N° 059 Août 2021

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IRAD news

LE MENSUEL ÉLECTRONIQUE D'INFORMATIONS BILINGUE DE L'INSTITUT DE RECHERCHE AGRICOLE POUR LE DÉVELOPPEMENT

Web site: www.irad.cm E.mail: info@irad.cm Directeur de Publication : **Dr Noé WOIN**

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Avancement en grade 2021

La Commission ad hoc examine les candidatures des chercheurs de l'IRAD

Les travaux de l'instance d'évaluation présidés par le Directeur Général de l'Institut de Nkolbisson, Dr Noé WOIN se sont, dans le strict respect des mesures barrières contre la pandémie de COVID-19, tenus à Yaoundé, les 10 et 11 août.

L'ouverture solennelle des travaux par le DG, Dr Noé WOIN.

43 candidats pour le passage du grade d'Attaché à celui de Chargé de recherche (soit 90%), 03 candidats pour le passage du grade de Chargé à celui de Maitre de recherche (soit 6%) et 02 candidats pour le grade de Maître à celui de Directeur de recherche (soit 4%). Au total 48 dossiers sur lesquels ont planché, les membres (17) de la Commission ad hoc d'évaluation des chercheurs de l'Institut de Recherche pour le Développement Agricole (IRAD), sous la présidence du DG, Dr Noé WOIN (Directeur de recherche).

«Je ne me féliciterais jamais assez de l'amélioration des fréquences de la tenue de ces assises qui donnent ainsi l'occasion aux chercheurs d'être évalués en temps réel », a, d'entrée de jeu relevé le DG de l'IRAD, au cours de l'ouverture des travaux. Avant de reconnaître que «cette disposition contribue significativement à l'amélioration qualitative et quantitative de la production scientifique des chercheurs et partant, améliore la visibilité de l'Institut». La plus grande des structures sous-tutelle du ministère de la Recherche scientifique et de l'Innovation (MINRESI).

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Pour un processus d'avancement en grade crédible, DR Noé WOIN a prescrit aux membres de la Commission d'évaluer «la qualité des travaux par domaine conformément aux dispositions de la décision du 25 mai 2021 de Mme le MINRESI, Dr Madeleine TCHUINTÉ. Afin que nul n'en ignore, des principes devant guider les débats ont été rappelés par le dirigeant. Notamment, la contribution effective de tous lors des échanges, dans un esprit d'ouverture, de respect mutuel, d'équité et de parfaite collaboration ; et une rigueur suffisante dans leurs approches. Tant il est vrai que la carrière des chercheurs en lice en dépend des résultats issus de cette évaluation. Après la Commission ad hoc, place désormais aux évaluateurs indépendants et ainsi de suite.

Photo de famille

En effet, le processus d'évaluation amorcé au sein de l'Institut de Nkolbisson à Yaoundé est effectué, d'après la décision du MINRESI susmentionnée, par quatre (04) instances : la Commission ad hoc d'évaluation ; les évaluateurs indépendants ; les jurys d'audition par domaine de recherche, pour des candidats aux grades de Maître et de Directeur de recherche; et la Commission centrale d'évaluation pour l'avancement de grade. Et la fin du processus est sanctionnée par une signature de l'acte (décision) de changement de grade du chercheur méritant par le MINRESI.

En rappel, au cours de la session 2020 d'évaluation des chercheurs de l'Institut bras séculier de l'État en matière de développement agricole, 54 (soit 46 Attachés pour le grade de Chargé de recherche, 06 Chargés pour le grade de Maître de recherche et 02 Maîtres pour le grade de Directeur de recherche) dossiers avaient été déposés.

Par Pierre AMOUGOU

Agricultural innovation

IRAD tests organic cotton in the Grand-Nord

An alternative found by the institute managed by Dr Noé WOIN, to involve vulnerable groups in the production value chain of this cash crop and guarantee the fair cotton concept.

Experimental plot in IRAD-Touboro (North)

In partnership with the German International Development Cooperation Agency (GIZ), the government, through the Institute of Agricultural Research for Development (IRAD), has been experimenting the cultivation of organic cotton for some time. IRAD's objective is to free small farmers from their dependence on access to input credit from the Cotton Development Company (SODECOTON). This practice discriminates against a large part of the rural population that does not benefit from input credit, especially young people and women.

