



ACP Science and Technology Programme

AFS/2009/219015

AFROweeds Project African Weeds of rice

Second workshop of the AFROWeeds project and field surveys
June 27-July 2, 2011
Cotonou - Benin



(© T. Le Bourgeois - Cirad)



Thomas Le Bourgeois - Cirad
Pierre Grard - Cirad
Nora Bakker - Cirad
Jonne Rodenburg - AfricaRice

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Mission calendar

26/06/2011	20h		CIRAD team arrived in Cotonou
27/06/2011	8:30-12h		Technical Meeting AfricaRice / CIRAD, update on the progress of the various actions
	12h-13h30		Lunch
	13h30-15h		Administrative Meeting AfricaRice / CIRAD
	15h-18h		Technical Meeting AfricaRice / CIRAD program of future actions
28/07/2011	8h30 to 8h45	Workshop with partners	Introduction by T. Kumashiro representative of the Director of Research for Development AfricaRice
	8:45-9h		The project AfroWeeds P. Marnotte
	9h-9h30		The website Afroweeds T. Le Bourgeois
	9:30 - 10h30		The collaborative platform T. Le Bourgeois
	10h30 -10h45		Coffee break
	10h45-12h		The identification system P. Grard
	12h-13h30		Lunch
	13:30 - 17:30		Partner training in the use of the collaborative website
29/07/2011	8:30 - 10:30	Workshop with partners	The database, review data collection T. Le Bourgeois
	10:30 - 10:45		Coffee break
	10h45-12h		Working on data with partners
	12h-13h30		Lunch
	13:30 - 15:30		List of priority species remaining to be collected
	15:30 - 15:45		Coffee break
	15h45-17h		Actions to implement
30/06/2011	8:30 – 12h	Training	Training AfricaRice team on the management of data in the database
	12h-13h30		Lunch
	13h30-17h		Training AfricaRice team on the management of data in the database
01/07/2011	8:30-12h	Surveys of CRR at Comé	Survey in rice fields at Toudjonoukouin and collection of material
	12h-13h30		Lunch
	13:30 - 16:30		Survey in rice fields at Codji Haham and collection equipment
02/07/2011	8:30-12h	Surveys of CRR at Zinvié	Survey in rice fields at Dokomey and collection of material
	12h-13h30		Lunch
	13:30-16:30		Survey in rice fields at Gbodjé and collection of material
28-29/06/2011: Analysis of financial documents AfricaRice first year, budget year and the second recall of administrative and financial rules (N. Bakker, L. Medenilla, C. Kan, G. Maina, A. Sadikou)			
03/07/2011	23h		Departure Cirad team

Introduction

The AfroWeeds project

The project aims to **create an initial network of partners in West, Central and Eastern Africa, and Europe**, interested in sharing their knowledge through the computer science applied to agriculture and the creation of a dedicated database for the identification and management of major weeds in rice farming systems in humid areas (lowland and irrigated rice fields).

The mission had three objectives:

- Make a point between the administrative and technical AfricaRice and CIRAD;
- Making a second workshop with partners weed scientists and extension people from different countries of Africa;
- Conduct field surveys in Benin.

The second workshop

At the mid-time of the project, the second project workshop was held for two days in Cotonou, Benin in AfricaRice temporary headquarters, located in Abomey-Calavi.



Second workshop AfroWeeds temporary headquarters AfricaRice Cotonou - Benin (© P. Gard - CIRAD)

This second meeting brought together partners AfricaRice and CIRAD, and weed scientists in national research systems and universities in different countries (Benin, Burkina Faso, Côte d'Ivoire, Ghana, Nigeria, Rwanda, Mozambique) and extension services in rice from Benin, Senegal, Mali and Côte d'Ivoire. Various points were discussed:

- Presentation of project progress and, in particular, the tools developed and how they work (website, collaborative platform, system identification ...).
- Training partners to use the various tools and analysis of their suitability to the needs of scientific and technical professionals.
- Definition of the activities to be implemented in the coming months.

