatics. What made this initiative different was that it took the traditional roles in a partnership between a national and an international institution and turned them upside down, with ICRISAT out-posting one GIS/RS scientist to act as a catalyst in an IER-housed facility in Sotuba, Mali (P.C.S. Traoré). In this initiative, sustainable capacity building was undertaken 'from within', like an incubator. It quickly reached beyond technical training to include broader, critical issues of human and physical resource management. For example, ICRISAT helped promote a selection and performance evaluation system favoring the recruitment of younger, motivated and quick learning staff. ICRISAT also played a pivotal role in the development of stable connectivity infrastructure, virtually unequalled in the region. Partnerships were fostered by the seminal association between ICRISAT and IER, progressively attracting significant CIRAD resources (PSP: 2001), WARDA (2002), ICRAF (2004), ILRI (2008) with dedicate resources as well. The development of a critical mass of GIS/modeling-literate staff, and a growing integration between partners activities shifted stakeholder attitudes towards collaborative (rather than comparative) advantage paradigms. Research is redistributed with increased contacts between IARC and NARS staff, leading to intensified exchange of research and technical skills.

7.4 Savanna Agricultural Research Institute (SARI), Ghana

Institutional capacity. The overall goal of SARI is to increase farmers' productivity and income through the use of appropriate technologies identified and promoted by the institute in partnership with its collaborators. In this regard, SARI has in place in the Upper West Region of Ghana a Farming Systems Research Team with qualified personnel to handle climate adaptation technology trials. The institute has considerable experience in participatory approaches to technology development and dissemination. The strong collaboration with institutions in the region also provides opportunity for communication between research and implementing agencies like the Ministry of Food and Agriculture (MOFA), NGOs and farmers. Scientists in the institute have experience with applications of crop models that can greatly help the proposed project succeed. In the immediate past, the institute has collaborated in a project with the University of Florida that sought to develop a decision support system for agricultural applications of climate forecast. The goal of the project was to couple climate forecast information with simulation model analysis to provide a better context for decision makers and producers, and then ask if this information gives them any flexibility and decision options than climate data alone.

Relationship with ICRISAT. SARI has been collaborating with ICRISAT for the past two and half decades mostly in the area of germplasm exchange for crop improvement. ICRISAT has organized several workshops to exchange scientific information and new technologies, and training courses for scientists and technicians of SARI. This has enhanced the capacity of the institute to conduct research. More recently, SARI, ICRISAT and partners have engaged on several climate-related projects such as the above mentioned Challenge Program on Water and Food (Project 5 on the Volta Basin) which aims to maximize water and nutrient use efficiency, CIDA-CCLF funded project on the development of Aflatoxin Early Warning Systems, the BMZ-CCAAA funded CODE-WA project, and the USAID funded Soil Management Collaborative Research Program Phase II. Several SARI-ICRISAT joint activities also involve University of Florida.

7.5 Universität Hohenheim, Stuttgart, Germany

Institutional capacity. The University of Hohenheim has an outstanding experience with respect to agricultural research in tropical areas. This is facilitated by a special Center dedicated to agriculture in the tropics (Tropenzentrum). Since more than 20 years now, the university is hosting special research programmes funded by the DFG on adapted agriculture in different regions of the earth with emphasis on West Africa and SE-Asia. These programmes are interdisciplinary in nature and have lead to expertise in managing such complex projects and networks in which natural scientist, social scientists and economists work together. A similar experience exists for climate change topics with the Institutes for Soil Science and Physics who work on meteorological as well as soil related climate phenomena (i.e. mineral dust in the atmosphere, green house gases, soil C-stocks) since the 80ies. The University is regularly hosting students, doctoral and post-doctoral fellows from all over the world. These are partly trained in specialized courses in English. A similar experience exists for climate change topics with the Institutes for Soil Science and Physics who work on meteorological as well as soil related climate phenomena (i.e. mineral dust in the atmosphere, green house gases, soil C-stocks) since the 80ies.

Relationship with ICRISAT. Since the mid-80ies the University of Hohenheim is cultivating research exchange with ICRISAT especially in West Africa. There, between 1984 and 1999 the ICRISAT Sahelian Center hosted the Special Research Programme 308 “Adapted Agriculture in West Africa”. Later on, collaboration focused on climate change research in the frame of the DEKLIM programme (German climate research funded by BMFT) and a number of projects related to cereal breeding under changing climates. The BMZ-funded CODE-WA project, and another BMZ-funded on mobilizing regional diversity for creating new potential for pearl millet and sorghum farmers in West and Central Africa (2006-09) are such examples.

7.6 Université de Bamako, Mali

Institutional capacity. *Université de Bamako* was established in 1996 following the reform of the Malian higher education system and currently includes 4 schools and 5 specialized training institutes. The institutional consolidation of these previously independent educational entities helped address disciplinary bottlenecks with new cross-departmental initiatives. One such example is an ambitious research and training water management program just being launched, that involves biologists, hydrologists, climatologists, geographers, sociologists and economists (2009-2012). Climate change issues, approached from an agro-pastoralist perspective, are at the core of this program, which builds on a series of M.Sc. dissertations defended on topics such as : crop genetic characteristics, varietal selection, farmer and pastoralist perceptions of drought, and climate proofing of cultivation practices.

Relationship with ICRISAT. Shortly after its creation, UB established working relationships with ICRISAT notably through its Molecular Biology Laboratory (School of Sciences and Technology). Prior to that, ICRISAT has been a historical collaborator with UB via the co-supervision of agricultural engineering students enrolled at *Institut Polytechnique Rural* (IPR, now one of the 5 specialized training institutes at UB), on average 5/year. In addition since 2000, ICRISAT, IER and UB jointly coached more than 20 masters level students within the Joint GIS and Modeling Facility, a successful trans-disciplinary incubator located within the IER-Sotuba premises. This fertile collaborative environment with the academic sector will be strengthened with the involvement of ACC fellows, who will be based in the same facility.

7.7 University of Florida, Gainesville, FL, USA

Institutional capacity. University of Florida (UF) is co-founder of a leading ag-climate modeling consortium (South-East Climate Consortium, USA) which contains considerable expertise for the creation of new climate information, crop modeling and extension of climate services to poor farmers and is coalescing into a worldclass center of excellence for climate preparedness. It has particular expertise in the extension of agro-climatic information to farmers (AgClimate.org), and UF’s Agricultural and Biological Engineering Department has been involved, from the 1980s, in the development of the Decision Support System for Agrotechnology Transfer (DSSAT) suite of models. Taking advantage of the exposure and vulnerability of the state of Florida to climate extremes, and to the close relation between Atlantic hurricanes and West African climate, UF and its partners (notably: Florida State University) have developed an early knowledge of African climate, today capitalized from a climate change adaptation perspective.

Collaborative projects on smallholder farmer adaptation in Ghana are ongoing, and UF has led several Soil Management CRSP activities with IER, SARI and ICRISAT in West Africa. Recently, UF organized an international symposium on Climate Information for Managing Risks – Partnerships and Solutions for Agriculture and Natural Resources (<http://conference.ifas.ufl.edu/CIMR>), a testimonial of its leading capacity in the field.

Relationship with ICRISAT. UF has a thriving relationship with ICRISAT involving at least 4 active donor-funded research projects in Africa and Asia. ICRISAT and UF have entered a strategic partnership on distance education, with pilot programs implemented by UF's Institute for Food and Agricultural Sciences (IFAS) on "strengthening agricultural and environmental capacities through distance education and locally relevant research" (SAEC-DE, initially implemented in Kenya and Uganda). A decentralized UF infrastructure at ICRISAT headquarters is being envisaged. One of this proposal's leaders, P.C.S. Traoré, was involved in developing a joint UF-ICRISAT GIS training workshop, delivered in August 2006, and is currently a part-time visiting faculty at UF working on prototyping carbon sequestration services for African smallholder communities.

7.8 University of Reading, UK

Institutional capacity. The Statistical Services Centre (SSC) of The University of Reading was established in 1983. It works in partnership with the academic statisticians in the School of Biological Sciences and has links with other organisations in the University, particularly meteorology, agriculture and the Walker Institute that also work on issues concerned with climate change. The SSC provides training and consultancy in statistics and data management to a wide range of clients mainly outside the University. One area of strength is in support of the management and analysis of the historical climatic data. This work is largely for National Meteorological Services and users of climatic data, in Developing countries, and is supported by the Met Office UK, among others. SSC's mission is to facilitate good statistical practice amongst its clients and collaborators and to keep abreast of modern developments in statistics so that we can turn them into practical tools. SSC prides itself on offering a modern approach to training in statistics and one key training course is an e-learning course called "Statistics in Applied Climatology". Face-to-face trainings on the analysis of climatic data at a more advanced level are also organized.

Relationship with ICRISAT. SSC works closely with ICRISAT staff on a range of research projects as well as on training courses. In 2008 SSC has been involved in designing a training course in statistics before the cropping season, and will return to give further training on the analysis, once the season has finished. SSC also works closely with ICRISAT staff on two projects, one in the ASARECA region and the second in Malawi. In each project, our role is partly one of capacity-development. It is also designed to re-enforce the links that ICRISAT has with National met Services in Africa.

