ACP Science and Technology Programme

AFS/2009/219015

AFROweeds
African weeds of rice

ANNEX VI
FINAL NARRATIVE REPORT

15 December 2012

Thomas Le Bourgeois – Cirad
Pierre Grard – Cirad
Pascal Marnotte – Cirad
Jonne Rodenburg – AfricaRice

ANNEX VI

FINAL NARRATIVE REPORT

- This report must be completed and signed by the Contact person
- The information provided below must correspond to the financial information that appears in the financial report.
- Please complete the report using a typewriter or computer (***you can find this form at the following address <Specify>).***
- Please expand the paragraphs as necessary.
- ***Please refer to the Special Conditions of your grant contract and send one copy of the report to each address mentioned***
- The Contracting Authority will reject any incomplete or badly completed reports.
- Unless otherwise specified, the answer to all questions must cover the reporting period as specified in point 1.6
- Please do not forget to attach to this report the proof of the transfers of ownership referred to in Article 7.3 of the General conditions.

1. Description

1.1. Name of beneficiary of grant contract:

CIRAD Centre de Coopération Internationale en Recherche Agronomique pour le Développement (International Cooperation Centre for Agronomic Research and Development)

1.2. Name and title of the Contact person:

Dr Thomas Le Bourgeois, Weed scientist

1.3. Name of partners in the Action:

Africa Rice Center (AfricaRice)

1.4. Title of the Action:

African Weeds of Rice (AFROweeds)

1.5. Contract number:

AFS/2009/219015

1.6. Start date and end date of the reporting period:

16th of October 2009 – 31rst of December 2012

1.7. Target country(ies) or region(s):

West, Central and East Africa

1.8. Final beneficiaries &/or target groups[1] (if different) (including numbers of women and men):

The target groups are weed scientists and agronomists working at universities or national research institutions and technicians working for development organizations, extension or crop protection services in Africa. Agronomy and weed science students are also an important target group as the tools and information generated by AFROweeds will be used to back up training and teaching. Students also represent a particular target of the project because they are the future research and development stakeholders or decision makers in Africa.
To date, 229 people have registered as a member on the AFROweeds collaborative online platform "*Weedsbook*".
Fig. 1 shows the distribution of members among different types of institutions interested in this project, while Fig. 2 shows the geographical origin of members and Fig. 3 the gender ratio of members.

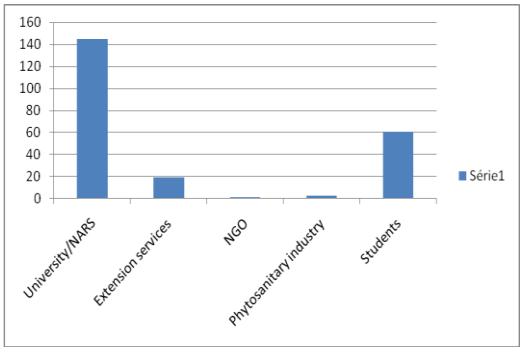

Fig. 1: Institutional belonging of members

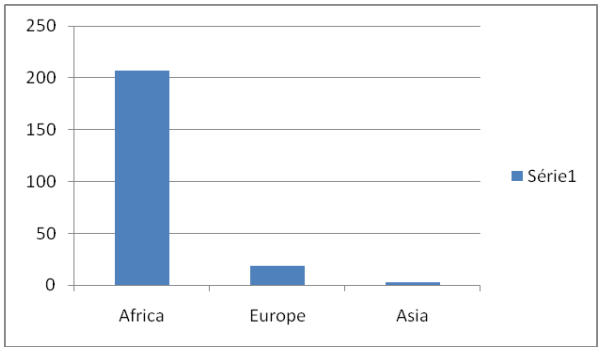

Fig. 2: Geographical origin of members

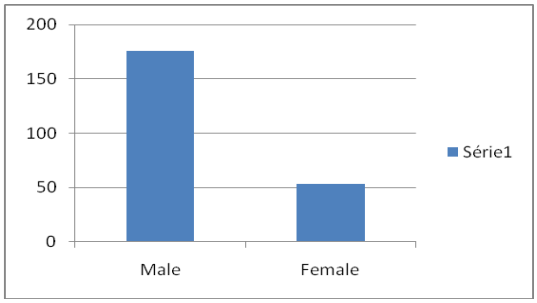

Fig. 3: Gender ratio of members

At the moment, scientists represent the biggest group of members. This group includes agronomists from national or international research centers and weed scientists or botanists from universities. Students from agronomical schools or universities have increase a lot during the third year of the project. They are the researchers or developers of the future and are already very familiar with the use of new information and communication technologies. They are a very receptive audience for the innovative tools developed by the project and it is important to sensitize them in an early stage of their careers. Extension people have also increased rapidly since they have been invited to attend several workshops and training sessions and they have been met during

[1] "Target groups" are the groups/entities who will be directly positively affected by the project at the Project Purpose level, and "final beneficiaries" are those who will benefit from the project in the long term at the level of the society or sector at large.

field visits. Female members are also increasing; they are mainly from research (scientists or students). Females represent about 25% of the members.

All along the project, about 12 meetings, workshops, conferences or training sessions were conducted in several countries such as Benin, Tanzania, Kenya, Uganda, Madagascar, Mozambique, Senegal and France. Participants of these meetings and workshops were proposed to subscribe to the collaborative platform "*Weedsbook*" and to diffuse the information to other people throughout their own professional network. Around 3/4 of the members of the collaborative platform were met during presentations and trained while the remainde joined the network by themselves, discovering the project on the internet, or upon introduction by other members.
For example, Dr. Friday Ekemele from Nigeria introduced this platform at the 44th Nigerian annual weed conference from 19 to 22 November 2012 held at Ahmadu Bello University, Zaria, Nigeria. A large number of new members have registered on the collaborative platform "Weedsbook" from this presentation.

We expected to gather around 200 "*Weedsbook*" members within the three years of the project. Early 2013 the community of rice weed actors gathered throughout the AFROweeds project is about 229 members. The Fig. 4 shows the evolution of membership along the three years of the project (until February 2013) with an increasing slope during the third year. We are really confident that this community will continu to grow during the following years as the network will not stop to exist by the end of the European funding.

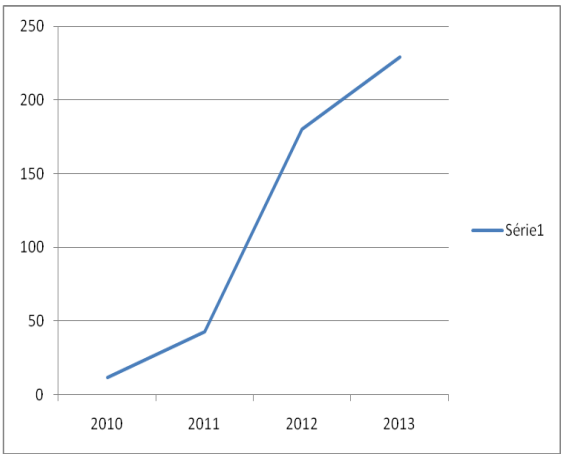

Fig. 4: Evolution of memberships during the project

The final beneficiaries are the African rice growers, who should be able to enhance rice crop production through better weed control, and the populations of participating countries, who should gain access to larger national rice production, making them less dependent on rice imports.

Over the period of 2001–2010, paddy production in Africa increased by 4.8% per year. In 2009, total paddy rice production in Africa was 24.5 Mt (FAO, 2012a). The 2010 production figure given by FAO (2012a) is 25.6 Mt. Based on FAOSTAT, West Africa produced more than 10 Mt in 2009 and about 11 Mt in 2010, while the East and North African production was 6.7 Mt and 4.4 Mt in 2010, respectively. Central Africa harvested over 0.664 Mt and Southern Africa 69,351 tonnes (0.0694 Mt). The growth in paddy rice production during the post-crisis period demonstrates the efficacy of the policy-advocacy endeavors undertaken throughout the 2008 crisis period. However, despite the price hikes in 2008, rice consumption in Africa grew even more during the period 2008–2010 — at a rate of 4.26% per year — reaching 20.3 million tonnes (Mt) in 2009 and an estimated 21.19 Mt in 2010. Average annual rice production was 16.89 Mt during

the period 2001–2007, and 20.33 Mt during 2008–2010. Even though total rice consumption has been increasing at more than 3% per year, actual per-capita rice consumption has increased at only 1% per year, indicating that the trend in rice consumption mainly comes from population growth. With an increasing population, growth in rice consumption will follow, resulting from increasing demand from all sectors of a growing population requiring a diet richer in carbohydrates, of which rice is one of the principal suppliers (AfricaRice, 2012[2]).

Rice production is continuously increasing in Africa. Across the continent, there should be an additional 14.5 million tonnes (MT) of paddy rice in 2020. Moreover, imports will have declined by an impressive two-thirds of 4.6 Mt. Overall, some 11 million people – members of rice farming housholds and rice consumers- should be lifetd out of poverty by the end of 2020 as a direct result of increased production of better-quality rice and lower prices on the market (AfricaRice, 2011[3]).

In addition to the expected contribution to improved rice productivity in the region, the AFROweeds project is conducted in conjunction with national research and development systems (NARES) and should enhance their capacities and intra- and inter-institutional collaboration.

1.9. Country(ies) in which the activities take place (if different from 1.7):

The AFROweeds project comprises those countries of West, Central and East Africa with significant rice crop production. Initially, since the AfricaRice partner is established in Benin, Senegal and Tanzania, these countries were given priority. In the first year the active member countries concerned were: Benin, Senegal, Côte d'Ivoire, Mali, Burkina Faso, Nigeria, Ghana, Chad, Kenya, Uganda and Tanzania. In the second year we enhanced this group by two more countries from East- and Southern Africa: Rwanda and Mozambique. During the third year, Madagascar was also implicated as well as Togo and Congo. A few members are based in The Netherlands, Belgium, Italie, UK and France but involved in research for development or phytosanitary activities with a focus on African rice production.
Finaly, by the end of the project, people from 29 countries are involved in the collaborative platform, within 22 countries in Africa, 6 countries in Europe and 1 country in Asia. Fig. 5 shows the number of members per country.

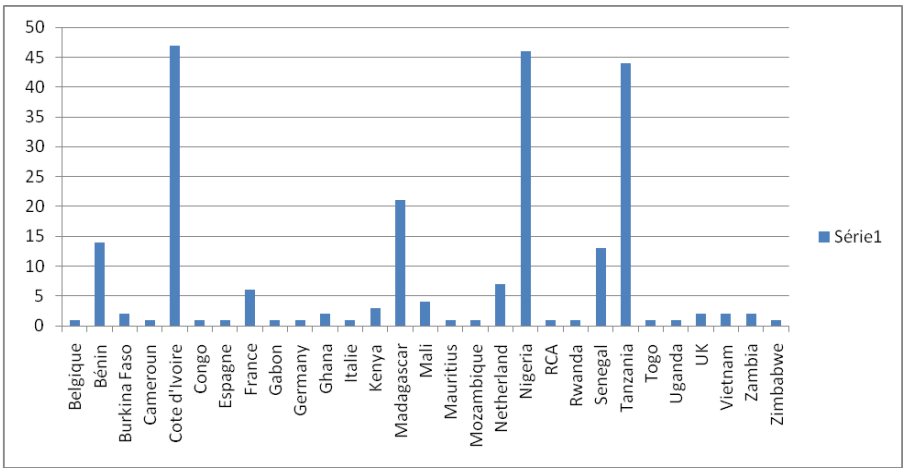

Fig. 5: Distribution of members per country

[2] Africa Rice Center (AfricaRice). 2012. *Africa Rice Trends 2012*. Cotonou, Benin: 107 pp.
[3] Africa Rice Center (AfricaRice), 2011. Boosting Africa's Rice Sector. A research for development strategy 2011-2020, Cotonou, Benin: 96pp.

2. Assessment of implementation of Action activities

Remarks on assessment of implementation of Action activities:

Mr. Pham Ngoc Hai was recruited by Cirad at Hanoi – Vietnam as Web manager of the project, for a 24 months contract from 01 November 2010 to 31 October 2012.

Mr. Pham Trung Doan was recruited by Cirad at Hanoi – Vietnam for Web management and software development in IDAO SVG for the AFROweeds project, for a contract from 01 April 2011 to 31 December 2011 then replaced by Mr. Nguyen Van Ngoc from 1 February to 30 April 2012.

During the second year of the project, the Research Technician of AfricaRice, Ms Kobusinge Aloys got an MSc scholarship for Belgium and left end of July while she was replaced by Mr Runyambo Irakiza from Rwanda since 1 October 2011. The Reseach Assistant of AfricaRice, Mr Gerald Kyalo left his position end of October 2011 to pursue a PhD degree in Kenya. He was replaced by January 2012 by Derek Makoha an MSc-holder in botanics from Kenya with good experience from the East African Herbarium in Kenya.

Pascal Marnotte from Cirad moved to the French Embassy at Cotonou – Benin in April 2011 as a "Technical assistant". Thus he is no longer a Cirad participant of the project but he still remains a local partner of the AFROweeds project. From that date, part of his work on species information has been assumed by Alain Carrara, a Cirad Reseach Assistant based in Montpellier the other part on weed science was assumed by Thomas Le Bourgeois from Cirad (project coordinator).

During the third year of the project, Pierre Grard got a new responsibility as Director of the French Institute of Pondichery and from April 2012 is no longer a Cirad participant of the project but he stills remains a member contributing to the developpement of the AFROweeds. He attended the closing workshop at Cotonou, Benin in September 2012, contributing highly in the presentation of the use of the AFROweeds applications on iPad tablets. By the end of the project, part of his work on computor tools was assumed by Thomas le Bourgeois from Cirad (project coordinator)

Finaly, Jonne Rodenburg from AfricaRice, Nora Bakker and Thomas Le Bourgeois from Cirad remained fully involved in the project throughout the whole project duration. We have tried to manage the situation changes of contributors so as not to compromize the operation of the project.