Partners

The coordinators of the AfroWeeds project are CIRAD and AfricaRice. CIRAD was represented at the workshop T. Le Bourgeois (weed scientist), P. Grard (expert computer information systems in botany) and N. Bakker (management assistant). Note that P. Marnotte (weed scientist) left the CIRAD in April 2011 to be allocated by the Ministry of Foreign and European Affairs) to the Embassy of France in Benin, as technical advisor to the INRAB. AfricaRice was represented by J. Rodenburg (weed scientist), G. Kyalo (research assistant), K. Aloys (technician), G. Maina (lead management), L. Medenilla (administrative follow-up), C. Kan (administrative follow-up) and A. Sadikou (accountant).

Twelve national, weed scientists and extension agents of rice development were invited to participate in this workshop. They are members of national research structures (agricultural research centers and universities) and are from seven countries in West and East Africa: Benin, Ivory Coast, Burkina Faso, Ghana, Nigeria, Rwanda and Mozambique or from extension services (Benin, Côte d'Ivoire, Mali, Senegal).

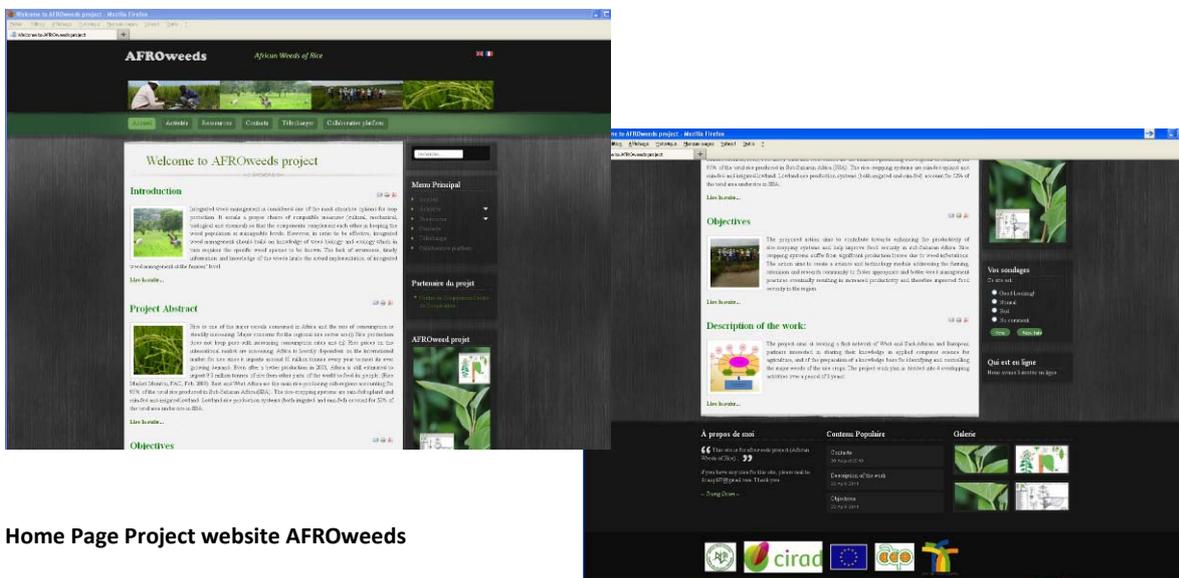
Some agronomists from AfricaRice also attended the workshop.

The list of participants is presented in Appendix 1.

Presentations and discussions

1 The Website Afroweeds

The project website Afroweeds is available at <http://www.afroweeds.org>



Home Page Project website AFROweeds

This website is presenting the AFROweeds project, the various activities (workshops, trade missions, techniques used), the project resources (bibliographical, botanical resources, fact sheets on species and identification system), contact of project coordinators and links with the collaborative platform.

2 The collaborative platform

The platform is a Web-2 collaborative space for members of the AFROweeds project. It allows to:

- create working groups on specific topics;
- sharing information, working documents, Web links of interest;
- create, animate and participate in online discussions;
- to supply photo albums (collections of missions, weed control practices, unidentified weeds ...)
- to submit questions or photos (eg to identify a weed or to discuss a practice of weeding) to the entire community.

Any page, document or photo can be subject to comments from members of the platform. These comments will include the basis for exchanges between the partners.