Indeed, according to IRAD researchers met during a monitoring and evaluation mission in Touboro (Northern Region), led by the Deputy Director General of the Nkolbisson Institute, Dr Francis Emmanuel NGOME AJEBESONE, «the cultivation of organic cotton, which is more ecological, requires very few chemical inputs and does not exclude any part of the sector». Moreover, the production basin is made up of a wide range of soils, ecology and new land recently cultivated. Furthermore, produced in a family-based system with the use of organic manure, crop rotation, association with vegetables and low input use.

This, according to the same experts, guarantees the quality of the fibre and makes this crop competitive on the increasingly demanding world market. The proof is that in recent years, the textile industries have been relying more and more on organic cotton, because consumers are constantly questioning their social responsibility. This is an opportunity for cotton producers in Cameroon and a very profitable market to conquer.

This project, which is supported by GIZ, aims to experiment and evaluate different technical itineraries for the production of organic cotton in the Cameroonian context in order to disseminate it to potential producers.

To achieve this, the methodological approach of the institute, which is the secular arm of the State of Cameroon in terms of agricultural development, combines field and laboratory work and the setting up of a multi-local trial. It also uses plant material.

The experimentation conducted in the rainy season (rainfall varying between 1000 and 1200 mm) is done in 6 sites in the cotton basin. These are Makébi (0.5 ha), Sirlawé (0.5 ha) and Meskine (0.5 ha) in the Far

North region, and Soukoundou (0.5 ha), Sanguéré (0.5 ha) and Touboro (0.5 ha) in the North region. According to IRAD researchers, the untreated variety IRMA Q302 is used on all sites

At the end of this vast scientific operation, the researchers intend to carry out a sanitary analysis of 100 mature bolls (four batches of 25 bolls each, 2 in line 3 and 2 in line 6) and to classify them as healthy, pierced, rotten and mummified bolls; to harvest the seedcotton produced on the 4 central lines (4 to 7), at 25%, 50% and 100% boll opening; to determine the height of the seedlings at harvest, the weight of the biomass and the cotton grain yield.

Far from using any chemical inputs during cotton production, the current initiative is an alternative that augurs a better future for the actors of the sector and the environment.

Written by Pierre AMOUGOU and translated by FONYE Anita Epse Nyamdzeka…

IRAD-Njombé

30 étudiants de 4 Universités en stage pratique

Du 1er au 31 août, au sein de l'Institut que dirige Dr Noé WOIN, dans le strict respect des mesures barrières contre la COVID-19, les futurs agronomes ont concilié théorie des salles et pratique du terrain.

Des étudiants à l'œuvre

Dans le cadre de l'accomplissement de ses missions d'encadrement et d'accompagnement des jeunes issus des institutions publiques et/ou privées de formation professionnelle, l'Institut de Recherche Agricole pour le Développement (IRAD), à travers la Station Polyvalente de Recherche Agricole de Njombé (SPRAN) dans la région du Littoral, a accordé un stage académique à 20 étudiants des Universités de Douala (06), Buea (11), Yaoundé (05) et Maroua (03) ainsi que de l'Université évangélique de Mbouo (05) à Bandjoun. Désherbage, entretien parcelles, repiquage, greffage, marcottage et planting bananier. Voilà, entre autres, sous l'égide du Dr NYAKA NGOBISA Aurélie épouse MANDENGUE, Chef de Station, ce qui a constitué, pour l'essentiel, du 1er au 31 août 2021, du manœuvrage technique au quotidien de ces futurs chercheurs du secteur agropastoral au Cameroun et au-delà. Puisque parmi ces étudiants, il y avait trois Gabonais et un Congolais. Une formation, selon les chercheurs de l'IRAD, qui va permettre à ces jeunes d'allier théorie et pratique. Notamment, des techniques innovantes utilisées pour la production des semences de qualité et en quantité de nombre de spéculations : arbres fruitiers, manioc, bananier et plantain, papayer solo…

Photo de famille

Au terme de leur formation, les étudiants-stagiaires sont visiblement satisfaits des techniques et pratiques agricoles innovantes apprises. Mlle LETOMBO en Master I à l'Université évangélique de Mbouo à Bandjoun (Ouest) déclare : «Notre passage à la SPRAN a été très bénéfique, en ce sens que nous avons acquis des connaissances pratiques dans différentes unités de production qui contribuent à notre meilleure formation professionnelle. Nous remercions l'IRAD pour cette opportunité». Et ABANGE Maurice ABENG de l'Université de Buea d'ajouter «IRAD Njombé is very nice and convinent place to learn and practice agriculture in a diverse ways. We obtained pertinent knowledge during this course».

