

# Darwin Initiative Annual Report

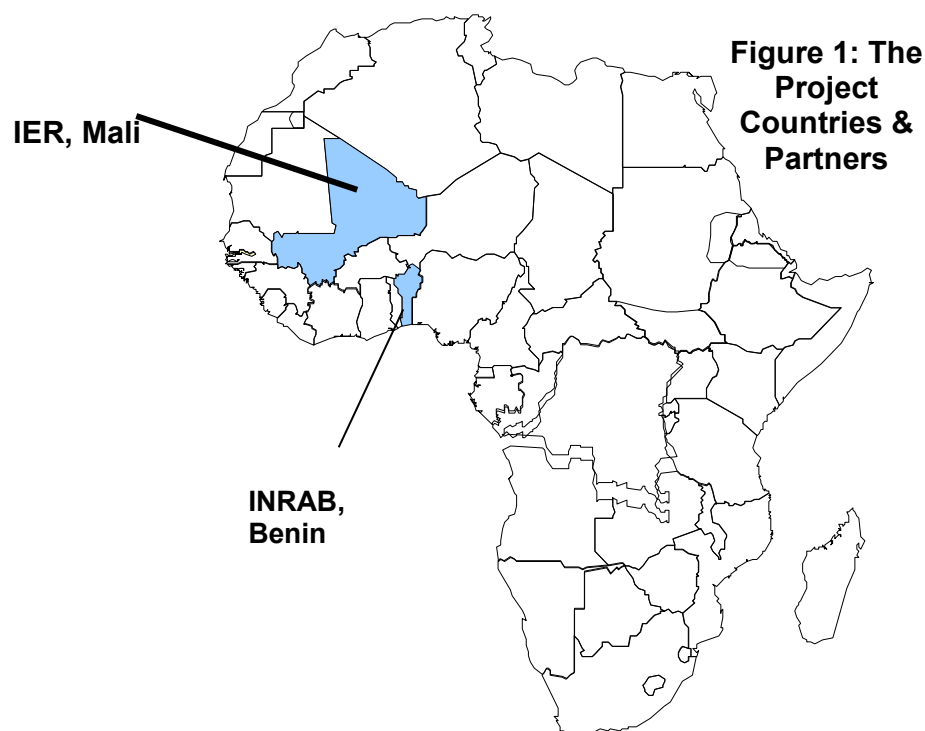
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## Darwin Project Information

Project Ref Number	15/003
Project Title	Conservation of Biodiversity in Traditional West African Species
Country(ies)	Benin, Mali
UK Contract Holder Institution	CAZS Natural Resources, Bangor University
UK Partner Institution(s)	-
Host country Partner Institution(s)	Institut d'Economie Rurale (Mali) Institut National des Recherches Agricoles du Benin (Benin)
Darwin Grant Value	£ 245,454
Start/End dates of Project	May 2006 – April 2009
Reporting period (1 Apr 200x to 31 Mar 200y) and annual report number (1,2,3..)	1 <sup>st</sup> April 2007 – 31 <sup>st</sup> March 2008 Annual Report 2
Project Leader Name	Dr. Margaret Pasquini
Project website	<a href="http://www.cazs.bangor.ac.uk/ccstudio/Research/cazsproject_Darwin1.php">http://www.cazs.bangor.ac.uk/ccstudio/Research/cazsproject_Darwin1.php</a>
Author(s), date	Dr. Margaret Pasquini, Dr. Ambrose-Oji, Dr. Francoise Assogba-Komlan, Dr. Kadiatou Gamby, Mrs. Aminata Dolo, Mr Enoch Achigan Dako, 29 April 2008

## 1. Project Background

This Darwin Initiative (DI) project addresses the urgent need for research & awareness-raising on the conservation of 'traditional' vegetable biodiversity in two West African countries – Benin & Mali (see Figure 1).