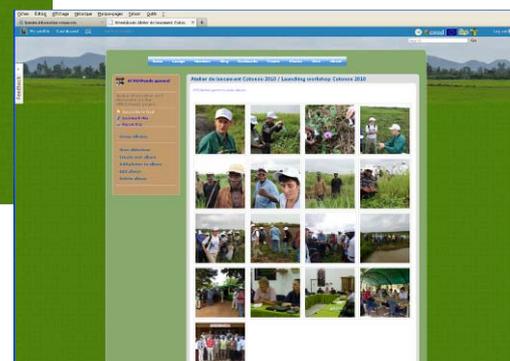
Participation in this platform requires registration. Registration is validated by the project coordinators to prevent automated registrations from bots or from people completely outside the issue of weed management in rice. There are currently 28 members registered to the platform. The workshop participants have been trained in the use of this platform and are now able to present it in their professional networks and seek new subscriptions.



Some working groups of the platform



Example of the AfroWeeds General group



Album photo of the first workshop in Cotonou 02/2010

At present, seven working groups are formed:

- Operation of the project AFROweeds
- AFROWeeds Coordination (closed group limited to the project coordinators)
- Botany and identification
- Tools and methods for identifying IDAO
- Distribution and invasion of regional weeds
- Irrigation network of the Office du Niger
- Management of weed infestations

Many scientific papers have already been made available to the community and a summary of references on the topic of weeds in general and weed control in rice.

3 software IDAO identification of weeds

Identification using the identikit process allows identifying a plant at any stage of development or from an incomplete sample, without requiring knowledge in botany.

This process is error tolerant.

Species are listed in order of probability of consistency with the information provided by the user.

Each species is fully described with information on its origin, its distribution, its ecology, its aggressiveness and control methods used, and abundantly illustrated.

This is a working tool, but also a way for the dissemination of knowledge and a teaching and training tool.

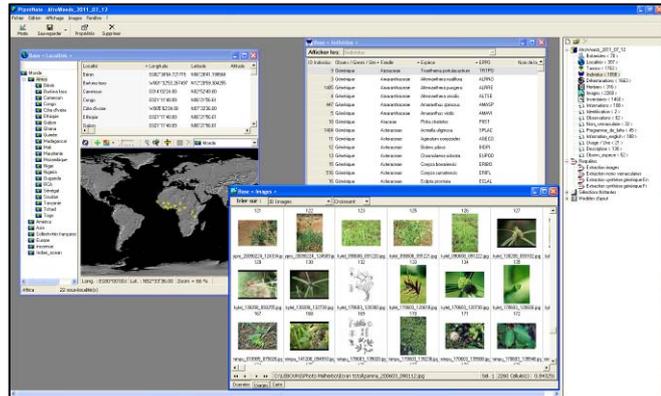
It is accessible from the website AFROWeeds from the tab "Resources" and from the collaborative platform from the working group "Botany - identification" or the working group "IDAO SVG," or can be used directly at:

<http://www.afroweeds.org/idao>

4 Database

The AFROweeds database is managed using the software PI@ntNote V.0.9. This enables data management in botany from repositories (taxonomic, geo-referenced locations, people) and modules for managing information on the species (illustrations, herbarium, descriptions, identification, control methods, synthesis of information in English and French, etc.). This software database, currently under development in the project PI@ntNet, will at least allow local management information and an online management for multi-user network use.

In its current state, the AFROweeds database contains 2200 photos and 316 herbarium sheets covering 160 species. The fact sheets include information on 120 species present.



Visualization of different modules of the database

5 The new partners from research institutions

Tomas Chiconela is a researcher and professor of weed science at the Faculty of Agriculture and Forestry of the University Eduardo Mandlane Maputo in Mozambique. He worked on the weeding of rice to Mozambique.

Claude Runyambo is a researcher in Rwanda Agricultural Board, in Butare. He works on botany and weed management. In Rwanda the system of rice production is only recent and traditional with mainly irrigated rice. There is no use of herbicide. Weeds are weeded by hand. Some of them are used (food, livestock feed, fertilizers ...). In Rwanda, there is a strong need for baseline studies showing the yield losses due to weeds.