Le Gabonais Jean Joël BIVINE-BI-MBENG de Yaoundé de magnifier: «Notre passage à la SPRAN nous a donné l'occasion d'acquérir des connaissances sur le bananier-plantain, une culture très importante dans notre pays le Gabon. Ce stage va ainsi nous permettre d'élargir nos horizons…».

Et le Congolais Joseph ZE MBOMO de l'Université de Yaoundé de conclure :

> **J'ai trouvé très enrichissant et bénéfique, la formation sur l'itinéraire de production du papayer solo n°8. C'est une culture porteuse dans mon pays le Congo**

Voilà un stage qui atteste, s'il en était encore, de la bonne coopération scientifique qui existe entre l'IRAD et les Universités ou grandes écoles de formation professionnelle à travers le pays.

Par la Cellule de Communication

Evolution of Cloacal Bacteria and Fungi in Brahma Chickens (Gallus gallus domesticus) Fed with Chromolaena odorata Supplement

Pierrette NGO BAHEBECK, Mireille CHOUEGOUONG TUEDOM, Ghislaine NGUEMMOGUE, Sandra Olivia GHOMSI MAGNE, Antoine TAMSA ARFAO, Iréne MAMA, Gatien ENAMOU MBANGA, SULEM YONG Nina NINDUM and Kingsley Agbor ETCHU

Abstract

A study was conducted to evaluate the evolution of cloacal bacteria and fungi in Brahma (Gallus gallus domesticus) chickens fed with a Chromolaena odorata supplement. A total of 180 cloacal samples were collected over a 10 weeks period from August to October 2020. Three feed rations (R0, R1 and R2) containing 0, 1 and 2% dried leaves of Chromolaena odorata respectively were tested. Studied microorganisms isolated were total coliforms, Escherichia coli, Salmonella sp., klebsiella sp., yeasts and molds. Bacterial load varied from 10 x104 to 5236 x104 CFU/g for R0, from 64 x104 to 12317 x104 CFU/g for R1 and from 1 x104 to 4292 x104 CFU/g for R2 Whereas fungal load fluctuated between 34 x104 and 3786 x104CFU/g for R0, between 153 x104 and 8988 x104 CFU/g for R1 and between 8 x104 and 18154 x104 CFU/g for R2. This flora was subject to wide temporal fluctuations. The analysis of these results considered the interaction of the different variables (gender, weight and time). Apart from the time factor (weeks) which significantly ($p<0.05$) influenced the abundance of Escherichia coli, yeast and mold, no other factor had a significant effect on the evolution of the cloacal microflora of these birds. However, linear relationships between the factors ration, gender, time and weight evolution of microbial cells revealed a significant effect ($p<0.05$). This action resulted in an improvement of the feed conversion ratio and an increase in live weight of the studied birds which was most marked for the R1 ration and in males.

Keywords: *Pant density; Rain-fed rice; Growth parameters; Grain yield.*

Secondary metabolite effects of different cocoa genotypes on feeding preference of the mirid Sahlbergella singularis Hagl

R. J. MAHOB, I. MAMA NGAH, R. DIBANDA FEUMBA, H. C. MAHOT, C.B. BAKWO BASSOGOG,•C. F. BILONG BILONG, F. EDOUN EBOUEL, P. B. NSOGA ETAM, D. M. TALIEDJE, R. HANNA, R. BABIN.
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Abstract