The project encountered difficulties from partners to contribute, they all are really interested and motivated in the project but most of them have not contributed a lot. Only few of them (Benin and Côte d'Ivoire) have sent information on the species. Eight partners from Côte d'Ivoire, Benin, Nigeria, Rwanda, Mozambique, Ghana, Burkina Faso and Mali have sent images and three partners from Nigeria, Benin, and Kenya have sent herbarium specimen images. However, since the collaborative platform (Weedsbook) is geting more and more efficient and contains more topics, the activity and consultations are growing rapidly and contributions to discussions as well.

Mr. Fredy Kouame, a Phd student of the University of Abidjan-Cocody (Côte d'Ivoire) working on rice weeds, planned to spend two months early 2011 at Cirad Montpellier to analyse his data and manage them in the AFROweeds database. However, the political unrest in Côte d'Ivoire made this visit impossible until now. He is now ready to defend his Phd thesis "*Ecologie et biologie des principales adventices de la riziculture dans le disctrict de Yamoussoukro en Côte d'Ivoire*" which will be uploaded onto *Weedsbook* to be available to all members.

Note that the collaborative approach and tools used are very new to most of the people involved in the project. Their use is not always easy and requires a little practice. The partners often have no permanent access to the Internet which does not facilitate their work.

During the closing workshop, discussions with African partners showed the interest in developping a version of weed identification and information applications available on iPhones. A request for a two-month extra time was sent to the European authority with a proposal of budget reallocation of unused funds for complementary salaries and purchase of new devices. An addendum of the contract was signed by the parties on 13 November 2012 for an ending of the project on 15 December 2012 with a modified budget.

2.1 Activities and results

Please list all the activities in line with Annex 1 of the contract during the reporting period

Activity 1: *Project launch, preparation of the website and preparation of the project exchange platform and modalities*

Activity 1a: Open the project website

The AFROweeds project website (http://www.afroweeds.org) came online during the initial workshop in February 2010. It was rebuilt with a new frame by the end of 2010 and was complemented by the collaborative platform in 2011.
Currently the Website is a public space where the project is presented and information and project results are made available to the general public.
This comprises a home page with a presentation of project objectives, partners and grant suppliers (Fig.6), from which several links allow access to different pages:

- **Activities** - to present workshops results and field works.
- **Resources**
  - Compilation of bibliographical references on rice weeds, flora and field guides, weed control, technical and scientific papers (Fig. 7),
  - Botanical resources such as Internet links dedicated to systematic or botanic purpose,
  - The list of rice weed species selected by all the partners during the initial workshop with a direct access to their HTML description and illustrated sheet (Fig. 8),
  - The AFROweeds identification system (Fig. 9).

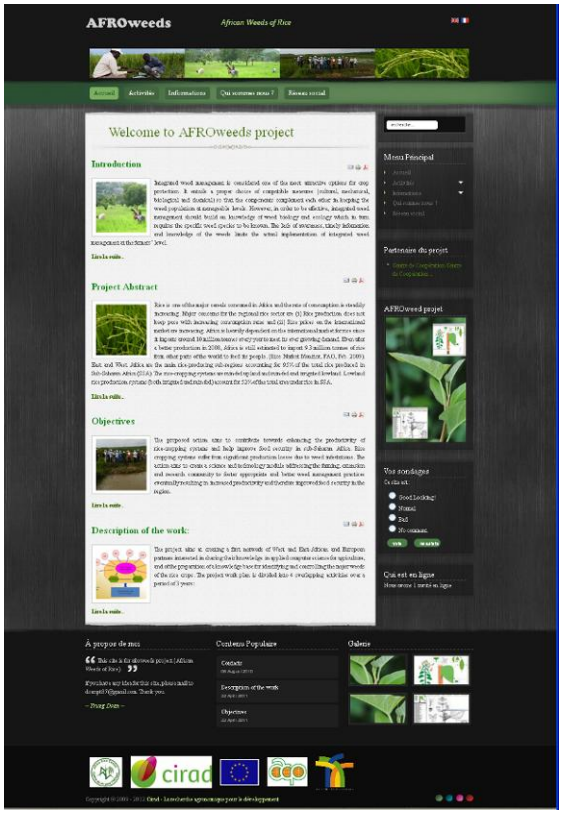

Fig.6. Home page of the AFROweeds project Website.

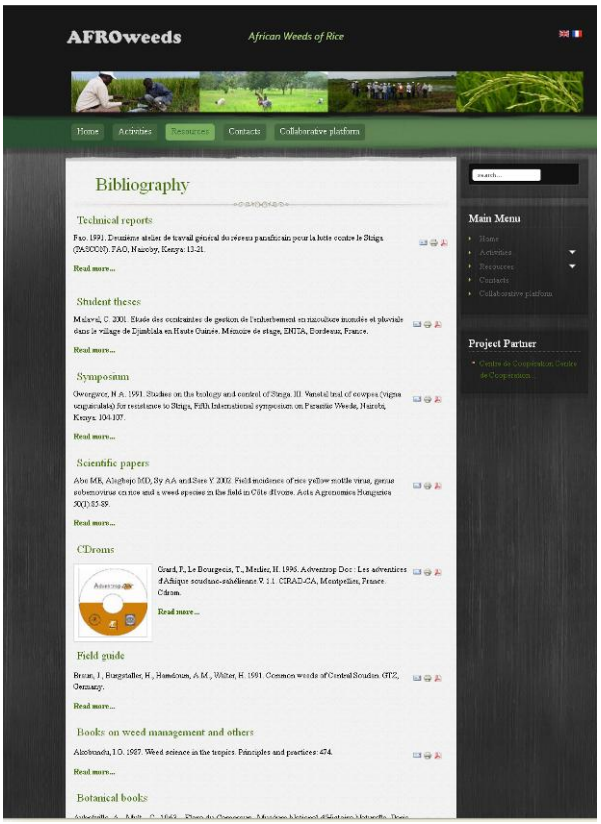

Fig. 7: Bibliography page

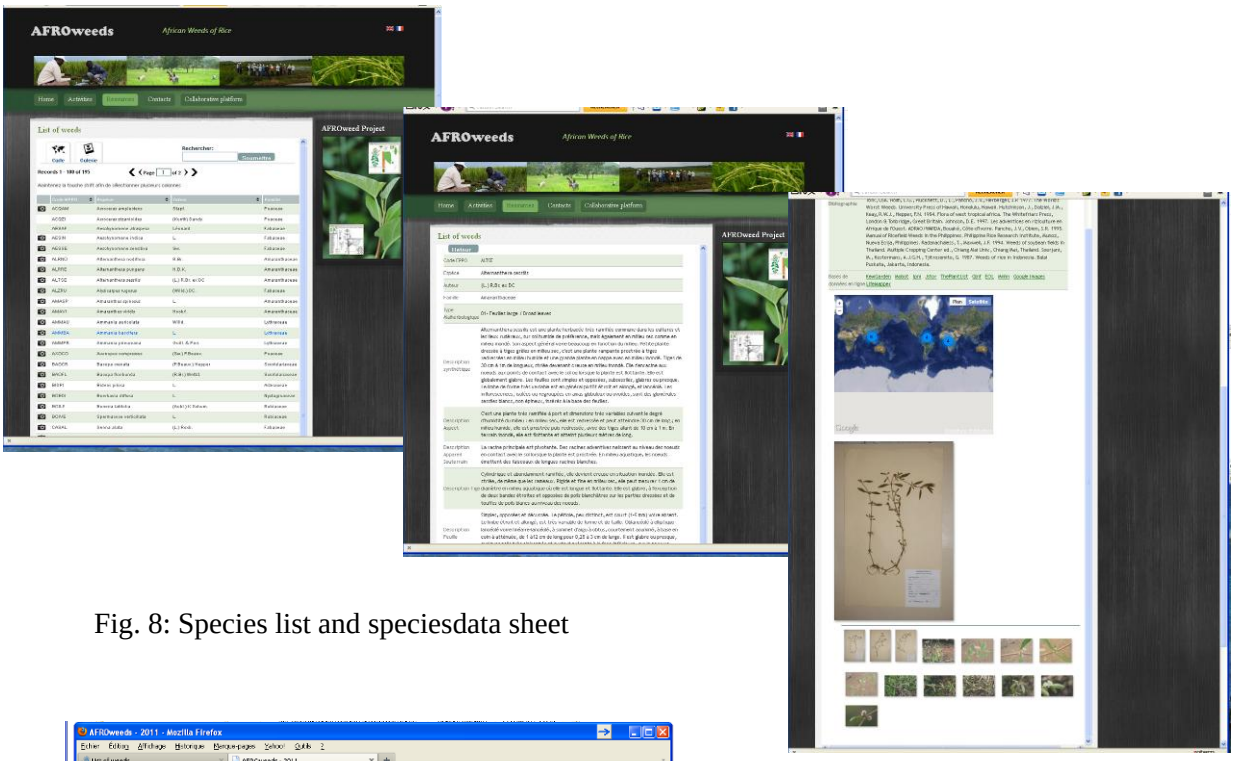

Fig. 8: Species list and speciesdata sheet

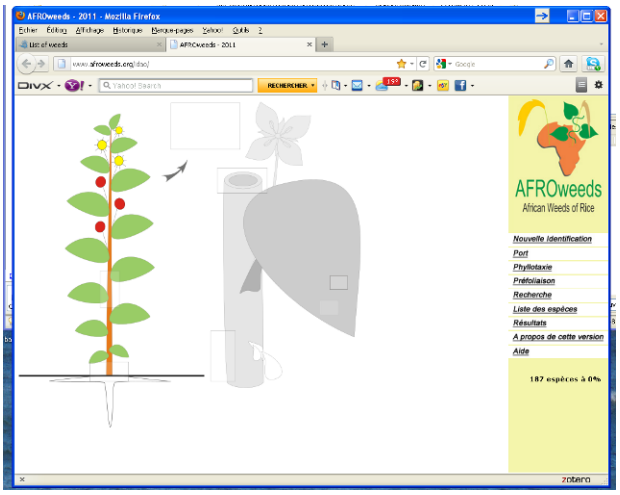

Fig.9: AFROweeds identification page

- **Contacts** – with coordinates of the main Cirad and AfricaRice partners involved in the project.
- **Collaborative platform** – to access directly the Web 2 collaborative platform "*Weedsbook*" of the project where members can share their information, documents, knowledge, questions, photos, etc.
- **News** – to present the last events of the project.
- **Links** – to other Websites related to rice production or weed management in rice, such as DIVECOSYS in Africa (http://divecosys.e-monsite.com), SAED in Senegal (http://www.saed.sn), and CCR-MC in Benin (http://crrmc.ilemi.net). They also have a link to the AFROweeds Website (Fig.10).

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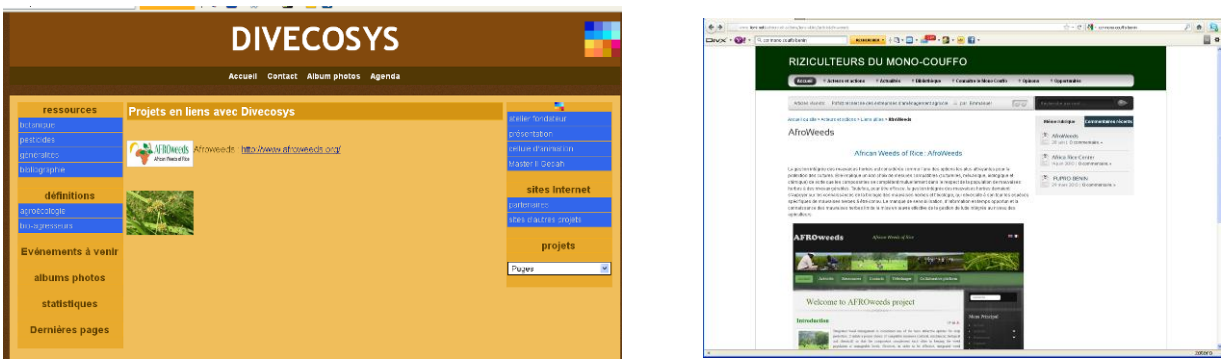

Fig. 10: Examples of links to AFROweeds from DIVECOSYS and CCR-MC Websites.

The project website is operational and can be accessed by the general public (project partners and target players). It is updated regularly. Most of the information is in English and part of it is translated in French. Because the Web manager was only English speaking, and translation by external people is expensive, we could not take time to translate all the information in both languages. Nevertheless, an automatic translation of the web pages in French, English, Portuguese or other languages is possible using the Google Chrome navigator.

Activity 1b: Open the Web 2.0 participatory tools

A Web 2.0 collaborative platform was developped using the Open Source Social Networking Engine Elgg[4] 1.8.0.1. It enables partners and project coordinators to have online working space to manage discussions, to exchange information, data and photos and to find new professional contacts.

The collaborative platform of the AFROweeds project "*Weedsbook*" is a professional network available at the address: http://www.afroweeds.org/network/

This kind of collaborative platform allows two ways of use:

- Public access is possible without any registration with login and password. So that anybody can consult the main publicly available information on the platform. Only two working groups can be consulted by public audience. AFROweeds general which introduces the AFROweeds project and gives links to species information web pages and identification tools and the IDAO-SVG working group présenting the IDAO process and which gives link to the identification tool.

  Other working groups, discussions, shared documents and photos are then unable to access by any public audience and reserved for registered members of the project. Public visitors can only consult or download public information but cannot contribute nor upload any information or document.

- Member access requires registering, using a login and password with a minimum of information about the personal profile such as location, institution, and type of institution, professional activity, Interest, e-mail address.

[4] Elgg : http://elgg.org/

These registration requirements could be considered a constraint for people who would just like to have a look to the platform but it has been recognized essential. This information allows platform administrators to keep off any hacking of the platform.
There are two levels of registration. The first and most important one is at the level of the *Weedsbook* platform. The second one is at the level of the working groups. Working group can be open to the public (e.g. AFROweeds general), to registered members at the level of the platform, to members who have joined a working group or to a few selected number of people (e.g. the AFROweeds Coordination group which can be used only by coordinators of the projects cirad and AfricaRice).

All along the use of the "*Weedsbook*" platform, we have had to face a lot of hacking attempts.

Thus, the public can consult the project Website which synthesises a lot of information of the project and gives access to species identification and information or the two public access groups of the collaborative platform. If they want to participate to the project and/or share knowledge or questions with other members they have to use the collaborative platform after registration.