6 The new partners from extension services

Representatives of the extension services were given the floor to explain the difficulties/challenges encountered in the field and how the project can be helpful in addressing them.

Assemien Koutou, Coderiz, Tiassale, Côte d'Ivoire.

Opinion: "In Ivory Coast rice farmers face huge problems with weeds, firstly to identify them and secondly to control them. Species that pose the most problems are *Echinochloa* spp. and *Lindernia* spp. Herbicides are typically used, particularly at the time of soil preparation.

This type of tool (recognition and platform) will allow us to better identify the species, including those from other regions but present in the seed lot and we do not know, as well as access to the means of struggle in seeing the practices of other regions. There is also a lot of local knowledge and

traditional means and local innovations for control available. Extension services can observe those and describe them and include them in the database to make them available to the AFROweeds community. The platform will allow us in particular to exchange information with other parts of the country such as between Korhogo and Katiola. It is therefore important that all structures of development are part and participate. This can also serve as a training tool for technicians and farmers. "

Emmanuel Anado Codjo, Conseil Régional des Riziculteurs du Mono et Couffo, Benin.

Opinion: "I plan to share this AFROweeds platform with counterparts from the five other regions of Benin. This will allow us to exchange information and better advice and support the farmers.

For example, a farmer recently referred to a species of the Lamiaceae family against which it is difficult to control but which is interesting because it serves as an indicator of fertility for the selection of plots. With the platform, we will be able to take pictures of the plant to ask others to help identify and then see if there is information on this species. If the species is not in the database we can add it. "

A reciprocal link is made between the CRR website Mono and Couffo (<http://crrmc.ilemi.net>) and the AFROWeeds website and platform.

Salif Diack, SAED, Saint Louis, Senegal

Opinion: "The SAED oversees the production of rice in two distinct areas:

- the Senegal River Valley where intensive agriculture with direct seeding pre-germinated, use of fertilizers and herbicides (Propanil – 2,4-D or Londax). The main problems encountered by farmers are the Poaceae and Cyperaceae, weed due to poor cultivation or to lack of equipment and service providers inadequate.
- the upstream region, with a low-intensity agriculture rice transplanted without the use of herbicide. Manual weeding is usually too late. Farmers are waiting for the big weed before removal because they use to feed livestock.

There is currently an increase in the problem due to perennial weeds in the case of continuous cultures of rice. It then recommends a break with a regular dry farming.

Species are fairly well known in Senegal through the work of NARS, but encountered a major problem of confusion with the use of vernacular names. The AFROweeds database should allow us to clarify this information and to print the fact sheets on species for distribution to farmers.

We can distribute this tool at the level of NGOs present in Senegal. "

A practical manual for irrigated rice has just been published, which is a product of SAED, AfricaRice and ISRA, with a chapter on weed control that will supply the platform AFROweeds. A reciprocal link is made between the website SAED (<http://www.saed.se>) and AFROWeeds platform.

Daouda Diara, Office du Niger, Niono, Mali

Opinion: "The Office du Niger oversees 70 years of experience and 90,000 ha of irrigated rice where water control is total. We practice two growing seasons of rice per year. The main problems relate to

the perennial wild rice (*Oryza longistaminata*) and aquatic plants that grow in irrigation systems. Large scale farms (private) 100-200 ha, direct seeding is used. Currently, *Eichhornia crassipes* is becoming less important than *Salvinia molesta* which is invading the tertiary irrigation network. The fight against aquatic plants is the largest budget item in the Office du Niger.

The problem is that farmers do not want to ensure the fight in the channels. The species also develop and produce seeds distributed by the water into the plots.

The platform and tools AFROweeds will be very useful for advisers who all have access to their computer and can relay information to farmers. "

Daouda will organize meetings with farmers and extension to inform them about the AFROweeds tools. Following this summary we had a discussion on the use of herbicides and biological control (against water weeds). It was suggested that this kind of discussion could be continued or started through the forum page on our collaborative platform.