8. Supervisor / mentor team

- 8.1 Pierre C. Sibiry Traore, Remote Sensing Scientist & Head, GIS
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Resume and list of supervised fellows: annex C
- 8.2 Dr. Ramadjita Tabo, Deputy Director, West and Central Africa
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- 8.3 Dr. Michel Vaksmann, Agronomist, Soils and bio-climate specialist
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Resume and list of supervised fellows: annex E

9. **Interest in applicant review: YES.**

Annex A – ICRISAT-WCA publication record (selected publications: ICRISAT staff in bold, ACCFP proposal cited partner staff in italics)

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Annex B: ICRISAT-WCA hosted fellows during the past 5 years (partial listing of fellows involving supervision by above mentioned ACCFP proposal mentors)

Post-doctoral fellows:

- Gospel Omanyia : Pearl millet adaptation to the Sudano-Sahelian environment
- Youssouf Camara : Impact assessment of sorghum varieties and natural resource management technologies
- Albert Nikiema: Agroforestry research under semid-arid conditions

Doctoral fellows:

- Comfort Manyame: Spatial modeling of regional soil water balance from remotely sensed data and indigenous knowledge to predict crop stress and mitigate food deficit in Niger
- Irenikatche Akponikpe: Modeling intensification strategies for pearl millet under Sahelian conditions
- Mehdi Saqalli: Decision-making processes of Sahelian farmers
- Mounkaila Mohamed : Elaboration des documents GEF
- Aminata Sidibé : Carbon sequestration and soil fertility studies (Borlaug fellow, SM-CRSP)
- Lassana Toure: Spatial analysis of ecological and genetic interactions between wild and cultivated sorghums in Mali
- Evans Mutegi: Ecogeographical distribution of wild, weedy and cultivated *Sorghum bicolor* in Kenya
- Antonio L.E.F. Querido: Remote sensing estimation of tree biomass to assess carbon sequestration over spatially variable savanna agroforestry landscapes (Borlaug fellow)
- Jackson Acha Atam: Dynamic mapping of surface moisture and temperature with thermal, microwave remote sensing for aflatoxin risk early warning

Post-graduate fellows (M.Sc., M. Eng. Levels)

- Aissata M. Ibrahim : Selection et amelioration des especes vegetales
- Moussa Hama Boureima : Sociologie rurale
- Mamane Bachir Magagi : Test d' une methode pour ameliorer l' efficacite de la fumure par parcage du betail
- Garba Issa : Inventaire de ligneux sur image haute resolution
- Yahaya Mounkaila : Erosion eolienne
- Soumana Hamadou : Erosion hydrique
- Ibrahim Bio Yerima : Erosion eolienne
- Saadatou Oumarou : Stage de perfectionnement pratique dans le domaine du maraichage
- Nathalie van Vive: Spatial-temporal analysis of rainfall events at the landscape scale : the case of Fakara
- Caroline Dandois: Contribution to the analysis of the effect of organic and inorganic amendment and water interactions on millet yields
- Seriba Konare: Estimation of tree crown height in farmer fields from shade cone analysis on QuickBird images

- Abdou Ballo: Development of a reference framework for soil degradation monitoring in the Office du Niger area (Mali)
- Djeneba Dembele: Remote sensing of saline soils in the Office du Niger area
- Jean-Etienne Bounguili : Seasonal climate prediction and risk in sudanian regions: opportunities for improved sorghum varieties?
- Souleymane Kanta Kiari: Tree detection and crown extraction in farmers fields from QuickBird imagery
- Yacouba Dramane Traore: Contribution of texture analysis to crop LAI retrieval from satellites
- Aicha Foune Sako: Development of a varietal adaptation internet map server for sorghums and millets in West Africa
- Aurelie Folliard: Development of an improved photoperiod response function for DSSAT
- Binta Ndiaye: Development of a geospatial metadata inventory for ICRISAT-Mali data holdings

▪ **Annex C: Resume of P.C.S. Traoré**

RESUME: Pierre C. Sibiry Traoré

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 Saranbugu, Lot. 127 L-N, Com^{ne} de Sangarebugu, C/ Kati, Mali, West Africa (home)
Voice: +223 222-3375 / 224-2371 (office), +223 902-6428 (mobile)
Email: p.s.traore@cgiar.org / sibiry.traore@ier.ml / pstraore@ufl.edu (office),
sibiry@afribone.net.ml (home)

Skills

- | | |
|-------------------------|--|
| <i>Languages</i> | <ul style="list-style-type: none"> • Bamanankan, English, French |
| <i>Computer-related</i> | <ul style="list-style-type: none"> • LAN / WAN / website setup & management, Internet Map Servers (ArcIMS, IONIC), infographics (Corel) • DOS, WindowsNT, UNIX operating systems • General scientific: C, IDL, SURFER, SPLUS • Geomatics: PCI/EASI PACE, ERDAS, ENVI, ArcGIS/ArcInfo/ArcView, MapInfo, Pathfinder Office, GRADS • Agro-ecosystems modelling and related: APSIM, CropSyst, DSSAT, NUTMON |
| <i>Miscellaneous</i> | <ul style="list-style-type: none"> • GPS survey planning and operation; training in GPS, GIS and image processing • Field spectroscopy, land surveying, topography and geodetic field techniques • Remote sensing data processing: visible, near-infrared, thermal infrared, microwave • Spatial statistics : geostatistical modeling, texture analysis • Environmental research projects design and implementation • Superior adaptability, interpersonal skills and human resource management capacities |

Work experience

- [2006-pr.] Visiting Faculty, Univ. Florida, Agricultural & Biological Engineering Department, Gainesville, FL, USA (part-time)
- [2000-pr.] Head of GIS, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) with base in Sotuba, Mali
- [1998-00] Junior Research Scientist, Soil-Water-Plant Laboratory (LaboSEP/IER), Bamako, Mali
- [1996-98] Graduate Research Assistant, Center for Remote Sensing Research and Applications (CARTEL), Sherbrooke

Current research undertakings

- Domain: linkages between global change, agriculture and health
- Specific: carbon sequestration, agricultural forecasting and early warning systems (crop yields, pests, fungi & diseases)
- Approach: applications of satellite earth observation and multi-scale environmental modeling to target and implement enhanced productivity and sustainability options

Training

- Academic**
 - [1996-pr.] Ph.D. remote sensing (part-time), Univ. Sherbrooke, Sherbrooke, Canada
 - [1994-95] M.Sc. geography / remote sensing, Univ. Sherbrooke
 - [1993-94] M.Sc. physical geography, Univ. Joseph Fourier, Grenoble, France
 - [1990-93] B.Sc. geography, Univ. Joseph Fourier
 - [1987-90] Math/physics degree, Stendhal International High School, Grenoble
- Other**
 - [2007] NCAR (National Center for Atmospheric Research), Boulder, CO, USA
 - [2002] IRI (International Research Institute for Climate Prediction), Palisades, NY, USA
 - [2000] ICRISAT Asia Center (International Crop Research Institute In the Semi-Arid Tropics), Patancheru, India
 - [1995] NASA/JPL Earth Science Summer School, California Inst. Tech., Pasadena, CA, USA
 - [1993; 90] CRCT (Center for Research in Tropical Climatology), CNRS, Univ. Bourgogne, Dijon, France
 - [1992] LGGE (Laboratory for Glaciology and Environmental Geophysics), CNRS, Univ. Joseph Fourier
 - [1991] ICIV (Institute for the International Cartography of the Vegetation), CNRS, U.P.S., Toulouse, France
 - [1991] IFORD/FNUAP (Institute for Training and Research in Demography), Yaoundé, Cameroon
- Awards, grants and scholarships**
 - [2008-11] EUR 1,180,000 GTZ-BMZ research grant for a project on ‘Community management of crop diversity to enhance resilience, yield stability and income generation in changing West African climates’
 - [2006-09] CAD 225,000 CIDA research grant for a project on ‘an aflatoxin early warning system to improve nutrition, health and income on West African smallholder farms’
 - [2004-05] USD 10,000 sub-grant as part of a CGIAR ICT/KM project on metadata inventory
 - [2002-06] USD 40,000 sub-grant as part of the USAID Soil Management CRSP project on ‘Measuring and assessing soil carbon sequestration by agricultural systems in developing countries’
 - [2002-03] USD 23,000 grant (START/Packard Foundation) for the pilot project ‘Bytes for Bites: translating climate forecasts into

enhanced food security for the Sahel'

- [1993-94] CAD 10,000 scholarship (CIME – Student Mobility Program), AUPELF-UREF
- [1993-94] CAD 4,000 scholarship (International Student Exchange Program), Région Rhône-Alpes, France
- [1993] Gold Medal Award – Superior Studies in Piano (12th year), Erik Satie Musical Center, Grenoble, France
- [1992] Certificate in Pascal programming, Univ. Joseph Fourier
- [1989] Cambridge First Certificate of English, Cambridge, UK

Publications

- Traoré, P.C.S., Clerget, B., Haussmann, B.I.G., Kouressy, M., Maikano, I., Naab, J.B., Sako, A., Soumaré, M., Traoré, S.B., Vaksmann, M., Weltzien, E., 2008. Beyond “normal” LGP: mapping cultivar adaptation in variable West African climates. Or... adapting to what we know we don't know (yet). International Symposium on Climate Information for Managing Risks. June 10-13, 2008. St. Pete Beach, FL.
- Kouressy, M., Traoré, S.B., Vaksmann, M., Grum, M., Maikano, I., Soumaré, M., Traoré, P.S., Bazile, D., Dingkuhn, M., Sidibé, A., 2008. Adaptation des sorghos du Mali à la variabilité climatique. Cahiers d'Etudes et de Recherches Francophones – Agricultures 17(2) :95-100.
- Soumaré, M., Kouressy, M., Vaksmann, M., Maikano, I., Bazile, D., Traoré, P.S., Traoré, S.B., Dingkuhn, M., Touré, A., Vom Brocke, K., Somé, L., Barro-Kondombo, C.P., 2008. Prédiction de l'aire de diffusion des sorghos photopériodiques en Afrique de l'Ouest. Cahiers d'Etudes et de Recherches Francophones – Agricultures 17(2) :160-164.
- Bationo, A., Tabo, R., Okeyo, J., Kihara, J., Maina, F., Traoré, P.C.S., Waswa, B., 2008. General Characteristics of the Volta Basin. In: Bationo, A., Tabo, R., Waswa, B., Okeyo, J., Kihara, J., Fosu, M., Kaboré, S., (Eds.), Synthesis of soil, water and nutrient management research in the Volta Basin. © 2008 TSBF, Ecomedia Ltd., Nairobi, Kenya, ISBN 978-92-9059-220-04. pp 1-23.
- Acha Atam, J., Goïta, K., Traoré, P.C.S., He, D.G., 2008. Public health, food security and geomatics : the role of geomatics technologies in the development of an aflatoxin early warning system in West Africa. In: Tripathi, N.K. (Ed). Geoinformation Technology for Better Health. Proceedings of the Second International Conference on Health GIS. 14-16 January 2008, Bangkok, Thailand, pp. 63-66. ISBN 9789741369768.
- Traoré, P.C.S., Bostick, W.M., Jones, J.W., Koo, J., Goïta, K., Bado, V., 2008. A simple soil organic matter model for biomass data assimilation in community-level carbon contracts. Ecol. Appl. 18(3):624-636.
- Deu, M., Sagnard, F., Chantereau, J., Catalyud, C., Hérault, D., Mariac, C., Pham, J.L., Vigouroux, Y., Kapran, I., Traoré, P.S., Gérard, B., Ndjeunga, J., Bezançon, G., 2008. Niger-wide assessment of in-situ sorghum genetic diversity with microsatellite markers. Theor. Appl. Genet. (in press).