This Web2.0 collaborative platform "*Weedsbook*" is structured on working groups. Several screens of "*Weedsbook*" are presented in Appendix 1.

At the moment there are eleven working groups (Fig. 11)

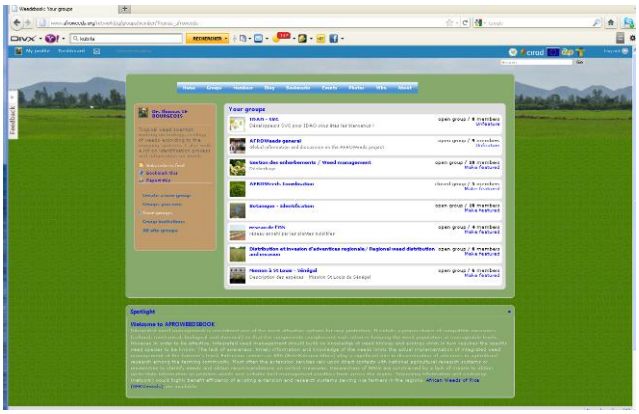

Fig. 11: List of the eleven working groups of the AFROweeds collaborative platform "*Weedsbook*"

- **AFROWeeds general** – is a public group for any member and gives global information and allows discussions on the project itself and its management.

- **AFROWeeds coordination** – is a restricted group concerning only AfricaRice and Cirad main partners, to work all together on the coordination of the project. All the agenda and reports of the coordination Skype meetings (5 during the second year) are managed and stored in the group pages. This allows any member to add comments or update the pages.

- **Weed management** – is a member group dedicated to discussions, and documents on weed control

- **IDAO SVG** – is a public group focused on the computer development of the identification system using the IDAO process.

- **Identification** – is a member group. It concerns discussions, sharing documents and photo albums of weeds that people cannot identify and ask the help of other members of the project.

- **Réseau de l'ON** –is a member group focused on the weed management of irrigation canals at the Office du Niger.

- **Regional weed distribution and invasion** – is a member group to share information and discussions on the regional distribution and invasiveness of problem species in order to align and prioritize the collaborative work

- **Mission Saint Louis Senegal** – is a restricted group for Cirad and SAED people to discuss about the results of the field trips and prospection done in Senegal in September 2011.

- **Scholarships, R&D grants** - is a member group. In this group, members share relevant calls for research and development (R&D) grants and scholarship opportunities for BSc, MSc and PhD in agricultural, biological, environmental and social sciences as well as relevant workshops and training and internship opportunities.

- **Conferences & Workshops -** is a member group. In this group you can find or post announcements and upload or download reports, papers or presentations on any relevant conference and workshop. The group can also be used to discuss participation, invite Weedsbook members to participate or, for instance, to propose members to join on papers to be presented. For example, pdf files of AFROweeds project presentations can be shared in this group for any use by other members.

- **Publications -** is a member group. In this group members can announce new (or old but still relevant) publications, include links to interesting journal articles or upload articles, reports and other publication types of interest to the Weedsbook community and, last but not least, comment and discuss the contents among peers. The group can also be used to notify the members of special issues or to discuss joint publications, as long as journal copyrights are respected!

Any member of the platform can create a new group and manage it, inviting other members to join the group and participate.

A lot of tools are available to members to work into a group, but, until now only those considered the most interesting have been selected in order to train gradually members in their use (see example of the AFROWeeds general group in Appendix 1):

- **Group Discussion –** Any discussion can be launched by a member. He/she has to mention the title and the subject of the discussion. Any member of the group can participate to the discussion adding his/her comment. Each comment is referenced by its author, and date of posting. A comment can include text and Web link.

- **Group Bookmarks –** To inform members on interesting Web sites or Web pages and give the URL address.

- **Group pages** – Pages which can be written and commented by any member of the group. Several pages have been used for agendas and reports of coordination meetings.

- **Group files –** To store any document of interest such as grey literature, scientific papers, technical reports, protocols etc. in Word or pdf document. The documents are uploaded and made available for consulting or downloading.

- **Group albums –** To share photos from workshops, field trips etc. Or on weed management, weeds, or unidentified weeds for comments or assistance in identification by other members.

- **Group videos** – To share videos on weed management. For example, a 17 mn video on rice weed management published by AfricaRice is available in the working group "Weed management". Forthcoming AfricaRice videos on "the use of the rotary weeder in lowland rice" and "safe and efficient use of herbicides' will be uploaded as soon as they are out.

Other tools such as "Blog", "Event calendar", "Presentation", "Polls" could be made available later if necessary, depending on each working group's needs.

While logging on to the collaborative platform, a member can see directly what are the last events happened in any working group he is a member of. All events are listed by categories (Members, Groups, Discussions, Bookmarks, Files, Pages, and Videos) and by date.

A feedback link is available from every screen. Any user can send a feedback (positive or negative) on the use of the collaborative platform.

An e-mail system allows members to send e-mail to other members, to members of a working group or to all the members of the platform. This tool is very useful to inform members of a group or all the platform members about any event.

The "*Weedsbook*" collaborative platform is now fully operational and is regularly improved according to feed back from participants.

Although it's use is not difficult, some training is preferable to enhance the effective and efficient use of "*Weedsbook*". Such training sessions (about 10) occurred during the second and the third year of the project in several countries (Benin, Senegal, Tanzania, Madagascar, Mozambique).

Statistics of the AFROweeds Collaborative platform "*Weedsbook*":

Members:	**229**
Groups:	12
Widgets:	2309
Photos:	221
Messages:	201
Files:	145
Messages RSS:	75
Albums:	42
Bookmarks:	39
Discussions:	33
Custom Profile Field:	12
Pages:	10
Feedback:	8
File Folder:	7
Agenda:	3

Videos:	4
Articles du blog :	5

Since the posting of the new Website of the project in March 2011 until February 2013, we recorded 138762 visits and 915438 page views including 114225 visits and 666083 page views during the last twelve months.
The Fig.12 shows the evolution of visits and page consulted during the past twelve months of activities. There is a regular visit of the Website pages all along the year.

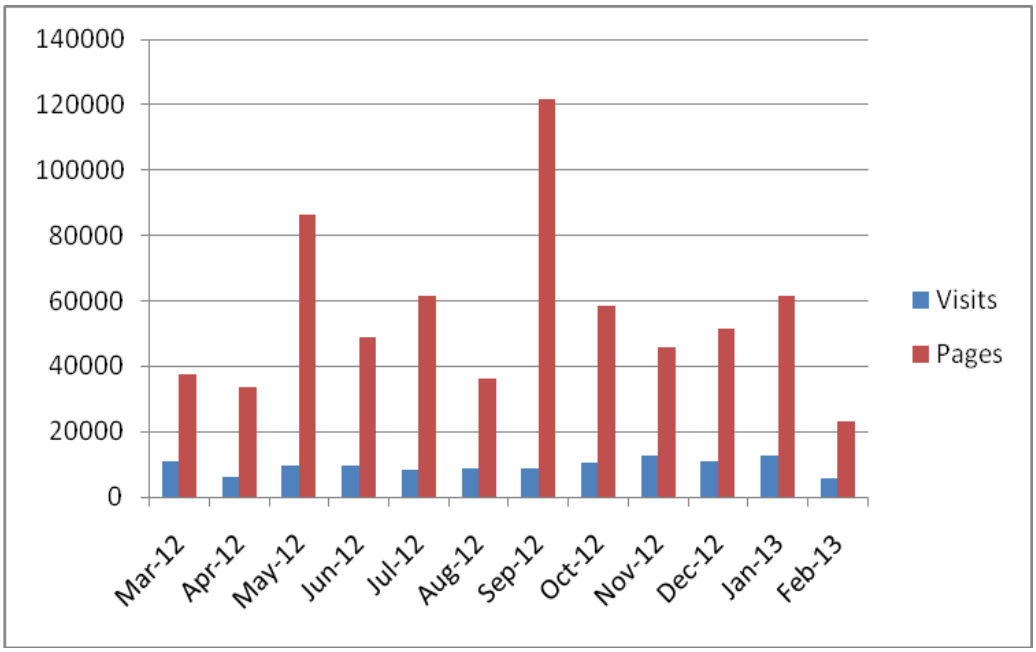

Fig. 12: Statistics of the AFROweeds Website visits and pages consulted

Monthly statistics of the two last year are presented in Appendix 2.

The Web 2.0 activity was postponed until the beginning of year 2 of project execution because of the lack of a Web manager during the first year. During the second year, the Web manager was finaly recruited in Vietnam to finalize the Web site and the collaborative platform.
The "*Weedsbook*" platform was created and tested by the coordination team during the second year and introduced to the AFROweeds members during the second workshop of the project in June 2011. From that date it is fully operational and is regularly used, improved, and presented at several occasions.

During the closing workshop of the project (22 September 2012), a discussion was launched using the "forum tool" specificaly on the evaluation of the *Weedsbook* collaborative platform. For two months, about 18 comments or contributions to this discussion were sent. In summary these comments are shown in Box 1.:

Box 1. Feed back from AFROweeds members on Weedsbook

Most participants indeed felt that the AFROweeds platform *Weedsbook* should become a platform for an African Weed Science Network. It will help the advancement of weed science in Africa.

This collaborative tool is very efficient as it allows for the sharing of information among members. The question is: will it be "perennial"? It was suggested that a permanent steering committee be

created to maintain the flame. Friday Ekeleme from Nigeria promised to introduce this platform at the 44th Nigerian annual weed conference from 19 to 22 November. Other participants were also enthusiastic about introducing the platform when back to their home countries.

However, language may hinder important discussions on the platform. Is it possible to add a translator to the platform, to give at least a rough idea of what is being discussed?

Queries were raised on whether the tool will be open to any other scientists apart from agronomists and weed scientists, and whether there should be a geographic limitation to Africa. It was indeed suggested that Weedsbook should allow membership from weed scientists working in other crops apart from just rice. On this platform, both scientists and extension people can discuss and share information and questions could really contribute to a sustainable development of agriculture in Africa. It provides an opportunity for African weed scientists to finally find a space for exchange and communication. They now have the opportunity to enjoy this space to initiate collaborative activities and solve weed problems in sub-Saharan Africa.

Extension services will find in this platform a repository for the wealth of information gathered in the field, to contribute to the reflections and hope to track possible solutions that do not emanate only from their local expertise, but from the scientific community who are active in the field of weed science.

We believe that the weedsbook is an exposure/training tool, through networking we can learn more about what is done elsewhere as far as weed science is concerned. Therefore, it is important to attract as many members as possible. Weedsbook has the potential to attract young scientists and to motivate them to work on weed problems.

Partcipants suggested that a consistent notification via e-mail should be established so that they can receive e-mail alerts on 'what is happening' at the platform. They also suggested that the administrators include as the option to "renew" or "reject" membership in order to 'clean' the network from uninterested or otherwise inactive members. It was concluded that this e-mail alert system as well as the membership renewal system could indeed be adopted but that we should keep the e-mail traffic to a minimum to avoid being perceived as spam.

The suggestion was also raised by participants to enhance the AFROweeds tool and database with species already covered by another tool called Adventrop (published by Cirad in 1995). During the workshop it was also mentioned that the translation of the database in other languages such as Portuguese and Swahili should also be considered.

Activity 1c: Bibliography

A preliminary review of the literature related to the weeds of the region was done to arrive to a broader perspective of the work already done in the region and to prepare a first list of rice weed species to be taken incount account in the project.
The first inventory of the books and papers concerning weeds and weed management of rice in Africa and published by AFROweeds project partners (Cirad and AfricaRice) included:

2 field guides for weed recognition
3 multimedia products (CD-ROMs)
10 scientific papers
12 conference communications
1 student dissertation
4 technical reports.

From this literature, a list of 186 weed species occuring in rice fields in Africa was prepared and sent to 11 national weed scientists (Burkina Faso, Benin, Cote d'Ivoire, Ghana, Kenya, Malin Nigeria, Senegal, Tanzania, Tchad, Uganda) to be checked and completed to 198 species before the launching workshop of the project hold at Cotonou, Benin in February 2010.

Activity 1d: prepare and organize an initial workshop in Cotonou (Benin)

The AFROweeds initial workshop was held at the AfricaRice station in Cotonou, Benin from 1 to 5 February 2010.
The full report was provided in Appendix 1 of the first year interim narrative report.
The workshop brought together both project coordinators (Cirad and AfricaRice) and 12 African weed scientists working for national research structures in 11 West, Central and East African countries. Those weed scientists were involved in the management of weeds of rice in Africa and wished to share their knowledge with all the players involved in African rice production.

The following weed scientists attended: Adam Ahanchede and Pascal Adéyèmi from Benin, Joseph Ipou Ipou from Côte-d'Ivoire, Hamidou Traoré from Burkina-Faso, Sarra Soungalo from Mali, Souleymane Diallo from Senegal, Israel Dzomeku from Ghana, Friday Ekeleme from Nigeria, Oueye Boure Gaouna from Chad, Thomas Kakema from Tanzania, Gerald Kyalo from Uganda and Hottensiah Wambui Mwangi from Kenya.

Cirad was represented by Thomas Le Bourgeois (weed scientist), Pierre Grard (botanist and computer specialist), Pascal Marnotte (weed scientist) and Nora Bakker (management assistant). AfricaRice was represented by Jonne Rodenburg (weed scientist), Paul Kiepe (program 2 leader), Kazuki Saito (agro-physiologist), Amadou Touré (research assistant), Komla Azoma (technicien), Yonnelle Dea Moukoumbi (PhD student), George Maina (Director of the Financial Department), Leny Medenilla (budget manager), Carine Kan (secretary) and Savitri Mohapatra (communications manager).

The list of weeds of rice studied in the framework of the AFROweeds project was drawn up collectively including 188 species from the 198 of the full initial list (see Appendix 3). The species were selected based on their frequency of occurrence in the various countries or on their detrimental effects both at regional and local levels, or on the difficulty encountered by farmers in their control.

By the third year, two more species were added due to their frequence and abundance in Tanzania for a final total of 190 species.