7 General discussions

Many weed problems relate to species groups and not individual species. It would be interesting to propose discussions and recommendations in relation to the functional groups of species such as:

- Annual small Poaceae (*colona Echinochloa, Digitaria spp. Dactyloctenium spp*)
- Annual large Poaceae (*Rottboellia conchinchinensis, Echinochloa pyramidalis, Sorghum verticilliflorum ...*)
- Perennial Poaceae (*Panicum repens ...*)
- Annual broadleaf weeds (*Sphenoclea zeylanica, Lindernia spp.*)
- Dicotyledons climbers (*Ipomoea aquatica*)
- Floating species (*Azolla spp. Pistia stratiotes, Eichhornia crassipes ...*)
- Parasite species (*Striga aspera, Rhamphicarpa fistulosa*)

Thus, we can recommend and regularly update the AFROWeeds platform (group Management of weed infestations) with control methods focused on functional groups and each species will be linked to a particular functional group.

Interest analysis of the platform and tools AFROweeds

Friday Ekemele, Nigeria. There are many extension services in Nigeria for whom this tool would be helpful. I will inform them. We can also provide a reciprocal link to the website of the Weed Science Society of Nigeria.

Israel Dzomekou, Ghana. What is much appreciated in the process of this platform is the direct link between the information managed in the database which is made immediately accessible to everyone on the species fact sheets from the website and collaborative platform. The comments made on the platform can then feed the database.

Assemien Koutou, Côte d'Ivoire. We can manage on the platform a specific sub-network for various departments of Côte d'Ivoire to exchange information at the country level and, secondly, at the whole of Africa.

Maryam Mariko, Benin. If you have an identification problem with a weed, you can take photos and create an album in the group "Botanical identification" and ask the entire community to recognize species and provide information. This makes the research much easier.

Jonne Rodenburg, Tanzania. For this platform to achieve its objective we need technicians and farmers can access information but we also need they contribute in sharing their knowledge with other members of the platform.

Training partners to the use of the collaborative platform

Half a day was spent in learning and training partners in the use of the collaborative platform of AFROweeds. The workshop participants were able to familiarize themselves with this Web-2 tool. They registered themselves and are now able to use the various tools available (participation in a working group, consultation of pages and files, comments on an object, create photo album, launch and participate in a discussion, etc.)..

They can now use the platform to contribute to its operation and its animation and feed the system with documents, knowledge and questions.

On the other hand, once they return to their country and their institution, participants aim to present this platform to other stakeholders in the rice, interested in managing weed infestations to expand the community.

The day of June 30 was devoted to the identification of many photos collected by the AfricaRice team and a training session to capture and manage information in the database. The AfricaRice team will preferably manage the synthesis of species information in English, while the CIRAD team will manage the species information in French. The data is regularly exported from each of the databases to generate fact sheets for information on species available from the website, the collaborative platform and the IDAO identification system.

Programme of future activities

The coordination team Cirad-AfricaRice continues its work of feeding and use of the tools (website, collaborative platform, system identification, information system ...).

This set of tools will be really interesting and useful to players only if they participate in their operation, and contribute to the provision of information and knowledge about species and their management. Now, it is the dynamism and commitment of community members that will allow the AFROweeds project to achieve its goal: a platform for exchange and information on weeds of rice in Africa.

Concerning the collection of information and pictures on the species, relatively few items were sent by partners to date (Benin, Côte d'Ivoire, Mali). During the workshop some partners have provided photos taken on the field.

Currently, twenty species of the initial list does not yet have an illustration and nearly 60 species do not possess yet consolidated information.

These species are a priority and all partners should strive to send CIRAD or AfricaRice information they have. The list of these species was distributed to participants.

The recommendations and weeding practices in different countries must be synthesized and incorporated into the database and the platform in the form of documents updated regularly.