- Sy, O., Marie, J., Morand, P., Ndjim, H., Bélières, J.F., Cissé, C., Diarra, L., Fofana, A., Givone, P., Maïga, H., Ndiaye, M.K., Orange, D., Traoré, P.S., 2007. The Niger River's Future. A collegial expertise. IRD Editions, 258 p. + CD-ROM, ISBN 978-2-7099-1632-5.
- Diarra, L., Fofana, A., Givone, P., Maïga, H., Morand, P., Orange, D., Traoré, P.S., 2007. Connaissance du fleuve Niger, évolution et indicateurs (English and French). In : Sy et al. (Eds), The Niger River's Future. Chapter 3 (CD-ROM), IRD Editions.
- Fofana, A., Givone, P., Marie, J., Morand, P., Orange, D., Traoré, P.S., 2007. Les systèmes d'information environnementaux (English and French). In : Sy et al. (Eds), The Niger River's Future. Chapter 3 (CD-ROM), IRD Editions.
- Querido, A., Yost, R., Traoré, S., Doumbia, M.D., Kablan, R., Konaré, H., Ballo, A., 2007. Spatiotemporal mapping of total carbon stock in agroforestry systems of sub-saharan Africa. ASA-CSSA-SSSA International Annual Meetings. New Orleans, 2007.
- Soler, C.T., Olatinwo, R., Hoogenboom, G., Diarra, B., Waliyar, F., Traoré, S., 2007. Peanut contamination by *Aspergillus Flavus* and Aflatoxin B1 in granaries of villages and markets in Mali, West Africa. ASA-CSSA-SSSA International Annual Meetings. New Orleans, 2007.
- White, J., Hoogenboom, G., Huda, S., Kimball, B., Ottman, M., Prasad, P.V., Rosenthal, W., Sanon, M., Staggenborg, S., Traoré, S., Vaksman, M., Vanderlip, R.L., 2007. Recent advances in the CSM-CERES Sorghum model. ASA-CSSA-SSSA International Annual Meetings. New Orleans, 2007.
- Traoré, P.C.S., Bostick, W.M., Jones, J.W., Bado, B.V., 2007. Simplifying RothC for biomass data assimilation in C sequestration contracts. International Symposium on Innovations for a Green Revolution in Africa: exploring the Facts. Arusha, Tanzania, Sept. 17-21, 2007.
- Traoré, P.C.S., Kouressy, M., Vaksman, M., Tabo, R., Maikano, I., Traoré, S.B., Cooper, P.J.M., 2007. Climate prediction and agriculture: what is different about sudano-sahelian West Africa? In Sivakumar, M.V.K. et al. (Eds.), Climate Prediction and Agriculture: Advances and Challenges, WMO. Springer-Verlag ISBN 978-3-540-44649-1, pp. 189-203.
- Shapiro, B.I., Winslow, M., Traoré, P.C.S., Balaji, V., Cooper, P., Rao, K.P.C., Wani, S., Koala, S., 2007. Climate Applications and Agriculture: CGIAR Efforts, Capacities and Partner Opportunities. In Sivakumar, M.V.K. et al. (Eds.), Climate Prediction and Agriculture: Advances and Challenges, WMO. Springer-Verlag ISBN 978-3-540-44649-1, pp. 63-70.
- Jones, J.W., Koo, J., Naab, J., Bostick, W.M., Traoré, S., Graham, W.D., 2007. Integrating Stochastic Models and in situ Sampling for Monitoring Soil Carbon Sequestration, *Agricultural Systems* 94(1):52-62.
- Diarra, D. Kangah, P.D., Traoré, P.C.S., Gérard, B., Konaté, M., 2007. Agriculture in Mali. In Hellmuth, M.E., Moorhead, A., Thomson, M.C., and Williams, J. (eds) 2007. Climate Risk Management in Africa: Learning from Practice. International Research Institute for Climate and Society (IRI), Columbia University, New York, USA, pp. 59-74.

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- Kouressy, M., Vaksmann, M., Traoré, S.B., Traoré, P.C.S., Dingkuhn, M., 2005. Photoperiodism of African sorghums: a response to rainfall variability. AMMA-CIRAD workshop on 'Monitoring and forecasting the African monsoon impacts on agriculture and vegetation', CERAAS, Thiès, Senegal 6-9 Dec. 2005. Conference paper.
- Cooper, P.J.M., ALUMIRA, J., Dimes, J., Hatibu, N., Rao, K.P.C., Shapiro, B.I., Shiferaw, B., Traoré, P.C.S., Twomlow, S.J., Winslow, M., 2005. Coping with current climatic variability and adapting to future climate change in the rain-fed farming systems of sub-Saharan Africa: the rationale for building a consortium. Meeting of the CGIAR Inter-Center Working Group on Climate Change, ICRAF-Nairobi, 11-14/10/05. Conference paper.
- Sagnard, F., Traoré, P.C.S., Weltzien, E., Touré, A., Touré, L., Koïta, O., Kanyenji, B., 2005. Environmental Risk Assessment of Genetically Engineered Sorghums in Mali and Kenya: Objectives and methodological framework. USAID-PBS Biotechnology and Biodiversity Interface External Advisory Board Meeting, 12-15/9/05, Manila, Philippines. Oral communication.
- Shapiro, B.I., Winslow, M., Traoré, P.C.S., Balaji, V., Cooper, P., Rao, K.P.C., Wani, S., Koala, S., 2005. Climate Applications and Agriculture: CGIAR Efforts, Capacities and Partner Opportunities. International Workshop on Climate Prediction and Agriculture: Advances and Challenges. Geneva, Switzerland, 11-13 May 2005. Oral communication.
- Traoré, P.C.S., Doumbia, M.D., Jones, J.W., Naab, J.B., Goïta, K., 2005. Unlocking opportunities from global change for sudano-sahelian agriculture: carbon sequestration in soils. International Workshop on Earth Observation and Global Environmental Change, 17-19 Aug. 2005, UCAD, Dakar, Senegal. Oral communication.
- Traoré, P.C.S., Bounguili, J.E., Kouressy, M., Vaksmann, M., 2005. Seasonal forecasting and climate risk in the Sudanian zone: progress towards new opportunities for improved sorghum varieties. International Workshop on Climate Prediction and Agriculture: Advances and Challenges. Geneva, Switzerland, 11-13 May 2005. Oral communication.

- Traoré, P.C.S., Doumbia, M.D., Jones, J.W., Naab, J.B., Goïta, K., Gérard, B., Van Rooyen, A., NDIAYE, B., 2005. Unlocking opportunities from global change for sudano-sahelian agriculture: a spatial data assimilation framework for carbon sequestration. CGIAR-CSI Geospatial Science Meeting and Planning Workshop, 17-21 Oct. 2005, Nairobi, Kenya. Oral communication.
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- Traoré, P.C.S., Sagnard, F., Touré, L., Kanyenji, B., 2005. Environmental risk assessment of genetically engineered sorghums in Mali and Kenya: a landscape genetics approach in contrasted African settings. Symposium for Agricultural Biotechnology Risk Analysis Research. USDA-APHIS, Riverdale, MD, Nov. 29-Dec. 1, 2005. Poster.
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- Delisle, L., P.C.S. Traoré, A. Ballo, M.D. Doumbia, R.S. Yost, 2004, Estimating soil organic carbon stocks at the field-level using GIS and geostatistics, 2004 ASA-CSSA-SSSA International Annual Meetings, Seattle, WA, Oct. 31-Nov. 4, 2004. Poster.
- Soumaré, M., M. Vaksmann, P.C.S. Traoré, M. Kouressy, 2004, Recent evolution of climate and consequences on adaptation for sorghum varieties in Mali (in French), Mali Symposium on Applied Science (*MSAS'2004*), Bamako, Mali, 2-5 Aug. 2004. Oral communication
- Traoré, P.C.S., J.W. Jones, J. Koo, W.M. Bostick, M.D. Doumbia, J.B. Naab, 2004, Integrating remote sensing, soil sampling, and biophysical models with an Ensemble Kalman Filter to monitor soil carbon sequestration, *MSAS'2004*. Oral communication
- Traoré, P.C.S., N. Sakana, M.D. Doumbia, R.S. Yost, 2004, Accuracy assessment of ASTER digital elevation models for topography extraction at field and watershed levels, *MSAS'2004*. Oral communication
- Traoré, P.C.S., W.M. Bostick, M.D. Doumbia, J.W. Jones, A. Yoroté, 2004, Monitoring landscape variability from space to optimize projections of carbon accretion by small agricultural communities, International Symposium of the African Network for Soil Biology and Fertility (AfNet) of the TSBF institute of CIAT, Yaoundé, Cameroon, 17-21 May 2004. Poster
- Traoré, P.C.S., W.M. Bostick, A. Yoroté, J. Jones, M.D. Doumbia, 2004, Upscaling carbon model predictions using very high resolution imagery : evaluation of contextual approaches to land cover classification and crop identification, *SW-LMCS*. Oral communication
- Traoré, P.C.S., A. Folliard, M. Vaksmann, C. Porter, M. Kouressy, J.W. Jones, 2004, Enhanced photoperiod response modeling for improved biomass simulation in a Sudanian carbon accounting framework, *SW-LMCS*. Oral communication.