The first participatory tools have been implemented (AFROweeds website, database, information management tables and documents, pictures, etc.) and could be accessed by partners during the first workshop.
At this time, the database (version 1) was operated locally, on a single workstation only and managed by Cirad's team.
Different technical documents were drawn up and distributed to partners and a variety of computer files were created for data input and management.
The task concerning the collection of weed species information was divided among the national weed scientists according following the importance of the species in the respective countries. Each partner accepted to collect information on the species that could be found in his/her country.

During the discussions that took place at this initial workshop, it became clear that for good project progress, another workshop needed to be scheduled at the end of the first year or at the beginning of the second. This would bring together all partners and weed scientists to determine progress made with actions involving the synthesis and management of information in the project's database. The financing of the weed scientists' presence at this second workshop was not initially planned in the project's budget.

Thus a request to change the use of certain budget headings was made to the European Union proposing that salary amounts not used owing to the delayed recruiting of a research assistant and technician be reassigned (respecting the 15% reassignment rule), which would allow African weed scientists to be invited to the second workshop.

From an administrative perspective, Nora Bakker's mission gave the AfricaRice partner a better perception and consideration of European Union expectations and operating rules. The approach was appreciated and considered useful by AfricaRice's Finance Director, Mr George Maina.

Discussion on results of Activity 1 in reference to assumptions of the Log frame

Most of the tasks of the Activity 1 were performed with success within the three first months of the project (project launching, Website, Database) except the collaborative platform. The launch of the collaborative platform "*Weedsbook*" has had to be postponed until the begining of the second year because of the delay of recruitment of a Web manager. The web manager was finaly recruited by Cirad in Vietnam to work closely to the Cirad biodiversity and informatics expert.
During this first Activity, all equipment (laptops and photo equipment) was bought and distributed to the two main partners except the video projector because such an equipment was already available at AfricaRice. Four Europe /SSA flights instead of three (because P. Marnotte was not yet based in Africa) and zero SSA/SSA flights instead of four (because research assistant and technician of AfricaRice were not yet recruited and the flight of J. Rodenburg was paid by an other programme) were used to reach the Launching workshop. A total of 29 days perdiem were used instead of 38 because of the absence of Research assistant and Technician during this activity.
The cost of this activity (in Euros) can be summarised as follow:
Total cost of activity 1: 72.147,00 € (salaries 38.315 + equipment 12.865 + workshop 20.166 + travel 8.272 + perdiem 5.394).

Activity 2: *Collection and compilation of existing knowledge resources on the weeds of rice of West and East-Africa, from NARS and partners involved in the project*

Activity 2a:

An inventory of botanical works, field guides, identification software, scientific papers, conference communications, student dissertations and technical reports on weeds of rice or on weed management in rice in Africa but also world-wide, has been undertaken by the various partners.

To date, the literature review includes 413 references corresponding to:

- 14 botanical books and floras
- 7 books on weed management and others
- 11 field guides for weed recognition

- 6 multimedia products (CD-ROMs)
- 381 scientific papers on rice weeds and weed management
- 33 conference communications
- 1 student dissertation
- 5 technical reports.

The list can also be accessed on the website and from the "Weedsbook"collaborative platform: http://www.afroweeds.org/fr/ressources/bibliographie.html

It is updated regularly. The Fig. 13 shows the evolution of the completion of this literature compilation during the project.

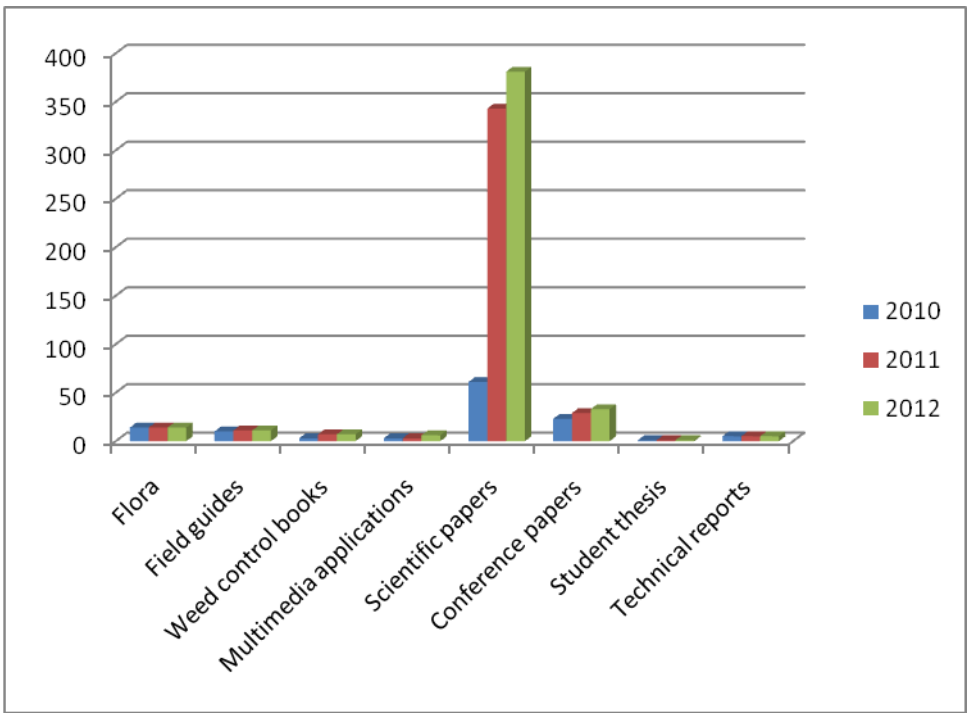

Fig. 13: Evolution of completion of the literature compilation along the project

Activity 2b: Consultation of existing herbaria (West and East-Africa and France)

This activity was performed during the whole duration of the project. Various herbaria were consulted.

The AfricaRice herbarium based at Cotonou Benin now contains 154 specimen corresponding to 98 species.
A new, additional herbarium was set up at the AfricaRice station in Dar es Salaam in Tanzania with specimen collected during the various field trips carried out in 2010 and 2012. It currently comprises 110 prepared and scanned specimen corresponding to 73 species. The East African Herbarium at Nairobi - Kenya was visited to take pictures of specimen of 28 weed species.

Cirad's tropical weed science herbarium includes 815 specimen corresponding to 134 species of the AFROweeds project while Cirad's ALF herbarium comprises 1212 specimen corresponding to 113 species. 330 specimen corresponding to 141 species have been digitalized.

Currently, the AFROweeds database contains about 473 digitalized specimen corresponding to 183 species. Only seven species have no picture of herbarium specimen at this time.

The herbarium specimen at the botanical laboratory of the University of Cocody-Abidjan were scheduled to be digitalized during the second year but civil war by the end of 2010 and part of 2011 made this action impossible. Until now it is not possible to work in the herbarium, further-more the herbarium is now endangered because of degradation of the equipment, lack of air conditioning and computers destroyed during the unrest. The University of Cocody Abidjan just opened again by September 2012, but it is still impossible to digitalize the specimen.

African partners have collected few specimen and digitalized some herbaria. For example, Mr. Sara Soungalo of the IER in Mali collected and prepared 41 herbarium specimens corresponding to 22 of the project's species. Prof. Friday Ekemele provided 37 herbarium specimens corresponding to 35 species while Prof. Akoegninou from the National Herbarium of Benin provided pictures of 50 herbarium specimen.

The herbaria of Arusha and Dar es Salaam in Tanzania were visited and collaborations undertaken. We have solicited the help of a botanist from the University of Dar es Salaam herbarium, for species identification and literature (floras). We invited a representative of this herbarium and of the National Herbarium of Tanzania (based in Arusha) to the workshop held at Morogoro in May 2012, where both played an active role.

Activity 2c: Field trip preparation

When preparing the project, we were expecting P. Marnotte to be based in Benin and preparing field trips with NARS and extension services of his professionnal network of several countries of West Africa while J. Rodenburg and his team based in Tanzania would manage field trips mainly in East Africa.
Finally, P. Marnotte went to Africa later than expected (April 2011) and continued to work for the French Embassy rather than Cirad. He was not able to devote time to the project AFROweeds although he remained a member of the collaborative platform. Hence most of the field collections were managed by the AfricaRice team.

Activity 2d: Field trips

Table 1 outlines the various field trips in West and East Africa during the second year of the project by AfricaRice and Cirad teams.
Reports of the different field trips of years 1 and 2 were provided in Appendix of the Interim Narrative Reports of years 1 and 2. Reports of field trips of the year 3 are provided in the Appendix 4 of the Final Narrative Report.

At least 25 field trips to collect photos, botanical specimen and information were performed along the project in 6 countries and in collaboration with 33 local agronomical institutions such as NARS or Extension Service (see Table 1).

Table 1: Countries were field trip occured and local institutions implicated

Number of field trips	Country	Local partners
6	Senegal	SAED, CPSE Dagana, DPRD Dagana, DPRD Podor, Secteur Guédé, Secteur Aéré
5	Benin	CRS Mono Couffo, CRS Zinvié, AfricaRice,
3	Kenya	Kenya Agricultural Research Institute, TARDA
2	Uganda	National Crop Resource Research Institute, Doho rice Scheme,
28	Tanzania	Kyela district extension service, Dakawa Research Institute, Sokoine University of Agriculture, Kilimanjaro Agriculture Training Center, Forest Training Institute, MARI, Extension Service of Tabora, Extension Service of Magu, Extension Service of Kwimba, Agro inputs of Shinyanga, Regional District of Agriculture of Shinyanga, Tropical Pesticides Research Institute, TANRICE, Regional District of Agriculture of Iringa, District Agricultural Service of Kilombero, District Agricultural Service of Mvomero, Uwakuda Scheme, ARI-KATRIN, Zanzibar Agricultural Research Institute, Mtangatuani Agricultural Research Station
1	Côte d'Ivoire	AfricaRice
Total = 45	6 countries	

Activity 2e: Organize an Online Review Meeting

"Virtual" meetings of the AFROweeds coordination team

Cirad's Pierre Grard, Doan and Pham Ngoc Hai (the Web managers) were based in Hanoi (Vietnam) while Pierre Grard left to Pondicherry (India) in April 2012. Pascal Marnotte was based in Cotonou (Benin) since April 2011. The AfricaRice team (Jonne Rodenburg, Gerald Kyalo / Derek Makokha, and Kobusinge Aloys / Runyambo Irakiza) were located in Dar es Salaam (Tanzania), and Thomas Le Bourgeois, Nora Bakker and Alain Carrara were based in Montpellier (France).
Work meetings using internet tools (Skype) were organised regularly to assess project progress made and to schedule activities. These meetings concerned 2 or more people depending on the subject.
During the project, 10 meetings were held for the entire group while weekly meetings were held between P. Grard and T. bourgeois. The agendas and reports of group meetings are managed and stored in the "Group pages" of the AFROweeds coordination working group in the collaborative platform of the project. This enabled every member of the coordination group of the project to consult and review the agenda and the report of a meeting.

In addition, Jonne Rodenburg travelled to Montpellier twice (April 2010 and 2011) for another meeting and seized the opportunity to meet with Thomas Le Bourgeois to discuss project progress.
Pierre Grard also travelled to Montpellier several times and spent some days at Cirad Montpellier to work with Thomas Le Bourgeois on the project.
Thomas le Bourgeois went twice to Tanzania (September 2010 and June 2012) to review the project with the AfricaRice team.

Activity 2f: Organize in St Louis Senegal a workshop on collection of botanical information

When the AFROweeds project was first submitted, only one launching workshop and one closing workshop involving all partners and weed scientists were initially planned. During the discussions that took place at this initial workshop, it became clear that mid-term workshop gathering African partners for research institutions and extension services needed to be scheduled during the second year.
Thus, a request was sent to the European authority about a proposal to reallocate remaining funds of the first workshop and part of unpaid salaries. This request was accepted by the European authority.
The second participatory workshop was held in Cotonou at the AfricaRice station in Cotonou, Benin from 28-29 June 2011 (Fig. 14). The full report was provided in Appendix 4 of the Interim Narrative report of year 2.

Fig. 14: Second AFROweeds workshop 28-29 June 2011 Cotonou – Benin, attendees and plenary session

The second workshop brought together both project coordination teams (Cirad and AfricaRice) and 12 African partners working for national research and extension structures in 9 West, East and Southern African countries. The weed scientists and extension people are involved in the management of weeds of rice crops in Africa and wish to share their knowledge with all the players involved in African rice production. The participants were: Pascal Adéyèmi and Anago Codjo Emmanuel from Benin, Joseph Ipou Ipou and Koutou Assémien Apollinaire from Côte-d'Ivoire, Oumar Ouedraogo from Burkina-Faso, Sarra Soungalo and Daouda Diarra from Mali, Salif Diack from Senegal, Israel Dzomeku from Ghana, Friday Ekeleme from Nigeria, Runyambo Irakiza from Rwanda and Tomas Fernado Chiconela from Mozambique.
Cirad was represented by Thomas Le Bourgeois (weed scientist), Pierre Grard (botanist and computer specialist), Pascal Marnotte (weed scientist) and Nora Bakker (management assistant). AfricaRice was represented by Jonne Rodenburg (weed scientist), Gerald Kyalo (research assistant), Kobusinge Aloys (research technician), Mariame Mariko (research technician), Amadou Touré (research assistant), Yonnelle Dea Moukoumbi (PhD student), George Maina (head of the finance), Leny Medenilla (budget manager), Carine Kan (secretary) and Savitri Mohapatra (communications manager).

During the workshop we presented again the AFROweeds project for new attendees and took time to present the collaborative tools (Web-site, Web 2.0 collaborative platform). We made sure everyone got registered to the collaborative platform and we explained how the platform works and what the benefits are. Training sessions were then organised in the use of the different tools of the platform (fora, albums, bookmark, working groups, etc.).
This workshop was followed by two days of field trips with CCR-MC, AfricaRice and Cirad people to visit rice fields of the Comé and Zinvié areas to take photos and collect herbarium specimen.