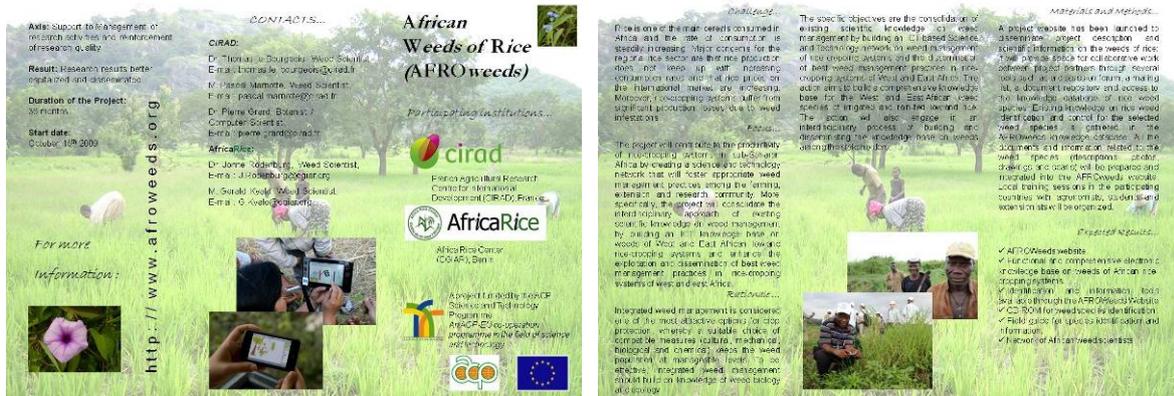
All information on species should be collected and integrated into the database by February 2012 so we can test the operability and efficacy of the various tools before the final project workshop in September 2012.

AfricaRice will organize training workshops on the use of AFROweeds tools in Tanzania.

A presentation of the project and tools will be made on the occasion of the 10th conference of the African Society of Agronomy in Maputo, Mozambique in September 2011.

Visibility actions

Flyers presenting the Afroweeds project in French and English were distributed to workshop participants so that they can distribute through their professional network in their country.



AFROweeds brochure in English

Interviews with different coordinators or participants were performed by the communication service to AfricaRice and are available online from the first page of the AfricaRice website:

<http://www.africarice.org/>

or directly at

<http://vodpod.com/africarice/africarice>

Field surveys, collection and testing of tools for access to information

Two collection days were held (01-02/07) by Emmanuel Codjo Anago, head of the RRC Mono and Couffo, in rice field from the Come region and with the help of Athanasius Lokonon rice farmer in Zinvié.

In each region, two sites were visited, around Come (Todjonoukouin and Codji-Haham) and around Zinvié (Dokomey and Gbodje).

It was an opportunity to collect many pictures and herbarium specimens.



Collecting botanical samples and photos at Todjonoukouin (© T. Le Bourgeois, N. Bakker-Cirad)



Collecting botanical samples and photos at Codji-Hahamé (© P. Marnotte, P. Grard, T. Le Bourgeois-Cirad)



Collecting botanical samples and photos at Dokomey (©T. Le Bourgeois, N. Bakker, P. Grard-Cirad)



Collecting botanical samples and photos at Gbodje (©P. Grard, P. Marnotte, N. Bakker-Cirad)

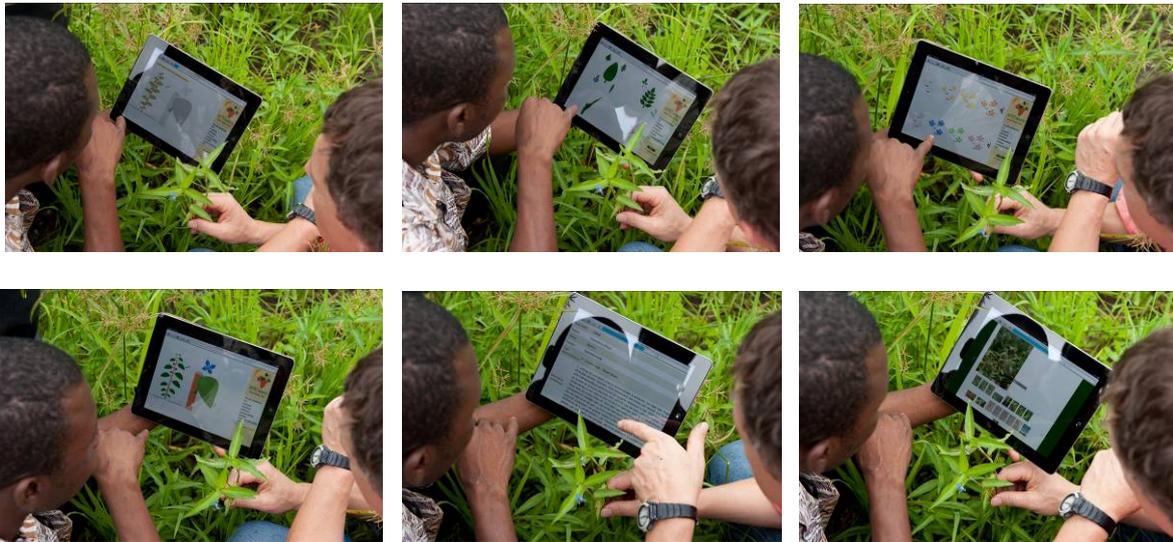
In total, several hundred photos on 65 weed species were collected as well as dozens of herbarium specimens to feed the database and AfricaRice herbarium.