- Folliard A., P.C.S. Traoré, M. Vaksman, M. Kouressy, 2004, Modeling of sorghum response to photoperiod: a threshold-hyperbolic approach, *Field Crops Research* 89:1, 59-70
- Traoré P.C.S., W.M. Bostick, A. Yoroté, J. Jones, A. Ballo, 2003, Assimilation of high resolution remote sensing imagery for soil carbon accounting in Sudanian cotton-based agricultural systems, *AfricaGIS'03*, 6th AfricaGIS Conference and Exhibition, Dakar, Senegal, 4-7 November 2003. Oral communication.
- Bostick W.M., J. Koo, J.W. Jones, A.J. Gijssman, P.C.S. Traoré, B.V. Bado, 2003, Combining model estimates and measurements through an ensemble Kalman filter to estimate carbon sequestration, ASAE paper no. 033042, St. Joseph, Mich.: ASAE
- M.D. Doumbia, A. Touré, A. Sidibé, M.A. Diarra, A. Bagayoko, P.C.S. Traoré, G.C. Peterson, D.T. Rosenow, L.R. Hossner, F.M. Hons, 2002, Adaptation of sorghum genotypes to acid soil conditions, *INTSORMIL Principal Investigators Conference*, Addis Ababa, Ethiopia. Poster.
- Traoré P.C.S., M.D. Doumbia, M. Kouressi, S. Sissoko, 1999, Crop growth modelling based on ERS scatterometer information, *International Society of Photogrammetry and Remote Sensing / AARSE Symposium*, Cotonou, Benin
- Doumbia M.D., A. Sidibé, P.C.S. Traoré, A. Bagayoko, 1999, Diagnosis of soil nutrient constraints and recommendations for lime, nitrogen and phosphorus in Mali, *Workshop on Decision Processes for Determining Diagnostic and Predictive Criteria for Soil Nutrient Management*, Maligaya, Philippines
- Traoré P.C.S., A. Royer, N. O'Neill, K. Goïta, R. Laprise, D. Caya, 1998, Analysis of the Potential of NOAA-AVHRR Times Series for the Validation of the Canadian Regional Climate Model, *20th Canadian Symposium of Remote Sensing*, Calgary, Canada
- Royer A., P.C.S. Traoré, N. O'Neill, K. Goïta, N. Bussièrès, 1997, Global parameterization of energy budget from satellite-derived albedo, NDVI and land surface temperature combined parameters, in Guyot and Phulpin (eds.), *Physical Measurements and Signatures in Remote Sensing*, Balkema, Rotterdam, pp. 773-777.
- Traoré P.C.S., A. Royer, K. Goïta, 1997, Land surface temperature time series derived from AVHRR global vegetation index composite: potential and constraints for northern latitudes, *Canadian Journal of Remote Sensing*, 23:4, pp. 390-400
- Traoré P.C.S., 1996, Meso-scale remote sensing of phyto-ecological dynamics and surface energy budget in West Africa, M.Sc Thesis (in french), University of Sherbrooke

Representing ICRISAT/IER around the world

- Numerous symposia and workshops worldwide. On average since 2000, 10 yearly representations abroad (Africa: 6, Europe/Asia: 2, America: 2)

Memberships

- ASPRS – American Society of Photogrammetry and Remote Sensing

- CASI – Canadian Aeronautics and Space Institute
- International Consortium for Agricultural Systems Applications
- Internet Society – Mali Chapter

Extracurricular activities

- [2003-pr.] Member of the Partnership to Cut Hunger and Poverty in Africa (Mali national committee and working group on capacity building for science and technology)
- [1995-pr.] Founder and co-manager of the Malian World Network <malilink@malilink.net> (Mali national mailing-list)
- [1999-00] Design and maintenance of the website of the Soil-Water-Plant Laboratory in Bamako, Mali
- [1998] Design and maintenance of the official website of the Embassy of Mali in Washington, USA
- [1996-98] Student representative for the remote sensing Ph.D. program with the university council, Univ. Sherbrooke
- [1993-98] Association of African Students in Sherbrooke (AEAS, secretary general [1993-95])
- [1993-98] Association of Malians in Sherbrooke (secretary [1993-94]), Canada
- [1992-93] O.A.U. Youth Mouvement (*Jeunesse O.U.A.*), Bamako, Mali
- [1992-93] *Coopérative culturelle Jamana*, Bamako, Mali
- [1989-93] Association of Malians in Grenoble (A.R.M.I.), France

Mentored fellows and students

Doctoral fellows

- Lassana Toure: Spatial analysis of ecological and genetic interactions between wild and cultivated sorghums in Mali (2006-09)
- Evans Mutegi: Ecogeographical distribution of wild, weedy and cultivated *Sorghum bicolor* in Kenya (2007-09)
- Antonio L.E.F. Querido: Remote sensing estimation of tree biomass to assess carbon sequestration over spatially variable savanna agroforestry landscapes (Borlaug fellow) (2006-07)
- Jackson Acha Atam: Dynamic mapping of surface moisture and temperature with thermal, microwave remote sensing for aflatoxin risk early warning (2007-09)

Post-graduate fellows (M.Sc., M.Eng. levels)

- Aicha Founé Sako: Development of a varietal adaptation internet map server for

- sorghums and millets in West Africa (2008)
- Seriba Konare: Estimation of tree crown height in farmer fields from shade cone analysis on QuickBird images (2005)
 - Abdou Ballo: Development of a reference framework for soil degradation monitoring in the Office du Niger area (Mali) (2005)
 - Djeneba Dembele: Remote sensing of saline soils in the Office du Niger area (2005)
 - Binta Ndiaye: Development of a geospatial metadata inventory for ICRISAT-Mali data holdings (2005)
 - Jean-Etienne Bounguili : Seasonal climate prediction and risk in sudanian regions: opportunities for improved sorghum varieties? (2004)
 - Souleymane Kanta Kiari: Tree detection and crown extraction in farmers fields from QuickBird imagery (2004)
 - Yacouba Dramane Traore: Contribution of texture analysis to crop LAI retrieval from satellites (2004)
 - Aurelie Folliard: Development of an improved photoperiod response function for DSSAT (2003)

Annex D: Resume of Dr. Ramadjita Tabo

NAME: Ramadjita TABO (PhD)
PLACE AND DATE OF BIRTH: Oum - Hadjer, Chad - March 4, 1957
NATIONALITY: Chadian
MARITAL STATUS: Married with 5 children
PERMANENT ADDRESS: Deputy Director and Regional Coordinator
 (West and Central Africa) Desert Margins
 Program (DMP)
 ICRISAT, Niamey
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 Niamey, Niger
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 Cellular: (227) 96997339
 Fax : (227) 20734329
 E-mail: r.tabo@cgiar.org,
taboram@yahoo.com

EDUCATIONAL QUALIFICATION

<u>Period</u>	<u>Institution</u>	<u>Degree Awarded</u>
Aug 82 - Aug 85	University of Arizona, Tucson, Az., USA	PhD in Agronomy and Plant Genetics
May 80 - May 82	University of Arizona, Tucson, Az., USA	MSc in Range Management
Aug 76 - May 80	University of Arizona, Tucson, Az., USA	BSc in Range Management

SUMMER TRAINING PROGRAMS:

June 82 - July 82	University of Arizona, Tucson, Arizona, USA.	<i>Topic:</i> Resource Development of Watershed Lands
June 79 - Aug 79	Colorado State University, Fort Collins, Colorado, USA	<i>Topic:</i> Irrigation Problems and Practices
June 77 - Aug 77	University of Wisconsin - Madison, Wisconsin, USA.	<i>Topic:</i> Development and Operation of Agricultural Extension Programs
June 76 - Aug 76	New Mexico State University, Las Cruces, New Mexico, USA	<i>Topic:</i> Range Management and Forage Production

MIDWINTER SEMINARS

Dec 19-28, 1982 Atlanta, Georgia, USA

Topic: Focus on Agric-Business

Dec 21-28, 1980 El Paso, Texas, USA

Topic: Multi-cultural living on an international border

Dec 20-29, 1978 Washington, D.C.

Topic: "International Visitors "

Dec 23-30, 1977 San Diego, California, USA

Topic: The American Community and Cultural Pluralism

Dec 19-31, 1976 Orlando, Florida, USA

Topic: World peace

PROFESSIONAL AND WORK EXPERIENCE

April 1988 to December 1998

Principal Scientist (Agronomy), ICRISAT-Western and Central Africa Regional Program (WCARP), **Kano, Nigeria.**

December 1998 to August 2002

Principal Scientist (Agronomy), **ICRISAT, Bamako, Mali**

September 2002 to present

Principal Scientist (Agronomy) and Regional Coordinator (West and Central Africa) **Desert Margins Program, ICRISAT, Niamey, Niger**

- Conducting research on the **agronomic and physiological responses of sorghum- and millet-based cropping systems involving sorghum, millet, cowpea, soybean, pigeonpea, groundnut** and other crops to varying management levels (viz. soil moisture/drought, soil fertility, genotypes, biotic stresses etc.) within a multidisciplinary team. Emphasis is on understanding the mechanisms influencing the responses of these systems to the environment.
- **Desert Margins Program (DMP):** DMP is a consortium of 9 countries : Botswana, Burkina Faso, Kenya, Mali, Namibia, Niger, Senegal, South Africa and Zimbabwe; five International Agricultural Research Centers: ICRAF, ICRISAT, IFDC, ILRI and TSBF-CIAT; and three ARIs : CIRAD, CEH, and IRD. My responsibility includes : Provide technical backstopping to Country Team Leaders of the Desert Margins Program

(DMP) to undertake contracted tasks; Responsible to the DMP Global Coordinator for timely reporting on progress, and for ensuring that financial records are maintained by the contracted institutions; Follow up on the progress of work in participating countries to ensure that a coherent program is being undertaken, and integrate their reports into a regional summary; Advise the DMP Global Coordinator if there are difficulties impeding progress in any associated country; Carry out coordination visits; Facilitate visits by Country Coordinators and Advisors (STAT) and by other visitors.