Traditional vegetables have played an important historical role in the food systems of West Africa, but their contributions to food security and nutrition have long been neglected by the research community. Conservation of biodiversity research has tended to focus on wild species and natural/semi-natural habitats, overlooking the great diversity of plant resources used for vegetable purposes. Moreover, the

vast majority of agricultural funding has been directed towards research and development of a few staple (and to a lesser extent vegetable) food crops that are usually non-native to the countries where they are consumed.

West Africa holds considerable reserves of vegetable species diversity, including species of *Amaranthus*, *Corchorus*, *Hibiscus*, *Solanum*, *Cleome*, *Curcubita*, etc., but as reported by the Consultative Group on International Research Institutions the recent years have witnessed “drastic reductions in genetic diversity” of local ecotypes and semi-wild species. The local project partners in Benin and Mali have noticed that a number of traditional vegetables once abundantly found in the wild are dwindling, through a combination of reasons e.g. over-collection or destructive harvesting practices prior to flowering, shifting cultivation, climate change and desertification, increasing population pressure leading to land clearance.

There has been little formal study of these species and their potential in Benin and Mali, and thus this DI project proposes to help remedy this situation by carrying out research (survey and inventory) of the vegetable crops and their traditional knowledge (e.g. cultivation practices, culinary practices and/or medicinal uses) in the two countries, analysis of their quantitative and qualitative potential for horticulture, and awareness-raising of their value and significance among stakeholders in the region.

## 2. Project Partnerships

**Project partnerships:** This project brings together three partners, CAZS Natural Resources (CAZS-NR) at Bangor University and the Institut d’Economie Rurale (IER) in Mali and the Institut des Recherches Agricoles du Bénin (INRAB). In addition, in Benin, staff members from the University of Abomey-Calavi are supporting INRAB in the administration of certain parts of the project, and in Mali, the West Africa office of AVRDC – The World Vegetable Centre is hosting a back-up seed bank for the project.

In this second year of the project, the UK partner has continued with the survey data analysis, whilst the country partners have continued with species identification and have set up on-station seed multiplication and germination trials. Information from the surveys enabled the teams to identify possible candidate species for domestication and villages which were likely to be interested in participating. Awareness-raising and dissemination activities have been carried out jointly.

As mentioned in the first year annual report, the partnership is supporting the host country institutions to build their capacity to meet the Convention on Biological Diversity (CBD) commitments as it concerns agricultural biodiversity, a research angle that is fairly novel for their institutions. The Benin partners are continuing to build the capacity of existing staff and young researchers from the University on traditional vegetable biodiversity through the repeat identification missions (to match local names to scientific names) which took place in the villages covered by the socio-economic surveys, and the additional collection missions to north-east Benin (which could not be covered in year 1). University students or recent graduates have also been given the opportunity to get some experience in a new sector, through the short-term research assistantships offered jointly by INRAB and the University (see below). In the UK the project continues to contribute to building the capacity of the project leader in terms of project management skills. A strong point of the partnership has been the exchange of knowledge and expertise between the two host country partners. This year this took place primarily at the mid-project review workshop in July 2007, but also in occasion of Mr Sognigbé N’Danikou’s visit to Mali in November 2007 (see under Activity 1).

Both country partners have been challenged by the problem of staff availability. Senior staff (with permanent contracts) can be very busy with multiple projects and cannot take part in long fieldwork sessions. Young researchers who can spend longer periods of time in the field are usually not permanent employees (and therefore participate in various phases of the project with short-term contracts), and over time they may become unavailable as they find more stable employment or go for further studies. This has been the case in Benin where the field botanists who had been involved in the first year were not all available for every one of the second year missions. Ultimately though, the INRAB partner was able to make up on its field staff numbers through its University contacts. In Mali the project progress was considerably slowed down as one team member went on maternity leave, and the other, Mrs Dolo, has started her PhD and is therefore very busy. Mrs Dolo, who under the project leader guidance has been overseeing most of the Darwin field activities, is planning to travel to the University of Copenhagen in connection with her PhD in December 2008 for five or six months, and will therefore be unavailable in the final phases of the project.