On the other hand, we were able to test in real conditions the use of information and identification tools of the AFROweeds project directly into the rice fields. Indeed, it is now possible to use the online identification system IDAO with a tablet computer equipped with a 3G smart phone with Internet access and direct access to fact sheets on species is possible. You can also check out the collaborative platform.

Various tests, quite successful, were made in the rice field in the region of Todjonoukouin Comé with agents of the CRR Mono and Couffo.



Using the Tools project AFROweeds directly into a rice field in Benin for the identification of a weed and access to information on the species using a tablet computer equipped with a 3G chip Internet phone (©P. Marnotte, N. Bakker-Cirad)



Steps of the identification of *Commelina diffusa* and access to information in the field by E. Anago Codjo responsible for CRR Couffo Mono and using project tools AFROweeds tablet computer and a 3G + (©P. Grad-Cirad)



Web site access AFROweeds from a rice field in the Como area (Benin) from a tablet computer 3G + (©T. Le Bourgeois-Cirad)

The tools developed in the AFROweeds project are userfriendly directly in the field with the new tablet computers and smartphones. Access time is reasonable. Loading the summary information of the species is slowed by the distribution map of the photos. It was therefore planned to make optional the display of this map to speed up the loading of the plug. This type of device is still little used in the public domain, but smart phones are increasingly used in Africa with chips Internet.

Administrative aspects of the AFROweeds project

Several meetings were held at the AfricaRice Centre between scientific and administrative teams from CIRAD and AfricaRice for an update on the technical and the administrative and financial monitoring of the AFROweeds project.

Technical aspects:

An operating and progress point was made on the different actions and different tools of the project:

- The Pl@ntNote software used to manage the database in developed by CIRAD, is so far local and single-user. Therefore, most of the data was entered by the CIRAD team. A multi-user version should be available in June 2011 but its development was delayed. It was therefore decided that AfricaRice now utilize the current copy of the database and feed it with all of its data (photos, herbarium specimens, species information). AfricaRice will in priority update information on the species in English, while the CIRAD will update in French. AfricaRice will send to CIRAD the updated copy of the database two times a month for CIRAD can export the new information and update the fact sheets of the species available from the website of the collaborative platform and the identification system. Once a multi-user and online version of the software Pl@ntNote is available, the partners can work simultaneously on a common database.
- The different tabs of the website AFROweeds were analyzed to propose improvements in implementation and content of the pages.
- The collaborative platform for Web-2 was developed from the software Elgg (social networking software Open Source). The various tools of the collaborative platform of AFROweeds were presented and discussed.
- The identification system has been redeveloped IDAO SVG and updated for the needs of the AFROweeds project. It is functional to 80% and can identify 120 species of the AFROweeds project. It can be used via Internet from the project website or the collaborative platform (working IDAO or Botanique).

Administrative aspects:

Thomas Le Bourgeois discussed all the remarks made by the EU Commission, Mr. Den Ouden concerning the first narrative and financial report of the project AFROweeds. He explained that the EU is very strict in relation to the justification of expenses.

Regarding the narrative:

Need to explain precisely any changes in the actions with the actions announced schedule changes and delays in hiring project staff.