Sahlbergella singularis is a major insect pest of cocoa in Cameroon. Conventional insecticides remain the most widely used option for mirid control, which unfortunately have adverse effects on the environment and human health. Improved methods of controlling this species, both environmentally friendly and inexpensive to farmers, are requirements. Varietal control based on the selection of resistant and/or tolerant genotypes can be an interesting approach. Nonetheless, the role of secondary metabolites (SMs) in cocoa defense against mirids is poorly documented; yet, these compounds are reported to be key elements in plant defense against herbivores. For this purpose, SMs of twelve cocoa genotypes were identified and quantified, as well as their impact on food preference by mirids. Food preference was assessed through microtests measuring cocoa attractiveness and antixenosis toward mirids. The results showed that

cocoa genotypes were differently accepted as food by mirids, with a significant preference for hybrid IMC60 x SNK605 and a non-preference for T60/887. The ten other cocoa genotypes showed intermediate results. Five SMs classes: alkaloids, flavonoids, polyphenols, saponins, and tannins were identified. Their rates varied between cocoa genotypes: polyphenols > alkaloids > flavonoids > tannins, and saponins. Cocoa genotypes with high total phenolic contents were significantly preferred by S. singularis (rα = 0.86, R2 = 74.0%, P < 0.001), while those with low saponins contents were lowly accepted (rα = − 0.83, R2 = 68.9%, P < 0.015), independently of the levels of other SMs. Given SMs high potential to affect mirid feeding behavior, analyzing cocoa SMs composition may help in early selection of resistant cocoa varieties against S. singularis.

Keywords: *Theobroma cacao, Biochemical analyses, Plant secondary metabolites, Attractiveness/ antixenosis, Tolerant/resistant varieties, Insect-plant interactions.*

Assessing rice production sustainability performance indicators and their gaps in twelve sub-Saharan African countries

AMINOU AROUNA, Krishna PRASAD DEVKOTA, Wilfried GNIPABO YERGO, KAZUKI SAITO, Benedicta NSIAH FRIMPONG, Patrice YGUE ADEGBOLA, MEOUGBE Ernest DEPIEU, Dorothy MALAA KENYI, Germaine IBRO, AMADOU ABDOULAYE FALL, SANI USMAN.

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Abstract

The benchmarking and monitoring of rice production performance indicators are essential for improving rice production self-sufficiency, increasing profitability, reducing labor requirements, optimizing fertilizer inputs, engaging youths in rice production, and increasing the overall sustainability of smallholder rice production systems in countries in sub-Saharan Africa (SSA). In this paper, we quantified five sustainability performance indicators (grain yield, net profit, labor productivity, and nitrogen (N) and phosphorus (P) use efficiencies) to benchmark rice production systems in SSA. Data were collected between 2013-2014 from 2907 farmers from two rice production systems (irrigated and rainfed lowlands) across five agroecological zones (arid, semiarid, humid, subhumid and highlands) in 12 countries (Benin, Cameroon, Cote d'Ivoire, Ghana, Madagascar, Mali, Niger, Nigeria, Senegal, Sierra Leone, Tanzania and Togo). The exploitable gap for each indicator (the difference between the mean of 10% highest-yielding farms and the mean-yielding farms) was calculated across the countries, the two production systems and agroecological zones. The mean yield varied widely between 2.5 to 5.6 t ha-1 and 0.6 to 2.3 t ha-1 in irrigated and rainfed lowlands, respectively, with an average yield of 4.1 and 1.4 t ha-1, respectively. Across the country-production system combinations, there were yield gaps of 29-69%, profit gaps of 10-89%, and labor productivity gaps reaching 71%. Yield, profit, and labor productivity were positively correlated. They were also positively correlated with N and P fertilizer application rate, but not with N and P use efficiencies. Only between 34-44% of farmers had desirable ranges in N- or P-use efficiencies in the two production systems. All sites for rainfed lowlands were characterized by low-yield and large gaps in yield, profit, and labor productivity, whereas irrigated lowlands in some countries (Madagascar, Mali, and Togo) have similar characteristics as rainfed ones. We conclude that there is an urgent need to disseminate precision nutrient management practices for optimizing nutrient use efficiency and enhancing rice performance indicators especially in rainfed lowlands as well as low-yielding irrigated lowlands. Furthermore, we propose recommendations for specific categories (i.e. farmer, rice production system, agroecological zone and country) to close performance indicator gaps and to allow the production at scale to achieve rice self-sufficiency in SSA.

Keywords : Yield gap, Net profit, Nitrogen use efficiency, Phosphorus use efficiency, Irrigated lowland, Rainfed lowland.