During the last two years of the project 5 small workshops were organized to present the project, introduce the tools and explain the methodology to collect data and provide information on weed species to feel the database:

- Kampala – Uganda at National Crops Resource Research Institute on 31 August 2011.
- Nairobi – Kenya at Kenya Agricultural Research Institute on 2 September 2010.
- Saint Louis – Senegal at SAED station on 6 September 2011. This workshop brought together 13 people belonging to Cirad (P. Grard and A. Carrara), SAED, ISRA (Institut Sénégalais de Recherche Agricole), AfricaRice, PAPRIZ (Projet d'Amélioration de la Productivité du Riz dans les Aménagements Hydro-Agricoles), PINORD (Programme d'appui aux initiatives du Nord), Projet Bey Doundé (Projet "Bey Doundé" pour la Fédération des Périmètres Autogérés), 3PRD (Programme de Promotion du Partenariat Rizicole dans le Delta du fleuve Sénégal).
- Morogoro – Tanzania at Sokoine University of Agriculture 10 May 2012. The workshop was well attended, with 37 participants, including 15 students. The gender ratio was 10F/27M). The participants came from a variety of organizations including the national research centres, extension services and the university (see mission report in Appendix 4.6).
- Antsirabé – Madagascar at FOFIFA on 20 March 2012. The workshop was well attended, with 31 participants, including 7 students and 11 women. The participants came from a variety of organizations including the national research centres, extension services and the university (see mission report in Appendix 4.2).

Activity 2g: Scanning the specimen

Currently, the AFROweeds database contains about 473 scanned specimen (Fig. 15) corresponding to 183 species. Very few AFROweeds project species are missing. These species will be collected after the end of the project as we will continue to supply the database beyond the duration of the AFROweeds project.

The herbarium specimen at the botanical laboratory of the University of Cocody-Abidjan were scheduled to be digitalized during the second year but civil war by the end of 2010 and part of 2011 made this action impossible. Until now it is not possible to work in the herbarium, further-more the herbarium is now endangered because of degradation of the equipment, lack of air conditioning and computers destroyed during the troubles. The University of Cocody Abidjan just open again by September 2012, but it is still impossible to digitalize the specimen.

African partners have collected specimen and digitalized herbaria. For example, Mr. Sara Soungalo of the IER in Mali collected and prepared 41 herbarium specimen corresponding to 22 of the project's species. Prof. Friday Ekemele provided 37 herbarium specimens corresponding to 35 species while Prof. Akoegninou from the National Herbarium of Benin provided pictures of 50 bv herbarium specimen.

The herbaria of Arusha and Dar es Salaam were visited but the bench fees asked by the University of Dar es Salaam to digitalize the specimen of the near-200 species of the AFROweeds on list prevented us to go further.

Fig. 15: Scanned specimen of *Sida acuta*

Activity 2h: Botanical description texts

Complete descriptions on botany, biology, ecology and control currently concern the 190 species of the project in both French and English.

The species descriptions are regularly updated on the webpage for consulting at http://www.afroweeds.org/fr/ressources/information-especes.html

Control methods can be focused on species, but for all the species a direct link exist to general descriptions of rice weed management in French and in English categorized per weed management option as well as per weed category (perennial grasses, annual grasses, perennial sedges, annual sedges, perennial broad-leaved, annual broad-leaved, parasitic and aquatic species).

To illustrate the species descriptive sheets, a set of 5,295 pictures was managed in the database.
There are 4,678 photos from Cirad collection or taken in the fields during the project, 144 botanical plates from Cirad or AfricaRice publications (Johnson 1997[5]; Le Bourgeois & Merlier 1995[6]; Le Bourgeois et al. 2008[7]), and 473 photos of herbarium specimens.

From these botanical descriptions, the identification characters needed to create the composite picture computer-assisted identification tool were completed for the 190 species of the project.

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Activity 2i: Weed control methods

African partners were supposed to compile the information they have on weed control methods.
Various aspects were taken into account:

- Control methods against one or a few species (e.g.: *Cyperus* spp., *Rhamphicarpa fistulosa, Striga aspera*)
- Control methods against wild rice (*Oryza barthii, O. longistaminata*…)
- Control methods against rice weeds (mutant *Oryza sativa* that has become a rice crop weed)
- Rice crop weeding methods with a distinction being made between rainfed lowland and irrigated rice production systems.

All along the project it was finally quite difficult to get this information from African partners. But, since the collaborative platform was increasingly used, the few information collected was integrated into the database and updated regularly.

Two review documents were written by AfricaRice on weed control in lowland rice. One provides a concise (10-11 pages) overview and description of weed control technologies of lowland rice. This document is available in English and French.
A set of 8 documents provides guidelines for the control of 8 different groups of weeds highlighted during discussions of the first workshop:

- annual grasses
- perennial grasses
- annual sedges
- perennial sedges

[5] Johnson, D.E. 1997. Les adventices en riziculture en Afrique de l'Ouest. ADRAO/WARDA, Bouaké, Côte-d'Ivoire.

[6] Le Bourgeois, T., Merlier, H. 1995. Adventrop - Les adventices d'Afrique soudano-sahélienne. Cirad, Montpellier, France.

[7] Le Bourgeois, T., Carrara, A., Dodet, M., Dogley, W., Gaungoo, A., Grard, P., Ibrahim, Y., Jeuffrault, E., Lebreton, G., Poilecot, P., Prosperi, J., Randriamampianina, J.A., Andrianaivo, A.P., Théveny, F. 2008. Advent-OI : Principales adventices des îles du sud-ouest de l'Océan Indien.V.1.0. *In* Cirad [ed.]. Cirad, Montpellier, France. Cdrom.

- annual broad-leaved species
- perennial broad-leaved species
- parasitic weeds
- aquatic weeds.

These documents are available in both English and French languages.

These documents are stored in the "group file" of the weed management working group of "*Weedbook*". They are accessible both from the collaborative platform (they can be read or downloaded) and from each HTML species information pages by a direct link, according to the language of the species sheet.

All these documents will provide useful information on control covering all species and discussing all likely effective measures, ranging from high to low input methods. The reason for storing them in the "group files" of the collaborative platform is to allow any member to make a comment on a document through the collaborative platform. All comments are visible to all members and can generate discussions between them. Furthermore, they can be regularly updated from the collaborative platform without any change on the species sheets.

Discussion on results of Activity 2 in reference to assumptions of the Log frame

All the tasks of the Activity 2 were performed with success but with longer time than expected.

Botanical descriptions of the last species, in both French and English languages, ended by July 2012 instead of early 2012. The work was partially hampered by the fact that until July 2012 Cirad and AfricaRice teams worked on separate and offline databases.

After authorization from European authority for budget realocation, a second participatory workshop was held, and several small workshops as well.

Herbaria consultations and the digitalization of specimen were assumed correctly even if the one of Cote d'Ivoire could not be used because of consequences of the civil war.

Field trips in West Africa were lower than expected due to the departure of Pascal Marnotte from Cirad, who could no longer devote as much time as planned in the project. This explains also the reduction of use of local transportation and SSA/SSA flights compensated by more Europe/SSA flights. 328 perdiem days instead of 423 expected were used for activity 2.
Note that countries other than those originally planned were visited (Kenya, Cote d'Ivoire, Uganda, Madagascar) due to different project adapatations and interesting collaborations of the AfricaRice team with East African partners.

Photo equipment was purchased in line with forecasts.

The cost of this activity (in Euros) can be summarised as follow:
Total cost of activity 2: 258,726 € (salaries 159,114 + equipment 12.612 + Running costs 18,600 + Workshop 2 14,300 + travel 16,600 + perdiem 37,500).

Activity 3: *Data Integration, implementation of the knowledge base (identification and control measures)*

Activity 3a: Feeding the species description databases

During the project there were two main steps in the feeding of the databases.
From 2010 to early 2012, we were working with "*PlantNote*" tool an offline, mono-user database developed by Cirad. AfricaRice team was trained to use this database. Thus, one database was located and managed at AfricaRice (Dar es Salaam, Tanzania) and another one by Cirad (Montpellier, France). Synchronizing the two databases was difficult, that's the reason why the database of AfricaRice was dedicated to species information in English while the one of Cirad was dedicated to species information in French.
Early 2012 a new database called "*Datamanager*" was developed by the Pl@ntNet[8] project with which the Cirad team has collaborations.
The "*Datamanager*" is an online application which can be used to feed databases simultaneously by several users and which enable the use an off-line version which can be used in situations of disconnection to Internet. This off-line version is synced with the online database as soon as the Internet connection is available.
Furthermore, the structure of the data management in the database is not fixed but can be modified according to wishes of the administrator of the database.

This new database has been tested for the project AFROweeds for several months. A new organization of the data structure has been built, which separates the generic information on species such as description, biology, ecology, control and common names to field observations and the management of pictures and herbarium collections. This new database was finally adopted and used by Cirad and AfricaRice teams to manage all the botanical data of project. All the data from the two "Plantnote" databases were transferred and reorganized in the new common database. A training session on the use of "Datamanager" by AfricaRice team took place after the closing workshop on September 2012. From now, everybody (AfricaRice – Cirad) can work simultaneously on the database and access all the data in real time, which is more efficient in terms of working time and data access. Until now, other African partners are not direct users of this database. We still prefer to review the data before entering it and the "Datamanager" application is still under improvement.
In the near future we will open access for reading or writing to the database online to African weed scientists who want to manage their data directly.

Complete descriptions on botany, biology, ecology and control are achieved for the 190 species of the project in both French and English languages. Control methods can be focused on species, but for all the species a direct link exist to a global text on rice weed management in French and in English.

All the Web species pages can be consulted from the Web site of the project (hyperlink "Resources" + "Species information") or from several working groups of the "*Weedsbook*" collaborative platform (AFROweeds general, Botanique-Identification).

The direct access is http://www.afroweeds.org/fr/ressources/information-especes.html

The morphological criteria necessary to create the IDAO identification application have been managed in an Excel table containing 297 columns corresponding to the modalities of 34 distinct characters and the 190 lines of weed species.

Activity 3b: To realize the different drawings of the composite picture used in the identikit system

Preparation of the drawings used to construct the composite picture of the computer-assisted identification system (IDAO SVG). These are vectorial drawings representing the different modalities of the botanical characters used.

[8] Pl@ntNet: http://www.plantnet-project.org/papyrus.php?langue=en

From the 41 characters selected during the initial workshop in Cotonou to develop the composite picture of the identification tool (IDAO SVG), 34 have been used, all corresponding to morphological characters. Environmental and geographical characters could not be used because we could not get all this information from local partners and it was not possible to manage the system with missing data.

Some of the vectorial drawings were already available. All the missing vectorial drawings of the 297 modalities corresponding to the 34 selected characters were performed.

Activity 3c: Image processing

Various actions were undertaken in the image processing activity

- Collection of plant photos during field trips,
- Selection of existing photos in the collections of various partners
- Digitalization of slides or hard-copy photographs
- Digitalization of herbaria specimens,
- Renaming the image files using the principle presented at the initial workshop in Cotonou to avoid duplicates and group together all the images of the same species in the storage folder,
- Input and management of image information in the project database.

Table 2 shows the result of this activity.

Table 2: Number of photos selected, collected, prepared and entered into the database

Item			**Very good quality**	**Good/Medium quality**	**Total**
Photos	-	AfricaRice collection	1580	1574	3154
	-	Cirad collection	1935	3517	6452
	-	AfricaRice selection	250	617	867
	-	Cirad selection	2103	1939	4042
	-	Other Partners selection			386
	-	Entry in the AFROweeds database	**2541**	**2754**	**5295**
Percentage of species with at least one photo in the database					**98%**

By the end of the project 187 species among the 190 of the project species list have at least one photo while four species have more than 100 photos (*Echinochloa colona, Eclipta prostrata, Heteranthera callifolia, Physalis angulata*). Until now the three following species have no image: *Fagopyrum tataricum, Melilotus officinalis* and *Oryza rufipogon*.

A message from the "*Weedsbook*" collaborative platform has been sent to all members to focus on collecting photos of these species.

Contributions from African partners in terms of photos are increasing regularly even if it is not a lot. At the moment 386 photos have been selected and entered in the database from nine partners (Côte d'Ivoire, Benin Ghana, Mali, Burkina Faso, Nigeria, Rwanda, and Mozambique).

Activity 3d: Translation of the botanical descriptions

All the 190 species information pages are written in both French and English.
They can be consulted from the website of the project (hyperlink "Resources" + "Species information") or from several working groups of the collaborative platform (AFROweeds general, Botanique-Identification).

Portuguese translations of the species information pages are not yet available at this time. We still are analysing how Tòmas Chiconela from the University of Maputo – Mozambique could contribute to this translation. One major problem for such a translation is that it can only be done by a translator with good knowledge in botany which is not so easy to find.

Discussions during the closing workshop confirmed the need for Portuguese translations of the species information sheets and also a Kiswahili translation for East African people.

We are still looking for external sources of funding which could be used for this work.

Nevertheless, instant translation can be obtained using Google Chrome navigator. But it does not provide a perfect translation.

Activity 3e: Glossary

A botanical illustrated glossary already exists for previous IDAO applications in French, English and Spanish languages (Fig. 14). It concerns about 465 different tecnhical words.
This glossary needed to be updated and made available directly from the new species information fact sheets. Unfortunately the process to publish the new species fact sheets directly on the Web disabled us to adapt the glossary. We could not manage the linkage between technical terms in the species texts and the illustrated glossary. Thus, this action could not be performed.

Activity 3f: Integration of IDAO and software development

A major effort was devoted during the second and third year of the project to the development of the IDAO identification tool.
Four different versions have been published to allow the use of this tool with different kind of devices in online or offline situations.

- AFROweeds-IDAO for Windows is available on CD-rom (Figs. 16-18) or can be downloaded from the Web site or the Collaborative platform "*Weedsbook*" at: www.afroweeds.org/downloads



Figs.16-18: the CD-rom AFROweeds-IDAO

This version can be used on any PC using Windows environment (Windows XP, Windows 7).
We encountered difficulties in the publication of this version because of the use of the same information fact sheets on the species as the SVG online version. We have systematically corrected the source code of all records, which took more time than expected.

- AFROweeds-IDAO SVG is an online version which can be used directly on any device (PC, UMPC, Tablet, smartphone...) connected to Internet (Cable, Wi-Fi or 3G+ card).

- AFROweeds-IDAO iPad is an encapsulate version specifically developed for iPad in offline situations. This version can be downloaded and installed in the iTunes software of a PC and from iTunes installed and synchronized with an iPad tablet. The AFROweeds-IDAO iPad can then be used directly on the iPad tablet without any need of Internet connection. This is very useful in situations with no or slow Internet. The identification application and the English and French species description files are available in the iPad.