Concerning the Financial Report:

It had to be revised seven times following comments and requests for corrections or clarifications from Mr Den Ouden. The main points were:

- Respect for the presentation format of the financial report.
- The details of the agents on a mission, the place of mission, the exact correspondence between the dates of tasks and the number of mission days, the use of correct values of per diem in accordance with the European scale based on the date of mission (if the per diem to the date of the assignment is higher than at the signing of the contract is that of signing the contract to be used if not that at the time of the mission).
- It is not possible to charge for meals while we ask for per diems. This has particularly been met for the first workshop participants.
- Compliance with the expenses in the right budget lines.
- Some expenses were charged as they did not correspond to activities of the Afroweeds project.
- The ineligibility of certain expenses.
- Per diems given to the invited people at the first workshop in Cotonou had to be explained.

- EU will pay each year after approval of the annual report (financial and technical) 80% of the total 85% (the total is a sum of what EU-ACP, CIRAD and AfricaRice are pooling together for the whole project). The remaining 20% will be reimbursed upon project completion and after having received and accepted the full and approved financial and technical reports.

- A financial audit will be conducted at the end of the project.

- The provision "Reserve for Contingencies (5%)" can be used after a reasoned request and agreement of Mr. den Ouden of the EU.

The EU was asked to re-allocate a portion of the amount of salary of the research assistant and technician from AfricaRice not used during the first year to allow African partners to participate at the second workshop. This request was granted which allowed to invite 11 partners at the second workshop of the project.

CIRAD has obtained the discharge of the EU Commission in May 2011 instead of late December 2010, which delayed (four months) the second payment.

Thomas Le Bourgeois attended the meetings of EU-ACP S & T (October 2010) to discuss project management. Many project representatives complained about the rigid rules of management and operation of these projects. The answer was that it was the rule imposed and it was not possible to change them. The next time the rules call for projects will likely be different and less rigid. Thomas Le Bourgeois also recalled the requirements of the European Union for the management of a European project.

Thomas Le Bourgeois and Nora Bakker presented the 2011 budget of the project AFROweeds. Nora Bakker, assistant project management provided an update with its counterparts in the Management Service of AfricaRice on monitoring project management and formatting of accounting documents.

- Presentation of the European rules (ACP S&T) AFROweeds project management to Sadikou Akram, an accountant.

- Remarks on the proofs of the first financial report of expenses.
- Analysis of the first financial report and supporting documents by type of expenditure and time sheets.

The method for the approximation of the timesheets, the days of per diem and evidence relating to the missions was explained to the accountant.

- Introduction to the method of verification made to Sadikou Akram, an accountant.
- Analysis of the estimated budget for the second year.
- Delivery of documents: the first year financial report with the remarks, the second budget year and rules.
- Summary of meeting with Leny Medenilla responsible for contract management and supervisor of Sadikou Akram, an accountant.

Conclusion

The second workshop of the AFROweeds project hold in Cotonou, Benin allowed further progress of the project:

- Involve extension people in the project;
- Integrate actors from new countries (Rwanda, Mozambique);
- Introduce new tools for collaborative work and train actors to use them;
- Linking the AFROWeeds project and other current projects working on the crop pests (Divecosys) or on rice development (Saed, Crrmc);
- Collect new information in the field in partnership with extension agents;
- Plan future actions;
- Most importantly, strengthen the links between the project partners and enable them to communicate more easily and effectively with new tools of the collaborative platform of the project AFROWeeds.

This workshop was conducted in the financial envelope provided.

From an administrative stand point, the mission of N. Bakker has an audit and review with partner AfricaRice ont expectations and rules of the European Union in financial management and justification of the project. This was very useful for the efficient administration of the project.

Acknowledgement

The project coordinators of AFROweeds acknowledge Dr. T. Kumashiro (representative of the Director of AfricaRice) in giving an opening speech to welcome all participants and present the objectives of the workshop. They thank the European Union (ACP Secretariat -Science and Technology Programme) in funding the project AfroWeeds through the tender of 2008 9th European Development Fund.

They also thank AfricaRice for hosting the workshop and organization of field trips, with a special thak to Ms. Carine Kan for her assistance in preparing this workshop and her availability during the course of it.

Appendix 1: List of attendees**Second workshop of the AfroWeeds project****Cotonou 28-29 June 2011**

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