**Other Collaborations:** Partners continue to collaborate with AVRDC in Bamako on the DI project and with AVRDC in Arusha on other related projects (such as the EU project “*IndigenoVeg*” described in our

Annual Report 1). Dr Margaret Pasquini and Dr Ambrose-Oji visited AVRDC on the 20<sup>th</sup> of July 2007. The purpose of this visit was to introduce Dr Ambrose-Oji to Ekow Akyeampong, the new head of the Mali office and Issoufou Abdourhamane the AVRDC plant pathologist, and to update the AVRDC staff on the outcomes of the workshop and the activities planned by the two partners for the second year. Dr Akyeampong mentioned that the Benin partner Dr Assogba-Komlan had requested AVRDC to sign a document confirming receipt of the seed samples from INRAB and accepting that these are owned by INRAB. This led into a discussion about the use of the backup seed bank, an issue which was also raised in the course of the mid-project review workshop. **Although the AVRDC protocols for germplasm collection and transfer are determined by the FAO International Treaty on Plant Genetic Resources (linked to the CBD), a few of the Malian partners were concerned about ownership of the seeds and do not look very favourably on the transfer of this material to long-term storage in Taiwan. The situation has not been resolved.**

INRAB has developed several mutually beneficial collaborations with the University of Abomey-Calavi. Several graduates or young researchers from the University have been involved on the DI repeat identification and seed collection missions (e.g. Mr Enoch Achigan Dako, Mr N'Danikou, Mrs Arlette Adjatin, Mrs Ines Deleke Koko).

In May 2007 Dr Assogba-Komlan and Dr Pasquini visited the Dean of the Faculty of Agronomic Sciences at the University of Abomey-Calavi, Dr. Jean-Claude Codja. Dr Codja was very keen to reinforce collaboration between the University and INRAB and suggested that various aspects of the forthcoming year's activities could be the basis of dissertations at undergraduate and Masters level, or of short-term work experience. As a result of this discussion, in August 2007 INRAB and the Faculty of Agronomic Sciences (through Prof. Ahanchédé) advertised four temporary research assistant positions to carry out a literature review on traditional vegetables found in Benin and specifically their: 1) distribution areas and consumption areas; 2) conditions for seed conservation; 3) germination methods; 4) seed viability. Eight candidates were shortlisted and interviewed and ultimately two men and two women were selected: Mr Akomian Fortuné Azihou, Mr Yao Agossou, Ms Judith Honfoga and Ms Victoire Faladé.

Collaboration continues with Dr Alexandre Dansi. In May 2007 Dr Assogba-Komlan and Dr Pasquini met with Dr Dansi to discuss co-publication strategies. Dr. Dansi had started compiling information on indigenous leafy vegetables in Benin through an International Foundation of Science (IFS) project. The current DI extended this work to comprise not only leafy vegetables, but fruit, seed, root and flower vegetables, expanded the geographical scale, brought in the conservation aspects and allowed for the collection of seed samples. It was felt that it would be very beneficial to publish the outcomes of both these projects in a joint illustrated catalogue. Dr Pasquini contacted the Darwin Initiative Secretariat to enquire whether a joint publication would be possible and a positive answer was received. Dr Pasquini and Dr Assogba-Komlan met with Dr Dansi again in March 2008 to agree on a workplan and authorship, and work on this publication is currently on-going.

Stakeholders at the Environment Ministry have been updated on a number of occasions. In May 2007 Dr Assogba-Komlan and Dr Pasquini visited Bernadette Dossou the Director General at the Environment Ministry. Dr. Dossou who formerly worked as a lecturer at the University of Abomey-Calavi, discussed the preliminary findings of the project with a lot of interest, and requested to be kept regularly updated and hope to be involved in the dissemination activities. Dr. Dossou also said she would update Mr. Ogouchi the contact point for the CBD (who could not be present at the meeting) about the outcomes of the discussions. Mme Dossou was updated again on Monday 14 January 2008 at a stakeholder meeting (see section 7).