- Coordinated the Mali benchmark site in the **SLP (System-wide Livestock Program) ‘best bet’ project** entitled ‘Intensification of integrated crop-livestock systems in the dry savannas of West and Central Africa’ in collaboration with ILRI, ICRISAT, IITA, IFDC, TSBF, the University of Kingston, IER (Institut d’ Economie Rurale) and other NARES in West Africa.
- Coordinated the **USAID TARGET project** entitled ‘ **Fertilizer micro-dosing** for small farmer prosperity in the Sahel’; involving three countries: Burkina Faso, Mali and Niger ; from 2002 to 2004
- Project Leader and coordinating the **Challenge Program on Water and Food (CPWF) project 5** entitled ‘Enhancing rainwater and nutrient use efficiency for improved crop productivity, farm income and rural livelihoods in the Volta Basin’ involving the ‘Centre National de Recherche Scientifique (CNRST), Burkina Faso and the Savanna Agricultural Research Institute (SARI), Ghana, and various other partners including CIAT, TSBF-CIAT, UNU-INRA (United Nations University-Institute for Natural Resources in Africa), SAFGRAD, and ZEF (the Development Center of University of Bonn, Germany); from 2004 and on-going.
- Leader of the **CORAF/WECARD funded project** entitled ‘Combining water harvesting techniques and nutrient management to sustain food production in the dry lands of West Africa; Team member of CORAF/AfDB projects on i.) “ Promoting use of indigenous rock phosphate for soil fertility “recapitalization” and ii) Fertilizer microdosing and drought tolerant varieties technology transfer for small farmer prosperity in the Sahel; Partners include INRAN, Niger; INERA, Burkina Faso; IER, Mali; CERAAS, Senegal; TSBF-CIAT, Kenya; Projet Intrants FAO, Niger; several NGOs from participating countries; 2005 -2008.
- Collaborated with **ICRAF on integrated crop-tree-livestock research** in Mali and Niger; The project focused on both improving soil fertility in short duration fallows and improved sources of quality fodder; 1998 - 2002

- Evaluating **integrated Striga management technologies** on farmers' fields, in collaboration with NARS, extension units and Wageningen University; from 1998 – on-going
- In collaboration with pathologist, evaluated integrated management options for **controlling aflatoxin in groundnut**; from 1998 – on-going.
- Coordinated the Mali pilot site of the **EU funded CLIMAG West Africa project** entitled ' A network for harmonization of climate prediction for mitigation of global change impact in sudano-sahelian West Africa'; 1999 -2002;
- Involved in **Simulation Modeling (APSIM)** of the sorghum- and millet-based cropping systems in relation to resource use and sustainability, characterization of production systems, diagnostic surveys and on-farm work. Most of this work is being carried out in collaboration with National Agricultural Research and Extension Services (NARES), farmers and other International Agricultural Research Centers (IITA, ILRI, IFDC, TSBF-CIAT, and ICRAF).
- Training in models such **DSSAT** (Decision Support System for Agrotechnology Transfer), **NUTMON** (Nutrient Monitoring) and **SIMFIS** (Simulating Mixed Farming Systems)
- Involved in the establishment and development of ICRISAT Research Stations/farms at Bagauda and Kadawa near Kano, Nigeria.
- As Chairman of the Farm Development Committee of ICRISAT, Nigeria since its inception in 1988 up to 1998 (10 years) coordinated the development of the ICRISAT research farms and all other farm operations.
- Involved in the organization and conduct of various field days, meetings, courses/trainings (sorghum hybrid seed production and management, Computing and Statistics etc.) and symposia (Industrial Utilization of Sorghum) at ICRISAT, Nigeria for NARES in the West African Sub-region. Interacted extensively with sorghum and farming systems research networks, NARES, IARCs (IITA, ILRI, IFDC, etc.), NGOs in the region.
- Visiting scientist and member of the Farming Systems Research Program Committee at the Institute for Agricultural Research (IAR)/Ahmadu Bello University (ABU), Samaru, Nigeria. Participated in the reviews of research programs and projects at IAR and supervised postgraduate students for their PhD and MSc work.
- Acted for the ICRISAT Team Leader in Nigeria on several occasions.

- As chairman of the Computer Committee at ICRISAT, Nigeria since its inception in 1988 up to 1998, coordinated all the computing and statistics activities including training/courses, data analysis, and purchasing and maintenance of softwares and hardwares.
- Chairman of the Land and Space Use, Glasshouse and Seed Store Committee at ICRISAT Sahelian Center at Sadore/Niamey, Niger.
- Member of the ICRISAT Global Research Committee (RC) and of the ICRISAT West and Central Africa (WCA) Regional Coordination Committee (RCC); As a RC member participated in the ICRISAT Governing Board meetings.

June 2005 to present

Deputy Director, ICRISAT- West and Central Africa

Providing support to the Director, ICRISAT, West and Central Africa in resource mobilization, public awareness, and development of partnerships with various stakeholders in the region, development of the research and development strategy and priorities in the region, budget allocation to scientists and reporting research results. Involved in the administrative and technical supervision and management of ICRISAT operations in West and Central Africa.

January 2007

Consultant and member of a Team of TSBF-CIAT scientists to develop a report on soil fertility management for Bill and Melinda Gates Foundation (BMGF)- Alliance for A Green revolution in Africa (AGRA) soil health strategy

August 2006

External Reviewer/Consultant of the focus area on Environmental Sciences and Management of North-West University, Potchefstroom, South Africa

November 99 to Nov 2005

Member of the Regional Coordination Committee of the **Pole GRN/SP (Natural Resource Management/Production systems Network) of the Institut du Sahel (INSAH)/CILSS (Comité**

Inter Etats de Lutte contre la Secheresse au Sahel)

- Sep 97 to December 97 Training in **simulation modeling (APSIM: Agricultural Production Systems Simulator)** at ICRISAT, Patancheru, India and at Queensland Department of Primary Industries (DPI)/Commonwealth Scientific and Industrial Research Organisation (CSIRO)/Agricultural Production Systems Research Unit (APSRU) in Toowoomba, Australia;
- May 95 to November 96 **Team Leader of the Integrated Systems Project 2 (ISP 2) of ICRISAT**; coordinated and guided resource management research activities in ISP 2; revised project documents ; prepared and allocated budget to Project Team Members ; organized meetings to discuss project activities and work plans; Interacted extensively with ICRISAT Management regarding project matters.
- October 1996 **Consultant to the World Bank Assisted Adaptive Research Project in Chad**; advised Chadian officials on project matters, visited on-farm trials and provided technical backstopping to the project and researchers.
- September 1995 **Team Member of and consultant for the World Bank mid-term review of the Ghana National Agricultural Research System in Ghana**; I was a leader of one of the groups in the review and coordinated the preparation of the consultancy report of the group.
- June 1994 Attended the Project Team Member and Project Team Leader Training Courses organized by O'Hare Associates Incorporated, USA at the ICRISAT Sahelian Center, Niamey.
- June 92 to present Participated in the preparation of ICRISAT Medium Term Plans and in Project Development.
- Aug 87 - April 88 ICRISAT-Center, Patancheru, India;
Principal Sorghum Agronomist: Resource Management Program (RMP).
Carried out research on sorghum agronomy and

physiology with particular reference to the interaction between cultivars, plant density and resource use (water and radiation).

July 87 - Aug 87

ICRISAT/CIMMYT, Mexico
Visiting Scientist at the ICRISAT Latin American Sorghum Improvement Program (LASIP)

Gained experience as a Regional Sorghum Agronomist, working with the ICRISAT Agronomist based at LASIP, Mexico. Activities included visits to national programs in the region and discussions of network activities and coordination.

July 86 - July 87

ICRISAT-Center, Patancheru, India
Post Doctorate Fellow in Resource Management Program (RMP), Agronomy.

Topic : Sorghum agronomy and physiology:
Plant population, water use and crop productivity.

Fall, 1984

University of Arizona, Tucson, Arizona, USA.

Graduate research assistant in the Department of Plant Sciences: Assisted advisor and students in various research activities related to the physiology and agronomy of cotton, with particular reference to drought and salt tolerance.

May 80 - Sept 85

University of Arizona, Tucson, Arizona, USA.

Assisted in carrying out field, laboratory and greenhouse research on effects of salt on barley, alfalfa, and cotton.

Summer 1980

US Department of Agriculture (USDA) - Soil Conservation Service, Tucson, Arizona.

Summer 1981

Tucson Plant Materials Center, USA.

Carried out field and laboratory research on the introduction and the establishment of desert plants, grasses, and shrubs in Southwestern U.S., seed production and processing, and herbicide use in

crops.

1979-1985

Team leader of students workers at the University of Arizona Library, Tucson, Arizona, USA

FUND RAISING AND APPROVED PROJECT PROPOSALS

Prepared or contributed in the preparation of the following project proposals that were approved for funding:

- **Systemwide Livestock Project (SLP) on Intensification of Integrated Crop-Livestock System in the Dry Savannahs of West and Central Africa;** Covered three countries namely Mali, Niger, and Nigeria. The overall project goal is to improve food security, alleviate poverty and sustain the natural resource base of farmers in the dry savannas of West and Central Africa through the enhancement of the integration of crop-livestock systems to increase farm productivity and livelihood

Partners: International Livestock Research Institute (ILRI); International Institute for Tropical Agriculture (IITA); The Tropical Soil Biology Fertility Institute of CIAT (TSBF-CIAT); International Fertilizer Development Center (IFDC); International Crops Research Institute for the Semi-Arid Tropics (ICRISAT); Institute for Agricultural Research (IAR), Nigeria; Institut National de Recherche Agronomique du Niger (INRAN), Niger; Institut d' Economie Rurale (IER), Mali and various Non Governmental Organisations (NGOs).

Budget: US\$ 750, 000.00 for 4 years:

- **2000-2002 : EU CLIMAG (Climate Prediction and Agriculture) West Africa Project: A Network for: Harmonisation of climate prediction for mitigation of global change impact in Sudano-Sahelian West Africa.** Project Pilot site is Mali. The overall goal of the CLIMAG initiative is to contribute to optimise and harmonise the effort done to reduce food insecurity and vulnerability of agro-ecosystems caused by the interactive effects of global climate change, resource degradation and seasonal climate fluctuations in Sudano-Sahelian West Africa. It also aims at improving regional capacity to produce and apply seasonal climate predictions.

Partners: The Global Change SysTem for Analysis, Research and Training (START), USA; Fondazione per la Meteorologia Applicata (FMA), Italy; ICRISAT; The African Centre of Meteorological Application for Development (ACMAD), Niger; Centre régional de formation et d'application en AGRologie, HYdrologie et METéorologie opérationnelles (AGRHYMET), Niger ; International Research Institute for Climate Prediction (IRI), USA;

World Meteorological Organization (WMO), Switzerland; Climatic Research Unit (CRU), University of East Anglia (UEA), UK; Plant Research International (PRI)/University of Wageningen, The Netherlands; Malian Meteorological Service, Mali; Conseil National de la Recherche Scientifique et Technologique (CNRST), Mali ; Institut du Sahel (INSAH), Mali.

Budget: 300 000 Euro for 3 years; funded by the European Commission.

- **2002-2004 USAID TARGET project entitled ‘Fertilizer micro-dosing for small farmer prosperity in the Sahel’;** Project sites are Burkina Faso, Mali and Niger; The overall goal is to double crop production and increase farm incomes by 50% through the uptake of fertilizer micro-dosing and better farmer-based cooperative organizations.