Acibenzolar-S-methyl induces resistance against cassava mosaic geminiviruses in Nicotiana benthamiana and their vector Bemisia tabaci in cassava (Manihot esculenta)

Oumar DOUNGOUS, Behnam KHATABI, Rachid HANNA, Martin TCHUANYO, Apollin FOTSO KUATE, Vincent N. FONDONG.

Abstract

Cassava mosaic disease (CMD), caused by cassava mosaic geminiviruses (CMGs), is a major constraint to the cassava crop in Africa and southeastern Asia. Here, we investigated the ability of acibenzolar-S-methyl (ASM), a functional analog of salicylic acid (SA), to trigger systemic acquired resistance (SAR) against two CMGs, namely African cassava mosaic virus (ACMV) and East African cassava mosaic Cameroon virus (EACMCV) in Nicotiana benthamiana. ASM treatment delayed the time to first viral symptoms appearance, reduced virus infection rate, and attenuated symptoms. Furthermore, ASM caused an enhanced recovery from symptoms of both viruses and inhibited plant death observed in N. benthamiana plants infected by EACMCV. This study further showed that ASM induced resistance to the whitefly Bemisia tabaci (Gennadius), the vector of CMGs, in cassava. Notably, we observed that ASM treatment affected adult whitefly feeding preference and oviposition in cassava under both choice and no-choice conditions. A significant reduction in whitefly adult, egg, and nymph populations was observed irrespective of ASM treatment. The results of this study show that ASM has the potential to control both CMGs and their whitefly vector which is an important first step toward managing whitefly and cassava viruses.

Keywords : ASM; Induced resistance; Cassava mosaic geminiviruses; B. tabaci Reversion; N. benthamiana

Carbon Storage of some Rubber Trees (Hevea brasiliensis) Clones in HEVECAM's Plantations in South Cameroon

René MENOH A NGON, Esaïe TSOATA, Milie Lionelle TSOUGA MANGA, Pierre-André OWONA NDONGO

Abstract

The objective of this work was to estimate the quantity of carbon stored by four main clones of rubber tree cultivated in South Cameroon: GT 1, PB 217, PR 107 and RRIC 100. The forest inventory method was used to measure trees morphological parameters, the latter used to calculate carbon storage using the allometric equation of Wauters et al., (2008). The main morphological parameters measured were: leaf area index (LAI), circumference (C), diameter at breast height (DBH) and total tree height (h). Comparing the morphological parameters of clones two by two using a Dunn test, we observe significant differences in the circumference, the diameter and even very significant in the leaf area index, but not in the height. The clones GT 1, PR 107, PB 217, and RRIC 100 stored on average: 111.05 tC / ha, 150.18 tC / ha, 165.25 tC / ha, and 187.25 tC/ha respectively. A significant difference was established between the means of carbon storage of the clones GT 1 and PB 217 ($p = 0.0488$) on one hand and, that of the clones GT 1 and RRIC 100 ($p = 0.0240$), on the other hand. These results are an estimation of models, further research can be undertaken for exact measurements.

Keywords : Carbon storage, rubber tree, clones, HEVECAM, Cameroon.

Publications of the month

1- Pierrette NGO BAHEBECK, Mireille CHOUEGOUONG TUEDOM, Ghislaine NGUEMMOGUE, Sandra Olivia GHOMSI MAGNE, Antoine TAMSA ARFAO, Irène MAMA, Gatien ENAMOU MBANGA, SULEM YONG Nina NINDUM and Kingsley Agbor ETCHU (2021). Evolution of Cloacal Bacteria and Fungi in Brahma Chickens (Gallus gallus domesticus) Fed with Chromolaena odorata Supplement. Int. J. Curr. Microbiol. App.Sci. 10(06) : 484-496.

2- R. J. MAHOB, I. MAMA NGAH, R. DIBANDA FEUMBA, H. C. MAHOT, C.B. BAKWO BASSOGOG,•C. F. BILONG BILONG, F. EDOUN EBOUEL, P. B. NSOGA ETAM, D. M. TALIEDJE, R. HANNA, R. BABIN (2021). Secondary metabolite effects of different cocoa genotypes on feeding preference of the mirid Sahlbergella singularis Hagl. Springer Nature.