- Finally, to answer requests of AFROweeds members during the closing workshop, an AFROweeds-IDAO iPhone was developed. It is an encapsulate version specifically for iPhone mobile in offline situations. The identification process and the English and French species description files are available in the iPhone. A syncing of the iPhone and the PC is done by the iTunes software. A two-month extension of the project duration was requested to the EU authority to be able to perform this task.

The SVG version of IDAO, using drawings in SVG format, allows a better adaptation of the product when it is necessary to add more characters for identification and/or new species.

The AFROweeds-IDAO identification system is now available under the several versions from the Web site of the project (hyperlink "Resources" + "weed identification") and from several working groups of the collaborative platform (AFROweeds general, IDAO SVG, Botanique - Identification) (Fig. 19).

It can be directly used online at: http://www.afroweeds.org/idao/
Or can be downloaded for offline use at: www.afroweeds.org/downloads

500 CD-roms have been published and distributed to the main members of the projects for dissemination within their respective countries.

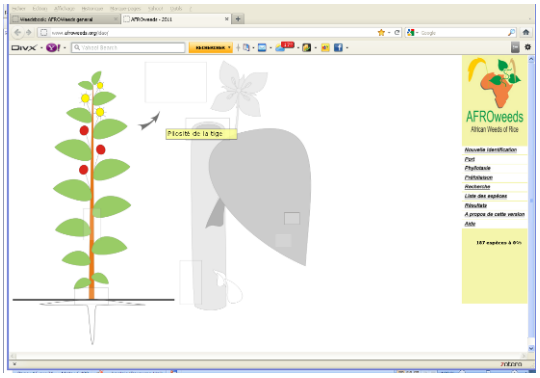


Fig. 19: Home page of the AFROweeds identification system using IDAO SVG process

The IDAO process (Cirad patented) was used because it is able to respond to difficulties encountered by non-botanists when identifying species using standard flora and the tool focusses on three major constraints, namely:

- The inability to identify the species without its flowers or before its flowers;
- The use of dichotomous key, which do not allow any error in the identification process and also imposes the choice as well as the order of questions; and
- The use of technical terms not understood by the non-specialists.

In order to minimize and resolve these constraints, the IDAO identification process uses a graphical system which reconstitutes the plants from different characters of the user's choice. This method has several advantages:

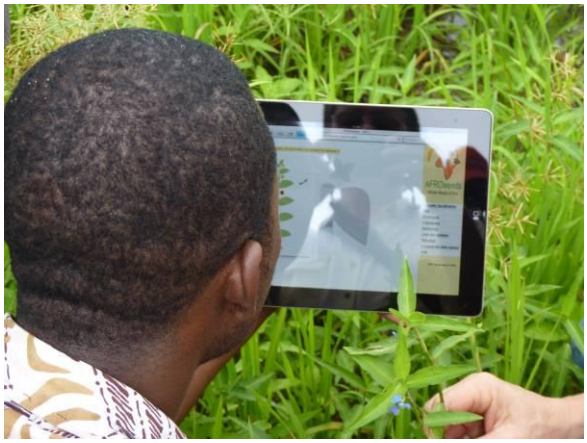
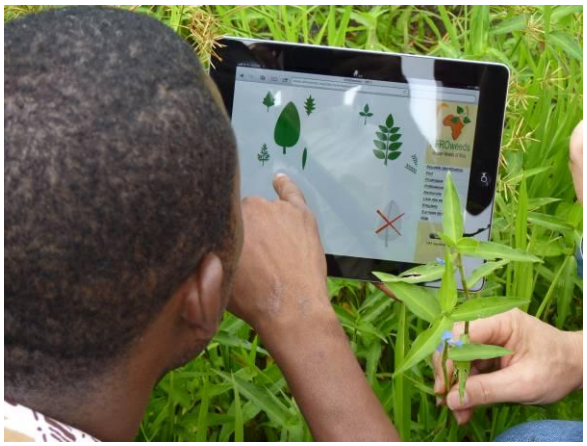
- It only uses drawings instead of technical jargon.
- It provides users the freedom to choose the character that needs to be described.
- Missing information or data are permitted, thus allowing for the identification of incomplete samples.
- Certain level of observational errors is also allowed, at least to the extent that the tool will also list species for which the selected characters do not match 100% with the choices of the identifier.
- At each step of the identification process, a probability of resemblance is calculated for each species.
- Thus species are sorted by decreasing order of similarity.
- At each step and moment, users can access the photos, the description, and the botanical illustrations of the species.
- In case users encounter doubt in the choice of characters (for description), they could ask the program for the most pertinent one.
- If the probability of a species identified is less than 100%, the program indicates the characters that contain wrong descriptions.
- Descriptions of the species are available through the Website with any type of browser.
- The program being multilingual, it will serve a wide range of people.

To explain the use of this AFROweeds identification system, several commented screen shots of the tool are presented in Appendix 5.

The first demonstration of the use of AFROweeds-IDAO on iPad tablet occurred during the second workshop at Cotonou – Benin in July 2011 (Fig. 20).

Fig. 20: Demonstration of the use of the IDAO SVG system on an iPad tablet during the second project workshop

This was also tested in rice field conditions during field prospection in Benin in July 2011 with extension people of the CCR Mono and Couffo. A local 3G+ phone card was bought at Cotonou (Figs. 21 – 26).


Figs. 21-26: Use of AFROweeds-IDAO SVG with a tablet with +3G Internet connection by Emmanuel Codjo extention agent of the CRR Mono & Couffo, in a rice field at Comé – Benin (© P. Marnotte and P. Grard - Cirad)

The use of AFROweeds-IDAO iPhone version is illustrated by Figs. 27-29

Figs. 27-31 Use of the AFROweeds-IDAO iPhone encapsulated version

Other tests and demonstrations took place in rice fields in Tanzania in June 2012 with partners from East Africa, in situation where Internet was very slow. Under these conditions, with the online AFROweeds-IDAO SVG version, the succesful identification and access to information sheets on species require anything between 2 and 8 minutes.

Major tests took place during the field trip of the closing workshop. The second day of the workshop was spent at Zoungo in the Ouémé Valley where workshop participants were trained in the use of AFROweeds-IDAO identification and information system using iPads. It was also the occasion to evaluate the performance of the system to identify the species and get information.
The encapsulated offline version of the AFROweeds-IDAO iPad identification and information application was installed on three iPads. Teams of two people were composed in the field to practice and to test the system.

For this evaluation, identification duration was timed for 16 different attempts, covering 12 different species (Figs. 32-37).

Figs 32-37: Evaluation of identification tools on iPads in the field (© A. Carrara / Cirad)

The average time taken for identification (Table 3) was 6 minutes and 34 seconds, with 76% successful identifications showing that the tool is useful for identification of weed species in the field. As none of the evaluators was experienced, it is likely that with a bit more practice the success rate can increase and the time to identification can decrease.

Table 3: Species identified and results of identification

Species	Identification time	Success/failure
Physalis angulata	9.07	F
Emilia sonchifolia	5.02	F
Ageratum conyzoides	4.39	S
Fimbristylis littoralis	3.44	S
Passiflora foetida	1.19	S
Ageratum conyzoides	4.00	S
Bacopa decumbens	3.23	S
Cyperus haspan	6.00	S
Imperata cylindrica	10.16	S
Cyperus distans	8.51	S

Acmela ulinosa	3.20	S
Physalis angulata	3.00	F
Ludwigia octovalvis	2.28	S
Phyllanthus amarus	1.14	S
Ageratum conyzoides	4.36	F
Phyllanthus amarus	9.07	S
Mean	6.34	76%

Activity 3g: Organize a workshop on the development of the AFROweeds tools in Dar es Salaam

It was planned to organize during the third year a workshop with some regional partners to test the tools developed prior to finalization.
So we invited four partners in the sub region to attend this workshop:

- Juma Kayeke, weed scientist at Mikocheni Agricultural Research Institute in Dar es Salaam (Tanzania)
- Ruth Kabanyoro weed scientist and agronomist at NARO, Mukono Zonal Agricultural Research and Development Institute (Uganda)
- Itambo Malombe, botanist taxonomist at the East African Herbarium (Kenya)
- Tòmas Chiconela, weed scientist teacher at Eduardo Mondlane University (Mozambique)

Unfortunatly P. Grard, just named at IFP (India), and P. Marnotte in Benin were unable to attend this workshop.

J. Rodenburg introduced the entire project AFROweeds and T. Le Bourgeois presented the various tools of the project, especially:

- Collaborative platform http://www.afroweeds.org
- Tools of information on species http://www.afroweeds.org/fr/ressources/information-especes.html
- The identification system online http://www.afroweeds.org/idao/

Partners have assessed the various tools.

It appeared that the choice of language of the information fact sheets on species was difficult to manage by the user.

The translation of information fact sheets in other languages was discussed. This would include the Portuguese so that the tool could be used in Portuguese speaking countries (Mozambique, Angola, Cape Verde) and Kiswahili language common to several countries in East Africa (Tanzania, Kenya, Uganda, Rwanda, Burundi). Such translation is not an easy task because the translator must have a good knowledge of botany and botanical terminology. It can be done only by a bilingual botanist (English / Portuguese or English Kiswahili). During the second workshop, we had already addressed the issue of translating forms into Portuguese with the help of Tòmas Chiconela University of Mozambique. So far this work has not been implemented.
Testing automatic translation in Portuguese using computer tools has been made. But these imperfect translations require revisions. AfricaRice plans to find external funding to ACP S & T budget to

compensate the partners who could take responsibility for this work. In fact, the budget line dedicated to the project AFROweeds translation does not cover these costs. It is used for simultaneous translation French / English at the main workshops.

It is temporarily possible to get instant translation of all the Web pages (site, collaborative platform, species information, identification). Although imperfect information remains understandable.

The assessment of the structure and content of species information has been carried out on several species from different biological types (grass, sedge, broadleaf, aquatic plant). We have highlighted the need to properly respect the choices of information content according to the different types of input fields.

For the French versions, 7 species files remained to be done. For the English version 40 records had to be written. Priority activities in the next weeks of the workshop were focused on the completion of these factsheets. Sheets already written in French were used as a basis for the English translation.

Tests of the AFROweeds-IDAO SVG version on iPad took place at the Ruvu rice scheme. It appeared clear from these initial field trials, the tool was technically fully functional, and that made it easy to accurately identify a species or at least to narrow down the choice to a selected small group of species for which the consultation of description fact sheets could be used to confirm the identification and access to advice on weed management.
This type of identification tool is easy to use and learn. The stand-alone version alleviates the constraints of availability and speed of the Internet.
Different tools will be finalized and presented at the closing workshop in September 2012 in Cotonou.

Discussion on results of Activity 3 in reference to assumptions of the Log frame

The tasks of the Activity 3 were performed with success but required longer time and some modifications.

The project started with one offline database then two separate offline databases (Cirad and AfricaRice). Finally we were able to gather all the data in a single online multi-user database that greatly facilitates data management by the Cirad and AfricaRice partners. Access to this database to other national partners will occur later.

Weed control measures have been synthesized first at the level of the full cropping system and secondly for each of the 8 main biological type of weeds. They are stored in the file folder of the “Weed control” working group of the “Weedsbook collaborative platform. This allows an easy update. All of the species information fact sheets are linked to these recommendations.

Four distinct versions of the AFROweeds-IDAO identification application were published for use in any type of condition, in the office or in the field, with or without Internet. They can be used on several types of devices (PC, UMPC, electronic tablets and smartphones). At the moment only iPad tablets and iPhones can be used. Version for Android tablets and smartphones will be developed later.

The action concerning the linkage between a previous botanical glossary and the technical terms in species descriptions could not be performed because of technical constraints we could not solve during the project.

Work of activity 3 took about 37,44 months (35 initially planned + 2,44 requested), 1 Europe/SSA flight instead of 3 (P. Marnotte and P. Grad could not attend the workshop at Dar es Salaam) and 3 SSA/SSA flights instead of 6.
25 perdiem days were spent to this activity.

Total cost of activity 3: 156,877 € (salaries 151,141 € + perdiem 3,158 € + travel 2,578 €).

Translation costs (4,000 €) were not used for this activity 3 but for simultaneous translation during the main workshops.

Activity 4: *Dissemination sessions and generate feedback on* AFROweeds *knowledge base. Launching of the CD and the web-based versions*

Activity 4a: Dissemination sessions / Communication

An Internet link to the Cirad site http://idao.cirad.fr was created on the AFROweeds website to disseminate general information on tropical weeds and on the computer-assisted identification system (IDAO) to AFROweeds project partners and associates.
The website presents the principles of identification process; several multimedia applications already used in Africa, Asia or countries in the Indian Ocean to identify and retrieve information on weeds, and provide access to 460 species description sheets available in the different tools. It is an important resource for partners and associates.

From the AFROweeds collaborative platform "*Weedsbook*", Web links are available to several African Websites on rice production or plant protection. On the other hand, links to the AFROweeds Website have been made available on those Websites to guide the ones interested in plant protection (DIVECOSYS) or in rice production (CCR MN) to the AFROweeds Website.

Communication actions and actions undertaken to boost project visibility

Presentations and training sessions

All along the project duration, presentations and training sessions were performed by both the main partners (Cirad and AfricaRice) and also by local partners.

Outside the main workshops where the improvement of the project and the tools were presented several sessions occured in different countries, gathering different kind of people:

- Saint Louis - Senegal, September 2011 – extension people, agronomists
- Maputo – Mozambique, October 2011 – 10th African Crop Science Society Conference, agronomists, weed scientists, NARS, Universities, CGIAR
- Antsirabé – Madagascar, March 2012 - extension people, agronomists, weed scientits, students, NARS, NGOs
- Morogoro – Tanzania, May 2012 - extension people, students, university professors, agronomists, botanists, NARS, extension services (Appendix 4.6)
- Montpellier – France, August 2012 – 1st International Conference on Organic Rice Production, farmers, agronomists, weeds scientists, extension people, NARS, universities, extension services (Appendix 7.3).
- Zaria – Nigeria, November 2012 - Annual meeting of the Weed Science Society of Nigeria, weed scientists, universities, NARS.