Partners: The Tropical Soil Biology Fertility Institute of CIAT (TSBF-CIAT); International Fertilizer Development Center (IFDC); International Crops Research Institute for the Semi-Arid Tropics (ICRISAT); Institut National de Recherche Agronomique du Niger (INRAN), Niger; Institut d’Economie Rurale (IER), Mali; Institut de l’ Environnement et de Recherches Agricoles (INERA), Burkina Faso and various Non Governmental Organisations (NGOs) including Winrock International, Mali; Sasakawa Global 2000 (SG2000), Mali; ADAF-GALLE, Mali; Hunger Project, Burkina Faso; ADRK, Burkina Faso; FNGN, Burkina Faso; Projet Intrants FAO, Niger.

Budget: US\$ 500,000.00 for 2 years; funded by the United States Agency for International development (USAID)

- **2002 – 2008 GEF/UNEP Desert Margins Program (DMP): Turning adversity into opportunity- Towards sustainable management of the desert margins of sub-saharan Africa;** Project sites in 9 countries in West Africa and Eastern and Southern Africa, namely Burkina Faso, Botswana, Mali, Namibia, Niger, Senegal, Kenya, South Africa, and Zimbabwe; The main goal is to improve rural livelihoods and food security of smallholders in Africa’s desert margins by arresting land degradation and conserving biodiversity.

Partners: INERA, Burkina Faso; ARD, Botswana; KARI, Kenya; IER, Mali; INRAN, Niger; DRFN, Namibia; ISRA, Senegal; University of Potchefstroom, South Africa; ARC, Zimbabwe; ICRAF; ICRISAT; IFDC; ILRI; TSBF-CIAT; CEH; CIRAD; IRD; UNDP; UNEP; and several NGOs

Budget: US\$ 16 million US dollars for 6 years; funded by the Global Environment Facility

- **2004 – 2009** **The Challenge Program on Water and Food project entitled ‘ Enhancing rainwater and nutrient use efficiency for improved crop productivity, farm income and rural livelihoods in the Volta Basin’.** Project sites are Burkina Faso and Ghana; The overall goal is to reduce poverty and improve food security, income and livelihoods of small-scale resource poor farmers in the Volta Basin by using a systems approach that integrates water use efficiency, nutrient, soil and crop management, and improved germplasm together with market opportunity identification and rural agroenterprise development, and empowerment of rural communities.

Partners : ICRISAT ; Centro International de Agricultura Tropical (CIAT) ; Tropical Soil Biology Fertility Institute of CIAT (TSBF-CIAT); The United Nations University-Institute for Natural Resources in Africa (UNU-INRA)); The Center for Development Research (ZEF); The Semi-Arid Food Grain Research and Development (SAFGRAD); Savanna Agricultural Research Institute (SARI), Ghana; Institut de l’ Environnement et de Recherches Agricoles (INERA), Burkina Faso

Budget: US\$ 1,500,000.00 (1.5 million US dollars) ; Funded by the CGIAR Challenge Program on Water and Food

- **2005 – 2008** **CORAF/AfDB project entitled ‘Combining Water Harvesting Techniques and Nutrient Management to Sustain Food Production in the Dry Lands of West Africa;** Project sites are Burkina Faso, Mali, Niger and Senegal. The overall objective is to transfer water harvesting and nutrient management technologies to increase food production in the dry lands of West Africa.

Partners: ICRISAT; TSBF-CIAT; Centre d’Etude Régional pour l’Amélioration de l’Adaptation à la Sécheresse (CERAAS), Senegal; INERA, Burkina Faso; IER, Mali; INRAN, Niger; and various NGOs and farmers associations.

Budget: US\$ 170,000.00 for 3 years; funded by CORAF/AfDB

- **2005 – 2008** **CORAF/AfDB project entitled ‘Fertilizer micro-dosing and drought tolerant varieties technology transfer for small farmer prosperity in the Sahel;** Project sites are Burkina Faso, Niger and Senegal; The goal is to double crop production and increase farm incomes by 30% through the adoption of fertilizer micro-dosing and

drought tolerant varieties and better farmer-based cooperative organizations

Partners: ICRISAT; TSBF-CIAT; Centre d'Etude Régional pour l'Amélioration de l'Adaptation à la Sécheresse (CERAAS), Senegal; INERA, Burkina Faso; IER, Mali; INRAN, Niger; and various NGOs and farmers associations.

Budget: US\$ 200,000.00 for 3 years; funded by CORAF/AfDB

- 2005 – 2008 CORAF/AfDB project entitled 'Promoting use of Indigenous Phosphate Rock for Soil Fertility "Recapitalization" in Sahel; **Project sites are Burkina Faso, Niger and Senegal. The goal is to transfer optimal approaches for the use of indigenous phosphate rocks to restore and maintain the productivity of the soils, improve agricultural production and food security, reduce poverty and promote overall well-being of the communities.**

Partners: ICRISAT; TSBF-CIAT; Centre d'Etude Régional pour l'Amélioration de l'Adaptation à la Sécheresse (CERAAS), Senegal; INERA, Burkina Faso; IER, Mali; INRAN, Niger; and various NGOs and farmers associations.

Budget: US\$ 165,000.00 for 3 years; funded by CORAF/AfDB

- **2006-2010 The Mcknight Foundation project entitled ' ALIVE and nutritious cropping systems: A legume intensification and variety enhancement participatory approach'.** Project site is Mali. The goal is to improve productivity of sorghum and millet, and provide nutritious food options using improved legumes and cereal based cropping systems.

Partners: L'Institut D'Economie Rurale (IER), Mali; International Research Institute for the Semi-Arid Tropics (ICRISAT), Helen Keller International (HKI), Mali; Michigan State University (MSU), USA and farmers associations.

Budget: US\$ 420,000.00 for 4 years; funded by the McKnight Foundation

CAPACITY BUILDING AND WORKSHOPS

- Supervised and co-supervised over 25 students for PhD, MSc and BSc degrees.
- Conducted on the job training of field and research technicians on various themes including agronomy, soil fertility management, modeling, participatory research
- Involved in training of farmers and farmers organizations (fertilizer microdosing, farmers field schools, water harvesting and management, warrantage)
- Organized several training courses and workshops on participatory research, scaling up and out technologies, Decision Support System for Agrotechnology Transfer (DSSAT), sorghum hybrid production and management, data analysis and statistical principles

PROFESSIONAL MEMBERSHIPS:

- American Society of Agronomy (ASA)
- Crop Science Society of America (CSSA)
- Soil Science Society of America (SSSA)
- The African Network for Soil Biology and Fertility (AfNET) of TSBF-CIAT (The Tropical Soil Biology and Fertility Institute of The International Center for Tropical Agriculture)

AWARDS/SCHOLARSHIPS/HONORS

- 1975 USAID scholarship for range management university degree work at the University of Arizona in Tucson, Arizona, USA.
- 1985 Honorary Citizen of Tucson, Arizona, USA
- 1997 10 year satisfactory service recognition award from ICRISAT.
- 2001 15 year Loyalty Award from ICRISAT
- 2001 Appointed member of the Pan-African START (a global Change for Change System for Analysis, Research and Training) Regional Committee (PACOM).
- 2002 Appointed member of the International Advisory Committee for the Training Institute on Climate Variability and Agriculture, New York, USA
- 2003 Appointed by START/PACOM as Lead Author for the Book on Global Change

- and Africa
- 2004 Appointed by WMO/UNEP as **Lead Author for the InterGovernmental Panel on Climate Change (IPCC) Working Group II Fourth Assessment Report**
- 2004 Millennium ICRISAT Science Award to Desert Margins Program (DMP) for Outstanding Partnership
- 2004 Resource Mobilizer Award for Outstanding Efforts in Mobilizing Resources in West and Central Africa
- 2005 Appointed Member of the Scoping Group on Global Change of the International Council for Science (ICSU)
- 2006 20 year Loyalty Award from ICRISAT
- 2007 Poster on fertilizer microdosing and warrantage system **won the first prize out of more than 60 posters** at the TSBF-CIAT International symposium in Innovations as key to the Green Revolution in Africa: Exploring the Scientific Facts. Held in Arusha, Tanzania from 17-21 September 2007
- 2007 **2007 Nobel Peace Prize** as a member of the Inter-Governmental Panel on Climate Change (IPCC) Working Group II Fourth Assessment Report ; shared the prize with former vice president of the United States of America, Al Gore

OTHER MEMBERSHIPS

- 1980-1985: Vice President of the African Students Union at the University of Arizona, Tucson, Arizona, USA
- 1999: Founding member of the Association ‘Foundation for Africa’
- 2004 – 2006: Member of the National Steering Committee of the Small Grants Program of the Global Environment Facility (SGP/GEF)-UNDP, Niger

PUBLICATIONS:

Journal articles

- Ajayi, O., Sharma, H.C., **Tabo, R.**, Ratnadass, A., and Doumbia, Y.O. 2001. Incidence and distribution of the sorghum head bug, *Eurystylus oldi* Poppius (Heteroptera: Miridae) and other panicle pests of sorghum in West and Central Africa. *Insect Sci. Applic.* Vol. 21, No. 2, pp. 103-111.
- Augustine A. Ayantunde, S. Fernandez-Rivera, P.H. Hiernaux, **R. Tabo.** 2008. Implications of restricted access to grazing by cattle in wet season in the Sahel. *Journal of Arid Environments* 72: 523-533

- Augustine, A., Ayantunde, Moctar Kango, Pierre Hiernaux, Henk M.J. Udo and **Ramadjita Tabo**. 2007. Herders' Perceptions on Ruminant Livestock Breeds and Breeding Management in Southwestern Niger. *Human Ecology* 35: 139-149.
- Marley, P.S., Bandyopadhyay, R., **Tabo, R.**, and Ajayi, O. 2001. Sorghum germplasm with multiple resistance to 2 major diseases in the Nigerian savanna. *Trop. Sci.* 41, pp. 44-49.
- Nicola M. Hall, Bocary Kaya, Jan Dick, Ute Skiba, Amadou Niang and **Ramadjita Tabo**. 2005. Effect of improved fallow on crop productivity, soil fertility and climate-forcing gas emissions in semi-arid conditions. *Biology and Fertility of soils* (3): 1-7
- Ogungbile, A.O., **Tabo, R.**, and Rahman, S.A. 2002. Factors affecting adoption of ICSV 111 and ICSV 400 sorghum varieties in Guinea and Sudan savanna of Nigeria. *The Plant Science*, Volume 3, pp 21-32.
- Olabanji, O.G., Elemo, K.A., Ogunlela, V.B., and **Tabo, R.** 2002. Productivity of pearl millet and cowpea mixture as influenced by component proportion, cowpea variety and sowing date. *Samaru Journal of Agriculture*, Vol 18, pp. 3-15
- Ogungbile, A.O., **Tabo, R.**, van Duivenbooden, N., and Debrah, S.K. 1998. Constraint analysis for agricultural production in the Sudan Savanna Zone of Nigeria using multi-scale characterization. *Netherlands. J. Agric. Science* 46: 27-38.
- Tabo, R.**, Olabanji, O.G., Ajayi, O., and Flower, D.J. 2002. Effect of Plant Population Density on the Growth and Yield of Sorghum Varieties Grown on a Vertisol. *African Crop Science Journal*, Vol. 10. No. 1, pp. 31-38.