3- AMINOU AROUNA, Krishna PRASAD DEVKOTA, Wilfried GNIPABO YERGO, KAZUKI SAITO, Benedicta NSIAH FRIMPONG, Patrice YGUE ADEGBOLA, MEOUGBE Ernest DEPIEU, Dorothy MALAA KENYI, Germaine IBRO, AMADOU ABDOULAYE FALL, SANI USMAN (2021). Assessing rice production sustainability performance indicators and their gaps in twelve sub-Saharan African countries. Field Crops Research 271, 108263.

4- Oumar DOUNGOUS, Behnam KHATABI, Rachid HANNA, Martin TCHUANYO, Apollin FOTSO KUATE, Vincent N. FONDONG (2021). Acibenzolar-S-methyl induces resistance against cassava mosaic geminiviruses in Nicotiana benthamiana and their vector Bemisia tabaci in cassava (Manihot esculenta). Crop Protection, Vol. 150, 105796.

5- René MENOH A NGON, Esaïe TSOATA, Milie Lionelle TSOUGA MANGA, Pierre-André OWONA NDONGO (2021). Carbon Storage of some Rubber Trees (Hevea brasiliensis) Clones in HEVECAM's Plantations in South Cameroon. Biodiversity of Ecosystems. DOI: 10.5772/intechopen.99297.

Nécrologie

Madame

NYINGCHIA Yvette YOAH Épse MVOLA

Le Directeur Général de l'IRAD a le profond regret d'annoncer le décès de Mme NYINGCHIA Yvette YOAH Épse MVOLA, Chercheuse à l'IRAD, survenu le 25 août 2021 à Yaoundé.

En cette circonstance douloureuse, le Directeur Général de l'IRAD adresse à la famille si durement éprouvée les sincères condoléances du personnel de l'IRAD, auxquelles il joint l'expression de sa profonde compassion.

Le Directeur Général
Dr Noé WOIN

Infos Projets

LIBELLÉ DU PROJET	ACTIVITÉS EN COURS	STRUCTURES
PD-CVA/filières palmier à huile, ananas et banane plantain	- A la Station spécialisée sur le **palmier à huile** IRAD-Dibamba, il y a des ensachages réalisés (1738), des fécondations assistées réalisées (1550), la fécondation assistée des régimes (2092), la création de 3 449 ha de surface de palmeraies, des graines sèches transmises (230 550), des régimes récoltés (147 692), la production de pollen (781 unités), l'entretien des parcelles (gyrobroyage et rotobroyage), la préparation et la finition des régimes et graines et l'élevage du matériel végétal. - S'agissant du volet **banane plantain**, il y a l'actualisation du PTBA 2020 et la poursuite des travaux d'entretien (désherbage et effeuillage) du parc à bananier plantain de 3 ha à la Station IRAD-Njombé. Un autre jardin (3 ha) de relais à banane-plantain est à la phase de planting. - S'agissant de la **filière ananas**, il y a la poursuite de certaines activités d'entretien des parcelles d'ananas et de la collection de ressources génétiques mises en place à la Station IRAD-Njombé.	IRAD Dibamba et Njombé (Littoral)
Production et distribution des plants d'anacardier et d'Acacia senegal	- Est : Fin d'activités - Extrême-Nord : RAS. - Nord : Poursuite de la production et distribution des plants d'anacardier aux producteurs. Appui conseil dans la mise en place de nouveaux vergers. - Adamaoua : production et distribution des plants d'anacardier aux Organisations paysannes et GIC agricoles.	SPRA-Bertoua (Est) CRA-Maroua (Extrême-Nord) SPRA-Garoua (Nord) CRA-Wakwa (Adamaoua)
CAS COVID : Renforcement de la production des semences améliorées et d'un meilleur encadrement des producteurs pour ce qui est des cultures de grande consommation ou des produits de substitution	- Production des semences de pré-base de cultures de consommation courante ; - Amélioration de l'offre en protéines animales (volailles, poisson…) ; - Production et tests d'extraits botaniques pour la protection des cultures de grande consommation et la lutte contre les parasites intestinaux de petits ruminants.	Dans les 05 zones agroécologiques du pays
Projet d'expérimentation du coton bio	Champs semenciers de 0,5 ha chacun en observation dans les 6 sites du Nord et de l'Extrême-Nord	- Makébi (Extrême-Nord) - Sirlawé (Extrême-Nord) - Meskine (Extrême-Nord) - Soukoundou (Nord) - Sanguéré (Nord) - Touboro.(Nord)