Power point and pdf files presentating the results of the AFROweeds project are available on the "Weedsbook" collaborative platform to help any member to present the project.

Videos

During each project workshop in Cotonou AfricaRice communication officer made videos featuring Jonne Rodenburg, Thomas Le Bourgeois, P. Grard and national partners (e.g. Friday Ekeleme, Salif Diack, Joseph Ipou Ipou, Ruth Kabanioro) to explain the project and comment on it. These videos featured prominently on the AfricaRice website and are currently still available at http://www.africarice.org/.
The video of the closing workshop was also posted on YouTube:
http://www.youtube.com/watch?v=y5jfJxV_sic&feature=youtu.be

It is also available on "Weedsbook" collaborative platform in the video folder of the working groups "Afroweeds general" and "Conference and workshops".

We also included a link to the AFROweeds website in a "Story of the Month" research brief published on the AfricaRice website http://www.africarice.org/warda/story-weed-management.asp.

Papers

A communication in the form of 300-word abstract have been submitted, published by the widely distributed CGIAR SP-IPM newsletter (for CGIAR researchers working on crop protection) and the editor of IPMnet (distributed among over 7,700 subscribers) promised to accept an article on AFROweeds once it is in a more advanced stage. This will be followed-up soon.

AFROweeds was presented (Jonne Rodenburg et al.) at the 10th African Crop Science Conference in Maputo, Mozambique on 11 October 2011. At this conference, both Jonne Rodenburg and Gerald Kyalo, as well as a five current members, were present and brochures (English and French) were disseminated (Appendix 6.3).

Jonne Rodenburg also organized and moderated a workshop on 'Advancing Weed Research in Africa' to discuss the likelihood and feasibility of an African Weed Science Society network. An association of weed scientists (or agronomists working on weeds) in Africa called "African Weed Science Network" (AWSN) was proposed. The AWSN will primarily work through a website. The website will feature a comprehensive database of weed scientists in Africa with names, addresses and professional profiles and will enable any interested individual to quickly assess 'who-does-what-and-where'. The Website will further consist of pages containing relevant information on events (e.g. workshops, conferences), capacity building opportunities (e.g. scholarship information), and calls for funding, (new) publications and discussion fora. In addition the website could contain a weed species database with photos and identification tools and information on management, similar to the one created by AFROweeds (http://www.afroweeds.org) and which could be the continuing of the AFROweeds project expanded to all weeds of cropping systems. As an additional feature, the AWSN could disseminate a regular newsletter (for instance 2 times a year). The AWSN will link with the Southern African Weed Science Society (http://www.weeds.org.za/) to make use of the existing weed scientist database for Southern Africa. The same can be done with other national societies like the one of Nigeria (WSSN). The AWSN will initially operate under the umbrella of the already existing African Crop Science Society (ACSS; http://www.acss.ws/). (Appendix 7.4)

Another presentation of AFRoweeds results was presented at the 1rst International Conference on organic rice production at Montpellier – France (27-30 August 2012)." *Améliorer la gestion de l'enherbement des rizières en Afrique par le partage d'information et l'aide a l'identification*

des adventices : le potentiel de la plateforme collaborative AFROweeds » (Le Bourgeois et al.).(Appendix 7.3).

Brochures presenting the AFROweeds project (English version and French version) were published and distributed to partners, associates and during international conferences (Appendix 7.5 and 7.6).

News on TV and Web

Interviews were performed during the launching and the closing workshops with journalists from ORTB (Benin National Television) and local news papers.

After the closing workshop a synthesis of the AFROweeds results was published online on 17 web news sites such as SeedQuest, Alpha Galileo, AidNews, All Africa Press, Modern Ghana, News from Africa, Ole Africa, AECC, African News Wire, The Nigerian Voice, African Press Orgaization, AgroNews, ApaPress, NewsCuss, Melodika and PR-USA (Appendix 7.7).

Flyers

Flyers presenting the AFROweeds project in both English and French (1000 for each) have been published and widely distributed (Appendix 7.5 and 7.6).

Journal papers

Interviews or presentations of the AFRoweeds project were also published in professional journals (Appendix 7.8)

Anonymous 2012. Experts launch tool for identifying major rice weeds of Africa. *International pest control*, November/Decembre 2012, Vol. 54, N° 6: 331.

Anonymous 2013. Identifying rice weeds in Africa. *Rice Today*, January- March 2013, Vol.12, N°1: 5

Favre, S. In press. Le projet AFROweeds : African weeds of rice – S'informer et échanger sur les adventices. *Cultivar Seeds.*

Activity 4b:

There is no activity 4b, it was a numbering error in the proposal

Activity 4c: To integrate suggestions for improvments:

All along the project, AFROweeds members can send feedback to the coordination team of the project using the "Feedback" link from the "*Weedsbook*" collaborative platform or by email.
During the second workshop and the closing workshop as well as the smaller workshops and training sessions, we collected feedback from people in the use of the different tools to improve them.
Improvement of tools and information content of species was an ongoing process facilitated by the methods used in the project. Indeed, all species data were managed in databases and more or less automatical procedures allowed to generate or to update regularly the species fact sheets on the Web and the IDAO applications.
This is why we preferred the dissemination of information and tools to be accessible through the internet rather than in paper form or a CD-rom, as the latter media do not allow easy updating on a regular basis.

The last suggestion proposed during the closing workshop in September 2012 was the development of an AFROweeds-IDAO version for iPhones. This has been completed during the last months of the project, after a request to EU for a two-month extension period.

Activity 4d: Finalize the cdrom and publication:

Once the AFROweeds-IDAO SVG version completed and validated, the Windows version have been published and 500 CD-roms were pressed and sent to African partners for distribution in their country.
It was initially expected to press 2000 copies of the CD-rom. But while it was not possible to complete it before the closing workshop and the cost of distribution by mail is high, it was decided to press and distribute only 500 copies. Furthermore, the Windows version is available on the Web site of the project and on several working groups of the "*Weedsbook*" collaborative platform. Hence anybody interested in this application can download it for free at: www.afroweeds.org/downloads .

It was expected to print and distribute 1500 copies of a paper version in French and English and 500 copies of a paper version in Portuguese. Paper publication needs a long time to be edited (several months). The final version of the species fact sheets in French and English was only available by August 2012. It was not possible at this time to order a printer to publish this paper version in time but we still want to pursue with the idea of printing a book based on the database.
Concerning the paper version in Portuguese, we were not able to get a Portuguese translation of the species fact sheets in time, but this still is a task we expect to do later with other fundings.

Three communications of the AFROweeds project were presented at national or international conferences.

Le Bourgeois T., Grard P., Marnotte P. & Rodenburg J. 2010. La plateforme AFROweeds – Le partage d'information et l'aide à l'identification des adventices des rizières en Afrique. AFPP – 21ème Conférence du COLUMA. Journées Internationales sur la lutte contre les mauvaises herbes. 8 et 9 décembre 2010, Dijon, France.

Rodenburg, J., Le Bourgeois, T., Grard, P., Marnotte, P. 2011. AFROweeds - A collaborative and participative online network to enhance weed science capacities in Africa, 10th African Crop Science Society Conference, 9-14 October 2011, Maputo, Mozambique.

Le Bourgeois T., Grard P., Marnotte P. & Rodenburg J. 2012. Améliorer la gestion de l'enherbement des rizières en Afrique par le partage d'information et l'aide a l'identification des adventices : le potentiel de la plateforme collaborative AFROweeds. First International Conference – Organic rice Farming and Production. 27th - 30th August 2012, Montpellier – France.

A scientific paper is in preparation for submission to the peer reviewed Science Citation Indexed journal *Computers and Electronics in Agriculture*.

Activity 4e: Organize on online review meeting:

"Virtual" meetings of the AFROweeds coordination team

Several online review meetings, using Skype, were organised regularly to assess project progress made and to schedule activities. These meetings concerned 2 or more people depending on the subject.
During the project, 10 meetings were held for the entire group while weekly meetings were held between P. Grard and T. bourgeois. The agendas and reports of group meetings are managed and stored in the "Group pages" of the AFROweeds coordination working group in the '*Weedsbook*" collaborative platform of the project. This way anyone belonging to the coordination group of the project could consult and review the agenda and the report of a meeting at any convenient time.

Activity 4f: Organize a final workshop in Cotnou (Benin) on Web2 Weeds portal progress:

At the end of the project, the closing project workshop was held for three days in Cotonou, Benin in AfricaRice temporary headquarters, located in Abomey-Calavi, Cotonou, Benin (Fig.36).

Fig. 36 AFROweeds project closing workshop temporary headquarters AfricaRice Cotonou - Benin (© T. Le Bourgeois - CIRAD)

This meeting brought together 22 people from AfricaRice and CIRAD, and weed scientists, extension service providers and botanists from 11 different countries (Benin, Burkina Faso, Côte d'Ivoire, Ghana, Nigeria, Madagascar, Mali, Mozambique, Uganda, Kenya, Senegal). Various points were presented and discussed:

- Presentation and discussion on the results and tools of the AFROweeds project;
- Training and evaluation of the use of tools with iPad tablets
- Partner feedback on the results and tools
- Discuss the prospects of the project at the end of EU funding

Just following the closing session of the workshop, 17 iPad tablets were offered to the participants (Fig. 37-39). These iPads were configurated with the AFROweeds-IDAO iPad application in French or in English depending on the participants, and with a direct access to the AFROweeds website.

Fig. 37-39: Ceremony of delevery of iPad tablets (© T. Le Bourgeois / Cirad)

The main conclusions of this workshop were:

- To pursue the project in feeding the database and the identification application with new weed species that may concern other cropping systems in Africa.
- To translate the species fact sheets in other languages such as Portuguese and Kiswahili.
- To extend the project to other rice production areas such as India, Asia and America where new collaborations can be initiated.
- The collaborative platform (*Weedsbook*) and associated tools to be used as an African Weed Science Network

The full report of the closing workshop is available in Appendix 5.

Activity 4e: Reporting to EC and publicizing results of project:

Interim annual reports were sent to EC as well as the present final report. Each of them was accompanied by an appendix gathering illustrated presentations of the tools produced during the project, mission reports, workshop reports, flyers, communications supports and press releases of the launching workshop and the closing worshop.

A synthesis of the results of the project has been published online on 17 news Websites such as SeedQuest, Alpha Galileo, AidNews, All Africa Press, Modern Ghana, News from Africa, Ole Africa, AECC, African News Wire, The Nigerian Voice, African Press Orgaization, AgroNews, ApaPress, NewsCuss, Melodika and PR-USA (Appendix 7.7).

It was also published online on the AfricaRice Web site and on the web pages of the Cirad Web site dedicated to Africa.

http://www.africarice.org/warda/newsrel-afroweed-oct12.asp

http://afrique-orientale-australe.cirad.fr/recherche_en_partenariat/projets_en_cours/agriculture_environnement_nature_et_societes/afroweeds

Results of the project or interviews were also published in several professional journals such as: International Pest Control 2012, Vol.54, N°6, Rice Today January March 2013, Vol.12, N°1, GRISP in motion, annual report 2012 and Cultivar Seed, Special issue February 2013 (Appendix 7.8)

Discussion on results of Activity 4 in reference to assumptions of the Logframe

Activity 4 was performed almost completely and supplementary actions were added.
500 CDRoms of the AFROweeds-IDAO Windows version where edited and distributed instead of 2000 because it occured later than the closing workshop and because the application can be dowloaded through the Website of the project and the "*Weedsbook*" collaborative platform. No paper version was printed because data was not available soon enough to respect the time to print a book.
Publicizing results of the project was done efficiently using mainly TV and Internet Media to reach an African or international audience as larger as possible.

Work of activity 4 took about 40,5 months, 4 Europe/SSA flight instead of 3 (A. Carrara from Cirad attended also the cloring workshop) and 7 SSA/SSA flights instead of 10.
28 perdiem days were spent to this activity. 24 tablets were purchased and distributed to main (7) and African (17) partners.

Financial audit has been performed by Hernst & Young Company for AfricaRice accounting and KPMG Company for Cirad accounting and the full financial consolidation in the final financial report.

Total cost of activity 4: 201,889 € (salaries 137,960 € + perdiem 5,180 € + travel 7,641 € + equipement 13,177 € + closing workshop 13,000 € (several invited people withdrew at the last moment) + Audit 7,000 €).

2.1. Please list all contracts (works, supplies, services) above 5000€ awarded for the implementation of the action during the reporting period, giving for each contract the amount, the award procedure followed and the name of the contractor

During the three years of the project, no contract above 5000€ was awarded for the implementation of the action.

2.2. Please provide an updated action plan [9]

Table 4 shows the updated action plan of the AFROweeds project.

Table 4: Updated action plan of the third year of the AFROweeds project (in brown colour the tasks which schedule has been adapted).

							Year 3 of the AFROweeds project								
	Semester 1						**Semester 2**								
Activity	**Month 1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**Implementing body**
2a - Bibliography															CIRAD + AfricaRice + NARS
2b - Consultation of existing herbaria															CIRAD + AfricaRice + NARS
2d - Field trip															AfricaRice
2e = 4e – Online review meetings															
2g - Scanning the specimens															CIRAD + AfricaRice + NARS
2h - Botanical description texts															CIRAD + AfricaRice
2i - Weed control management															CIRAD + AfricaRice + NARS
3a - Feeding the species description databases															CIRAD + AfricaRice
3b - Drawings of the composite picture IDAO															CIRAD
3c – Image process															CIRAD + AfricaRice + NARS
3d – Translation of botanical descript.															AfricaRice + NARS
3e - Glossary															CIRAD
3f – Integration IDAO SVG															CIRAD
3fbis- Integration IDAO for iPhone															**CIRAD**
3g - Workshop (Tanzania)															CIRAD + AfricaRice
4a - Dissemination / comm. sessions															Mainly Web 2.0 Mngmt. CIRAD and AfricaRice (Disseminati
4c – Integrate suggestion for improvements															CIRAD + AfricaRice + NARS
4d –Finalize CDROM and pub.															CIRAD + AfricaRice
4f – Final workshop (Benin)															CIRAD + AfricaRice + NARS
4g – Reporting to EC and pub.															CIRAD + AfricaRice

Despite the action plan of the project proposal, for which some activities were planned to stop during the third year, it appeared that most of regular activities can be continued all along the third year.