Conference papers and proceedings

- Adamou, A., Bationo, A, **Tabo, R.** and Koala, S. 2007. Improving soil fertility through the use of organic and inorganic plant nutrient and crop rotation in Niger. Pages 589-598; *In: advances in integrated soil fertility management in Sub-Saharan Africa: Challenges and opportunities* (Andre Bationo, Boaz Waswa, Job Kihara and Joseph Kimetu, eds); 1091 pp.
- Adamou A., **Tabo, R.** and A. Bationo. 2007. Effect of Manure on Millet Production in Long-Term Soil Fertility Management Experiment in Niger, West Africa. Poster Paper presented at the African Network for Soil Biology and Fertility Network (AfNet) International Symposium on Innovations as key to the Green Revolution in Africa: Exploring the scientific facts; Arusha, Tanzania, 17-21 September 2007; *In: Abstracts of the International Symposium of the African Network for Soil Biology and Fertility (AFNET) of TSBF Institute of CIAT*, September 17-21,

- 2007, Arusha (Bationo, A., Okeyo, J., Waswa, B.S., Mapfumo, P., Maina, F., Kihara, J., eds.) 252 pp
- Adamou, A., Bationo, A, **Tabo, R.** and Koala, S. 2004. Improving soil fertility through organic matter management, legume cultivation and cropping systems in Niger. Poster paper presented at the African Network for Soil Biology and Fertility Network (AfNet) International Symposium; Yaounde, Cameroon, 17-21 May 2004; *In: Abstracts of the International Symposium of the African Network for Soil Biology and Fertility (AFNET) of TSBF Institute of CIAT, May 17-21, 2004, Yaounde Cameroon (Bationo, A., Kimetu, J., and Kihara, J., eds.)* 196 pp.
- Ajayi, O., and **Tabo, R.** 1995. Effect of crop management practices on *Eurystylus immaculatus* Odhiambo on sorghum. Pages 233-240 *in* Panicle insect pests of sorghum and pearl millet : Proceedings of an International Consultative Workshop, 4-7 Oct 1993, ICRISAT Sahelian Center, Niamey, Niger (Nwanze, K.F., and Youm, O., eds.). Patancheru 502324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid tropics.
- Bationo Andre, Waswa S Boaz, Abdou Adamu, Bado Vincent, Bonzi Moussa, Iwuafor Emmanuel, Kibunja Catherine, Kihara Job, Karim Traore, Kristina Roing, Mucheru-Muna Monica, Mugendi Daniel, Mugwe Jayne, Mwale Cyprian, Okeyo Jeremiah, Olle Andrén, Sedogo Michel, **Tabo Ramadjita.** 2007. Lessons learnt from long term experiments in Africa. Paper presented at the African Network for Soil Biology and Fertility Network (AfNet) International Symposium on Innovations as key to the Green Revolution in Africa: Exploring the scientific facts; Arusha, Tanzania, 17-21 September 2007; *In: Abstracts of the International Symposium of the African Network for Soil Biology and Fertility (AFNET) of TSBF Institute of CIAT, September 17-21, 2007, Arusha (Bationo, A., Okeyo, J., Waswa, B.S., Mapfumo, P., Maina, F., Kihara, J., eds.)* 252 pp
- Bationo, A., **Tabo, R.**, Kihara, J., Kimetu, J., Adamou, A., and Koala, S. 2005. Farming in the drylands of West Africa: Promising soil fertility restoration technologies. Pages 100-125 *in* Sustainable agriculture systems for the drylands. Proceedings of the International Symposium for Sustainable Dryland Agriculture Systems, 2-5 December 2003, Niamey, Niger. Niamey BP 12404, Niger: International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) (Omanya, G.O. and Pasternak, D. eds) . 336 pp
- Bationo, A., Vanlauwe, B., Kimetu, J., Kihara, J., Abdoulaye, M.S, Adamou, A., **Tabo, R.** and Koala, S. 2005. Increasing land sustainability and productivity through soil fertility management in the West African Sudano-Sahelian zone. Pages 53-75 *in* Nutrient and Water Management Practices for Increasing Crop Production in Rainfed Arid/Semi-Arid Areas. Proceedings of a Coordinated Research Project. IAEA International Atomic Energy Agency.
- Bationo, A., Ramisch, J., Bado, B., Kihara, J., Adamou, A., Kimetu, J., **Tabo, R.** , Lompo,

- F., Ouattara, B. and Koala, S. 2004. Research highlights on integrated soil fertility management in the Sahel. Paper presented at the Consultation McKnight Foundation Workshop on Millet and Sorghum-based Systems in West Africa. Niamey, Niger 27-29 January 2004
- Bationo, A., Ntare, B.R., Tarawali, S., and **Tabo, R.** 2003. Soil fertility management and cowpea production in the Semi-Arid Tropics of West Africa. Pages 301-318 *in* Challenges and opportunities for enhancing sustainable cowpea production. Cowpea as a key factor for a new approach to integrated crop-livestock systems research in the dry savannas of West Africa. Proceedings of the Workshop, 4-7 September 2000, IITA, Ibadan, Nigeria, (Fatokun, C.A., Tarawali S.A., Singh, B.B., Kormawa, P.M. and Tamo, M, eds). IITA, Ibadan, Nigeria.
- Bationo, A., Traore, Z., Kimetu, J., Bagayoko, M., Bado, V., Lompo, F., **Tabo, R.**, and Koala, S. 2003. Crop productivity as affected by cropping systems and soil fertility management in the Sudano-Sahelian zone. Paper presented at the International Conference on the Cropping Systems in the Sahelian Zone, 2-5 December 2003, Bamako, Mali.
- Bationo, A., Vanlauwe, B., Kihara, J., Kimetu, J., **Tabo, R.**, Koala, S., and Adamou, A. 2003. Use of mineral and organic fertilizers to increase land productivity and sustainability with reference to the drylands of West Africa. Paper presented at the CTA Seminar on Information Support for Sustainable Soil Fertility Management, October 2003, Wageningen, The Netherlands
- Dimes, J., Twomlow, S., Rusike, J, Gerard, B., **Tabo, R.**, Freeman, A. and Keatinge, J.D.H. 2005. Increasing research impacts through low-cost soil fertility management options for Africa's drought-prone areas. Pages 82-92 *in* Sustainable agriculture systems for the drylands. Proceedings of the International Symposium for Sustainable Dryland Agriculture Systems, 2-5 December 2003, Niamey, Niger. Niamey BP 12404, Niger: International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) (Omanya, G.O. and Pasternak, D. eds) . 336 pp
- Hess, D.E., **Tabo, R.**, Traore, B., Dembele, B. and Sidibe, I. 2001. Farmer participatory evaluation of integrated striga management strategies. Pp. 270-273 *in* : Fer, A., Thalouarn, P., Joel, D.M., Musselman, L.J., Parker, C. and Verkleij, J.A.C. (eds.). Proceedings of the 7th International Parasitic Weed Symposium. 5-8 June 2001, Nantes, France. Faculté des Sciences, Nantes. 312 pp.
- Kaya, Bocary., Niang, Amadou., **Tabo, Ramadjita.**, and Bationo, Andre. 2007. Performance evaluation of various agroforestry species used in short duration improved fallows to enhance soil fertility and sorghum yields in Mali. Pages 547-556; *In*: advances in integrated soil fertility management in Sub-Saharan Africa: Challenges and opportunities (Andre Bationo, Boaz Waswa, Job Kihara and Joseph Kimetu, eds); 1091 pp.

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- Tabo, R.** 1985. Morphological and physiological development of cotton under various regimes of drip irrigation treatments. Ph.D Dissertation. University of Arizona, Tucson, Arizona, USA; 111 pp
- Tabo, R.** 1982. Activated Carbon: Its neutralizing effects on a pre-emergent herbicide. MSc Thesis. University of Arizona, Tucson, Arizona, USA.

COMPUTER SKILLS : M.S. WORD, EXCEL, POWERPOINT, GENSTAT, APSIM (Agricultural Production Systems Simulator) model, NUTMON (Nutrient Monitoring), DSSAT (Decision Support System for Agrotechnology Transfer) , SIMFIS (Simulating Mixed Farming Systems) model, and various utilities.

LANGUAGES: Speak and write French and English fluently
Speak Arabic and native language Sara Mbaye

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Annex E: Resume of Dr. Michel Vaksmann**Michel VAKSMANN (M.)****Agronome spécialisé en sciences du sol et du bioclimat.**

Centre de Coopération Internationale en Recherche Agronomique pour le Développement
Département des Cultures Annuelles (CIRAD-CA)

Nationalité :	Française
Date de naissance :	11 mars 1959
Adresse professionnelle :	Cirad-ca/Unité Propre de Recherche : Agrobiodiversité des plantes de savanes BP 1813 Bamako Mali Téléphone : (223) 21 42 93 Adresse électronique : michel.vaksmann@cirad.fr
Work experience :	
Depuis Janvier 2001	<ul style="list-style-type: none"> - Coordonnateur scientifique du projet « préservation de l'agrobiodiversité des sorghos du Mali », cofinancé par la coopération française et le Fond français pour l'Environnement mondial. - Animation du projet « Valorisation de la diversité génétique des mils et sorghos en zone cotonnière du Mali » financé par le Fond de Solidarité Prioritaire (FSP). - Jusqu'en 2004, animation du pôle de compétence en partenariat du CIRAD (PCP) sur le thème « Gestion des écosystèmes de savane, environnement et développement »
juin 1998 - décembre 2000	<ul style="list-style-type: none"> - Amélioration génétique des mils et sorghos du Mali. Valorisation de la diversité génétique des variétés locales.
janvier 1995 - mai 1998	<ul style="list-style-type: none"> - « Risques et intensification en Afrique tropicale semi-aride ». Etude financée par l'Union Européenne (CEE-STD3).
janvier 1992 - décembre 1994	<ul style="list-style-type: none"> - Unité d'agroclimatologie de l'Institut d'Economie Rurale (IER) du Mali.
mai 1988 - décembre 1991	<ul style="list-style-type: none"> - En poste à Bamako (Mali), animation du service d'agroclimatologie du projet Sol Eau Plante (financement FAC). Activités centrées sur la prévision des rendements paysans (Programme ESPACE) et la lutte contre la sécheresse (réseau R3S).

juin 1987 - avril 1988	– Programmation d'un logiciel de calcul des dates et des doses d'irrigation (BIPODE) en collaboration avec la SOPRA (ICI-France).
janvier 1984 - juin 1987	– Thèse de doctorat. Ile de la Réunion. Etude du fonctionnement hydrique de sols volcaniques. Bilan hydrique de la canne à sucre.

Selected Publications:

- Dingkuhn, M., Kouressy, M., Vaksman, M., Clerget, B., and Chantereau, J. (2008): A model of sorghum photoperiodism using the concept of threshold-lowering during prolonged appetence. *European Journal of Agronomy* **28**, 74-89.
- Kablan, R., Yost, R. S., Brannan, K., Doumbia, M. D., Traoré, K., Yoroté, A., Toloba, Y., Sissoko, S., Samaké, O., Vaksman, M., Dioni, L., and Sissoko, M. (2008): "Aménagement en courbes de niveaux" Increasing Rainfall Capture, Storage, and Drainage in Soils of Mali. *Arid Land Research and Management* **22**, 62 - 80.
- Kouressy, M., Dingkuhn, M., Vaksman, M., Clement-Vidal, A., and Chantereau, J. (2008): Potential contribution of dwarf and leaf longevity traits to yield improvement in photoperiod sensitive sorghum. *European Journal of Agronomy* **28**, 195-209.
- Kouressy, M., Dingkuhn, M., Vaksman, M., Clement-Vidal, A., and Chantereau, J. (2008): Potential contribution of dwarf and leaf longevity traits to yield improvement in photoperiod sensitive sorghum. *European Journal of Agronomy* **28**, 195-209.
- Kouressy, M., Dingkuhn, M., Vaksman, M., and Heinemann, A. B. (2008): Adaptation to diverse semi-arid environments of sorghum genotypes having different plant type and sensitivity to photoperiod. *Agricultural and Forest Meteorology* **148**, 357-371.
- Kouressy, M., Traoré, S. B., Vaksman, M., Grum, M., Maikano, I., Soumaré, M., Traoré, P. S., Bazile, D., Dingkuhn, M., and Sidibé, A. (2008): Adaptation des sorghos du Mali à la variabilité climatique. *Cahiers Agricultures* **17**, 95-100.
- Sagnard, F., Barnaud, A., Deu, M., Barro, C., Luce, C., Billot, C., Rami, J.-F., Bouchet, S., Dembélé, D., Pomiès, V., Calatayud, C., Rivallan, R., Joly, H., vom Brocke, K., Touré, A., Chantereau, J., Bezançon, G., and Vaksman, M. (2008): Analyse multi-échelle de la diversité génétique des sorghos : compréhension des processus évolutifs pour la conservation in situ. *Cahiers Agricultures* **17**, 114-121.
- Sissoko, S., Doumbia, S., Vaksman, M., Hocdé, H., Bazile, D., Sogoba, B., Kouressy, M., Vom Brocke, K., Coulibaly, M. M., Touré, A., and Dicko, B. G. (2008): Prise en compte des savoirs paysans en matière de choix variétal dans un programme de sélection. *Cahiers Agricultures* **17**, 128-133.
- Soumaré, M., Bazile, D., Vaksman, M., Kouressy, M., Diallo, K., and Diakité, C. H. (2008): Diversité agroécosystémique et devenir des céréales traditionnelles au sud du Mali. *Cahiers Agricultures* **17**, 79-85.
- Soumaré, M., Kouressy, M., Vaksman, M., Maikano, I., Bazile, D., Traoré, P. S., Traoré, S., Dingkuhn, M., Touré, A., Vom Brocke, K., Somé, L., and Barro Kondombo, C. P. (2008): Prévision de l'aire de diffusion des sorghos photopériodiques en Afrique de l'ouest. *Cahiers Agricultures* **17**, 160-164.

- Vaksman, M., Kouressy, M., Chantereau, J., Bazile, D., Sagnard, F., Touré, A., Sanogo, O., Diawara, G., and Danté, A. (2008): Utilisation de la diversité génétique des sorghos locaux du Mali. *Cahiers Agricultures* **17**, 140-145.
- Traoré, P. C. S., Kouressy, M., Vaksman, M., Tabo, R., Maikano, I., Traoré, S., and Cooper, P. (2007): Climate Prediction and Agriculture: What Is Different about Sudano-Sahelian West Africa?, pp. 189-203. In M. V. K. Sivakumar, and J. Hansen (Eds): *Climate Prediction and Agriculture*, Springer Berlin Heidelberg.
- Folliard, A., Traore, P.C.S., Vaksman, M., Kouressy, M., 2004, Modeling of sorghum response to photoperiod: a threshold-hyperbolic approach: *Field Crops Research*, v. 89, p. 59-70
- Clerget, B., Dingkuhn, M., Chantereau, J., Hemberger, J., Louarn, G., Vaksman, M., 2004, Does panicle initiation in tropical sorghum depend on day-to-day change in photoperiod?: *Field Crops Research*, v. 88, p. 21-37.
- Traoré, S.B., Reyniers, F.-N., Vaksman, M., Koné, B., Sidibé, A., Yoroté, A., Yattara, K., Kouressy, M., 2000, Adaptation à la sécheresse des écotypes locaux de sorghos du Mali.: *Sécheresse*, v. 11.
- Gigou, J., Traore, K., Coulibaly, H., Vaksman, M., Kouressy, M., 1999, Aménagement en courbes de niveau et rendements des cultures en région Mali-sud: Colloque International « L’homme et l’érosion », p. 391-404.
- Vaksman, M., Traoré, S.B., Niangado, O., 1996, Le photopériodisme des sorghos africains: *Agriculture et Développement*, v. 9, p. 13-18.
- Vaksman, M., 1990, A computer model to simulate the water balance of an "andic" soil. *Agricultural Water Management* v. 17, p. 265.
- Ducreux, A., Perret, S., Siegmund, B., Vaksman, M., 1989, Utilisation d’une sonde gamma-neutronique à l’Ile de la Réunion: *Machinisme Agricole Tropical*, v. 106, p. 36-46.

List of mentored fellows:

1. IPR Agricultural Engineers

Name (year)	Dissertation topic
Yacouba TOGOLA (2003)	Croissance et développement de quelques variétés de sorgho. Effets des dates et densités de semis.
Mahamoudou SOUMARE (2003)	Etude de la croissance et du développement de deux populations de mil à deux densités de semis et deux dates de semis
Gaoussou DIAWARA (2003)	Diagnostic participatif de la production du sorgho et tests multilocaux à Kaniko
Souleymane M. DEMBELE (2003)	Comparaison de la productivité du maïs et du sorgho dans les mêmes conditions de cultures. Cercle de Sikasso, terroir de Siramana.
Alain Alifa DIARRA (2004)	Etude de la productivité et de la stabilité du maïs et du sorgho en champs paysans dans le village de Kagnan. Cercle de Tominian.

Joseph DIARRA (2004)	Etude de la stabilité des rendements du maïs et du sorgho en champs paysans dans le village de Kaniko (Koutiala).
Abdramane SANOGO (2004)	Etude de la productivité et de la stabilité du sorgho et du maïs en champs paysans. Cas de Siramana (Sikasso).
Mikayil TRAORÉ (2004)	Etude des caractères « tallage » et « photopériodisme » du sorgho. Contribution à la mise au point de lignées isogéniques.
Toumani GOITA (2004)	Etude de l'effet de deux dates de semis sur la croissance et le développement de trois variétés de sorghos à Sotuba.
Sidi GOITA (2005)	Effet du photopériodisme et de la réduction de la taille sur la répartition de la biomasse entre les différents organes du sorgho.
Lassina SANOGO (2005)	Etude des caractères « tallage » et « photopériodisme » du sorgho. Contribution à la mise au point de lignées isogéniques
Mahamady KANE (2006)	Contribution à l'étude de la croissance et du développement de cinq variétés de sorghos en comparaison avec le maïs et le mil au Mali ;
Daouda TOGOLA (2007)	Contribution à l'étude de la croissance et du développement de quelques écotypes locaux de mil dans les conditions agroclimatiques de Sotuba.
Yacouba DEMBELE (2007)	Contribution à l'étude de la croissance et du développement de quelques écotypes locaux de sorghos des communes de Cinzana et de Koutiala.
Adama Seydou KONATE (2007)	Contribution à l'étude de la croissance et du développement de deux cultivars de mil à la station de recherche agronomique de Cinzana.
Bayoussou BENGALY (2007)	Etude de la variabilité spatiale des rendements des mils/sorghos/maïs dans la commune de M'pèssoba (Koutiala)

2. DEA candidates (*Diplômes d'Etudes Approfondies = M.Sc. + 1 year*)

Mamy SOUMARE (2004)	Contribution à la prévision de l'aire de diffusion de variétés de sorgho au Mali. Couplage entre Modèle de Croissance des Cultures et Système d'Information Géographique. Mémoire de DEA Université de Paris X. Institut National Agronomique de Paris-Grignon, 2004
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3. PhD students

Mamoutou KOURESSY (2007)	Adaptation agro-écologique et potentialités des sorghos photopériodiques à paille courte au Mali. Montpellier: Université Montpellier II, 2007.
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