The tools used in the project (e.g. Online and multi-user Database, Collaborative platform, IDAO SVG system for identification), allow to update the available information on species as soon as new data is entered.

All actions and data that can be updated regularly due to the acquisition of new information, have been continued throughout the third year of the project, such as bibliography, herbaria scanning, photo taking, species information managing, image processing, IDAO SVG Integration, etc.

The CDRom of the AFROweeds-IDAO V1.0 for Windows has been completed by November 2012.

Following the conclusions and recommendations of the closing workshop, a request for a two-month extension was sent to EC to allow the development of an AFROweeds-IDAO encapsulated version for iPhone. This action (3fbis) has been completed in November and December 2012 (columns 13 and 14).

In Table 5 we have summarized the outputs and links to results of the activites of the AFROweeds project.

Table 5: Aiding tool to assess activities

Description of the activity		Executed in the reporting period	Outputs (reference to OVI)	Comments on achievements	Appendix
1.a	Open project Website	100%	Website available	Updated regularly	http://www.afroweeds.org
1.b	Open Web2.0 Participatory tools	100%	Participatory platform available	Evoluting according to members use and feedback	Appendix 1 of the first year interim narrative report http://www.afroweeds.org/network
1.c	Bibliography	100%			http://www.afroweeds.org/fr/ressources/bibliographie.html
1.d	Launching workshop in Cotonou	100%	Report of the workshop		Appendix of the the first year interim narrative report
2.a	Biliography	100%	Can be consulted through the Website or the collaborative platform	Updated regularly	http://www.afroweeds.org/fr/ressources/bibliographie.html
2.b	Consultation of existing herbaria	90%	9 Herbaria consulted. Data entered in the database, can be consulted in species fact sheets	The herbarium of Cocody-Abidjan University could not be consulted	
2.c	Field trip preparation	45 field trips in 6 countries	Managed by CRR-MC in Benin, SAED in Senegal and AfricaRice in Tanzania, Cote d'Ivoire, Kenya, Uganda		
2.d	Field trips	45 field trips in 6 countries	Mission reports and data entered in the online database		Appendix 2.1 to 2.10 of the first year interim narrative report Appendix 3.1 to 3.8 of the second year interim narrative report Appendix 4.1 to 4.8 of the final narrative report
2.e	Organize a online review	several online	Reports available for		

	meeting	meetings	project coordinators on the Collaborative platform		
2.f	Organize in St louis a workshop	Replaced by a second participatory workshop at Cotonou	Report of the second Workshop	Second workshop at Cotonou because AfricaRice weed scientist is no longer based in Saint Louis and also allows administrative meeting	Appendix 4 of the second year interim narrative report
2.g	Scanning specimen	60%	473 specimens for 183 species. Data entered in the database, can be consulted through species fact sheets or from the online database.		
2.h	Botanical description text	100% in French 100% in English 0% in Portuguese	Information managed in the online database, can be consulted through species fact sheets	Portuguese version could not be performed	http://www.afroweeds.org/fr/ressources/information-especes.html
2.l	Weed control methods	100%	Global rice weed management in English and French available on the collaborative platform Specific weed management according to weed categories available on the collaborative	Updated time to time	http://www.afroweeds.org/network/pg/file_tree/list/300#

			platform		
3.a	Feeding species description	100% in French 100% in English 0% in Portuguese	Information managed in the database, can be consulted through species fact sheets and the online database	Updated regularly	
3.b	Realize drawings for identikit system	100%	IDAO SVG identification system available from the Website and the Collaborative platform		http://www.afroweeds.org/idao
3.c	Image processing	100%	5295 images entered in the online database. Can be consulted through the species fact sheets or the online database	Updated regularly	http://www.afroweeds.org/fr/ressources/information-especes.html
3.d	Translation of the botanical description	100% in French 100% in English 0%in Portuguese	Botanical descriptions are written directly in French or in English	Translation in Portuguese could not be done. It is expected to be done later	http://www.afroweeds.org/fr/ressources/information-especes.html
3.e	Glossary	Available for 465 terms	not linked to species fact sheets	It appeared impossible to link illustrated glossary to species fact sheets	
3.f	Integration of IDAO	100% 3 different versions of AFROweeds-IDAO available for 100% of the	AFROweeds-IDAO for Windows (500 cdroms distributed) AFROweeds-IDAO SVG AFROweeds-IDAO		Appendix 6 of the final narrative report http://www.afroweeds.org/downloads http://www.afroweeds.org/idao

		species	encapsulated for iPad SVG and Windows version are available from the Website or the Collaborative platform for direct use or downloading		
3.fbis	Development of IDAO version fro iPhone	100% 1 version of AFROweeds-IDAO for iPhone device	AFROweeds-IDAO encapsulated for iPhone	Developed during the two-month extension of the project	
3.g	Organize a workshop on the development of the AFROweeds tools in Dar es Salaam	100%	Report with partner recommendations for improvment of tools		Appendix 4.6 of the final narrative report
4.a	Dissemination sessions/communication	3 sessions organized during Cotonou and St Louis workshops, and Maputo conference Integration to GRiSP 700 brochures	Reports, abstracts and proposal 700 AFROweeds brochures in English and French distributed	Will continue after the end of the project	Appendix 1, 2.1 to 2.10, 6.1 to 6.4 of the first year interim narrative report Appendix 3.7, 3.8,4, 6.2 to 6.6 of the year 2 interim narrative report Appendix 4.2 to 4.8, 5, 7.1 to 7.7 of the final narrative report
4.c	To integrate suggestions for improvments	100%		Will continue after the end of the project	
4.d	Finalize the cdrom and publications	95%	500 cdroms published and distributed. The application can be downloaded through the Web site and the collaborative platform	Paper in scientific journal still in preparation.	http://www.afroweeds.org/downloads

4.e	Organize on online review meeting	several online meetings	Reports available for project coordinators on the Collaborative platform		
4.f	Organize a final workshop in Cotonou (benin) on Web 2 Weeds portal progress	100%	Report of the closing workshop 17 iPads distributed to project members		Appendix 5 of the final narrative report
4.g	Reporting to EC and publicizing results of the project	99%	3 presentations at international or national conferences. Synthesis of project results published online on 17 news websites and 4 professional journals. 1 video on YouTube	Will continue after the end of the project	Final narrative report and Appendix Appendix 7.7 and 7.8 of the final narrative report

3. Partners and other Co-operation

3.1. How do you assess the relationship between the formal partners of this Action (i.e. those partners which have signed a partnership statement)? Please specify for each partner organisation

AfricaRice partner:

Working relations are good, both technically and administratively even if it is not always easy to respect administrative procedures following the EU rules.
It should be noted that a collaborative research agreement was established at the end of 2009 and signed on 15 January 2010 by AfricaRice and Cirad. It specifically defines the technical and administrative contribution made by each partner and the allocated budget.

Both CIRAD and AfricaRice are also in the new Global Rice Science Partnership (GRiSP) for which the AFROweeds project is considered as a first step (or first stone) in the building of a global collaborative tool and platform on rice weeds at a global level.
AFROweeds features in the GRiSP plan under Product Line 3.3: "P 3.3.2. Management options for pests, diseases, and weeds", Milestone 3.3.2.2 (2012) "Tools and website on African rice weeds finalized and published".

The presence of Cirad's project administrative assistant, Mrs N. Bakker, at each of the participatory workshops at Cotonou, was useful in that she explained and clearly defined the administrative operating rules of the European Commission and work together with AfricaRice administrative in the preparation of financial reports. Comments made by Cirad coordinator on financial or functioning aspects of the project have been taken into account by AfricaRice.

Regular contacts by video conference (several all along the project) and meetings in Cotonou (3), Montpellier (2) and Dar es Salaam (2) allowed for administrative and technical updates on the state of project progress.

The involvement of outside partners in project activities was not always easy to manage. Partners interested in the project had difficulty getting involved due to the lack of a specifically allocated budget. It was difficult to make them understand that they were not being requested to perform a particular task requiring specific financing. It was rather that the project was an opportunity that provided the technical means for them to summarize knowledge that they had already acquired during their research projects or that they were in the process of acquiring so that it might be shared and discussed with all the members of the network with the aim to make it accessible to all. During the second and the third year we have emphasized that again and we sensed that an active group of interested collaborators is now emerging. This became also evident during the workshop organized at the 10th ACSS conference in Maputo, where we met great enthusiasm for AFROweeds and the idea to start an African network for weed science. This was confirmed bu the discussion launched on the "*Weedsbook*" collaborative platform during the closing workshop. Everybody wanted this project and tools to grow with more species, more cropping systems and at a larger geographic scale.
Several African partners aquired the final presentation of the project to introduce it to other stakeholders during national events.

3.2. How would you assess the relationship between your organisation and State authorities in the Action countries? How has this relationship affected the Action?

During the project, relations between the AFROweeds project and State Authorities in the various Action Countries were limited to the participation of "conseiller scientifique" of the French Embassy in Benin to workshops at Cotonou – Benin in June 2011 and September 2012. Project computer tools and products (website, database, species fact sheets, and identification systems) are now finalized and can be used by any stakeholder or decision-maker.

3.3. Where applicable, describe your relationship with any other organisations involved in implementing the Action:

- Associate(s) (if any)
- Sub-contractor(s) (if any)
- Final Beneficiaries and Target groups
- Other third parties involved.

Weed scientists/agronomists from universities, national research institutions and extension services of 13 countries of the concerned region were invited to participate in the differents workshops and training sessions in different countries (Benin, Burkina Faso, Cote d'Ivoire, Mali, Nigeria, Ghana, Senegal, Tanzania, Chad, Uganda, Kenya, Madagascar, Mozambique and Rwanda) and France.
Other partners from other institutions and other countries have joint the project trought the collaborative platform.
The network of partners is growing regularly reaching 229 members by the end of the project.

3.4. Where applicable, outline any links you have developed with other actions

During the 10th ACSS conference in Maputo and again during the stakeholder joint conference Edulink ACP S&T programmes in Brussells, we (respectively J. Rodenburg and T. Le Bourgeois) met with Prof. Phil Stevenson, project leader of the EU-ACP funded ADAPPT. We have discussed ways to set up a network and will reflect on how we can collaborate in the future.

Collaborations occured with the Pl@ntNet project, a Cirad involved project funded by Agropolis Foundation. This project has developped the "Datamanager" application for online multi-user database used in the AFROweeds project. The AFROweeds online database was the first database used by several people from different locations and the AFROweeds partners played an important role in testing the "Datamanager" application, sending lots of feedbacks and suggesting lots of improvments.

The AFROweeds project is now included in the research programme of GRiSP (Global Rice Science Partnership http:// www.grisp.net). GRiSP is led by IRRI, AfricaRice, and CIAT in collaboration with Cirad, IRD, JIRCAS. It aims to provide a single strategic plan and unique new partnership platform for impact-oriented rice research for development. It is designed to more effectively solve development challenges. GRISP is a research cooperation between international research centers working on rice (IRRI, AfricaRice, and CIAT), French national research centers (Cirad and IRD) and a Japaneses research center JIRCAS.
AFROweeds corresponds to the Theme 3 Ecological and sustainable management of rice-based production systems, Product Line 3.3: "Product 3.3.2. Management options for pests, diseases, and weeds", Milestone 3.3.2.2 (2012) CD-rom and Website on African rice weeds finalized and published

If your organisation has received previous EC grants in view of strengthening the same target group, in how far has this Action been able to build upon/complement the previous one(s)? (List all previous relevant EC grants).

4. Visibility

How is the visibility of the EU contribution being ensured in the Action?

The various logos of the EU and ACP S&T programme appear on all the information and communications material produced in connection with the project (PowerPoint presentations, posters, brochures, and website). Brochures of the project in English and French have been published and distributed at several occasions (workshops, conferences, meetings...). (see photo of Fig. 33 under activity 4f) (Appendix 7.1, 7.3, 7.5 and 7.6).

The various logos of the EU and ACP S&T programme appear on all the technical support material distributed to partners and associates Web site, Collaborative platform, AFROweeds-IDAO applications, Species fact sheets, (Appendix 6).
The EU and ACP S&T programme are acknowledged in all communications presented at conferences (e.g. Conference of the African Society of Agronomy - Maputo 2011 and 1st International Conference on Organic Rice Production – Montpellier 2012) and in all oral presentations or Web published papers.

5. Prospects beyond the duration of the EU project

With all the tools now fully operational (combination of an online multiuser databse, Web site, Web2.0 colaborative platform, identification tools available on several of devices), and following the conclusions of the closing workshop, multiple perspectives can be considered beyond the project AFROweeds at different scales:

- To continue collecting and digitalizing herbarium specimen and make them accessible through the online tool and data base; to continue feeding th online database with new species and more information and to update regularly the species datasheets for the species already managed in the AFROweeds project.

- To pursue the project in feeding the database and updating the identification application with new weed species of rice cropping systems in Africa, including upland rice.

- To translate the species fact sheets in other languages such as Portuguese and Kiswahili.

- To pursue the project in feeding the database and updating the identification application with new weed species that may affect other cropping systems in Africa such as sugarcane, coton, sorghum, maiz, etc.

- To extend the project to other rice production areas such as India, Asia and America where new collaborations can be initiated on management of rice weeds.

- The collaborative platform (*Weedsbook*) and associated tools to be used as an African Weed Science Network.

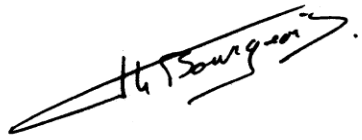
Among these opportunities for continuing the process initiated by the project AFROweeds, certain actions may be pursued by the current partners, based solely on the spontaneous

participation of members, while others will require new partnerships and new sources of funding.

The European Commission may wish to publicise the results of Actions. Do you have any objection to this report being published on EuropeAid Co-operation Office website? If so, please state your objections here.

Name of the contact person for the Action: Dr Thomas Le Bourgeois

Signature:



Location: Montpellier, France

Date report due: 15th of June 2013

Date report sent: 2nd of June 2013