In Mali, contacts have been kept with the CBD focal point Modibo Cissé. Mrs Dolo visited him prior to the mid-project workshop in July to deliver a hardcopy of the project proposal and inform him about the meeting. A second visit was made in late July 2007 by Mrs Dolo and Dr Pasquini to appraise him of the workshop outcomes. The discussion centred particularly on the need for good awareness raising activities and training of youth to encourage the use of indigenous vegetables. The probable reasons for the changing dietary habits observed in the course of the survey were discussed.

### **3. Project progress**

#### **3.1 Progress in carrying out project activities**

*Activity 1: Surveys contributing towards the Output 1 Catalogue of IV biodiversity richness, uses and threats*

Data analysis started for the Mali survey data in November 2006, but it was clear that providing scientific names against local names was a constraint to progress in this task. Repeat seed and herbarium

collection visits had been planned for September-October 2007 (towards the end of the wet season), however, the repeat visits to 13 villages of the survey actually took place during October 2007 to January 2008 resulting in a total of 130 herbarium specimens being collected representing 68 species of which 60 have been identified and 8 remain to be identified.

Further work with the missing species names in the original survey data has seen the village level recollection or verification of local names resulting in the resolution of 121 local names in the database now given scientific correspondence (this equates to 57 scientific taxa), with 48 local names remaining non-identified (although some of these may be resolved now that the herbarium list has been generated). A total of 7 local names have been clarified as belonging to medicinal plants rather than those used as vegetables, and are no longer included in the database. More than 600 database records were updated as a consequence. A visit by Mr N'Danikou from the Benin team during November 2007 at the same time as Dr Ambrose-Oji's visit provided the opportunity to work through the determinations of the original 90 plus herbarium specimens and correct about 35% of them. Mr N'Danikou also spent some time with the Malian team (Mrs Dolo), talking through ways to identify *Corchorus* and *Amaranthus* to species level regardless of the morphological and phenotypic variation resulting from local climatic conditions and provenance.

However, there are still issues with the detail of the information in the database, where for example, taxa are identified to genus but not species level. The genus *Amaranthus* and *Corchorus* for example are not identified to species level (i.e. *A. spinosus*, *A. viridis* or *A. hybridus*, and *C. tridens*, *C. olitorius*) in the majority of cases. There are three separate reasons for this:

1. Village respondents use a local name which is an umbrella term for all members of a genus and which may therefore, refer to any of the species present;
2. Village respondents recognise morphological characteristics of the plants and name them accordingly even though these names may not correspond with different taxa (e.g. amarante rouge, amarante blanc, or *Corchorus* rouge et blanc);
3. There is a general level of confusion amongst villager respondents and enumerators with regards to the differences between species using either folk or scientific taxonomy e.g. the difference between *A. viridis* and *A. hybridus* in different conditions, and between *amarante sauvage* (wild amaranthe) which may be spiny (*A. spinosus*) but sometimes also not spiny (*A. viridis*).

In Benin the work to match local names to scientific names (see Figure I in Annex 3) took place in five villages in the South (Ayetedjou, Gogbo, Gbeko, Akpate, Bognongon) and three in the North (Ganro, Guesso-Sud, Wellan). Three of the southern villages (Ayetedjou, Gogbo and Gbeko) had to be visited because in year 1 they had been surveyed by the socio-economist but not the botanist team.

The botanist team also visited another 14 villages in the north to cover regions which had not been surveyed the previous year (see Figure II). In total in the north the teams collected 83 new herbarium specimens, 12 seed samples, two fruit samples and one vegetative organ sample. Details about the species count per location are given in Table I in Annex 3. The data collected by the botanist missions in both years has been compiled into an Access spreadsheet, and currently comprises 2040 entries, representing over 200 species.

The herbarium samples are stored at the National Herbarium of Benin. INRAB has recently sent an official letter donating them to the herbarium, and they therefore will be prepared and mounted by Mr Paul Yedomonhan, the Herbarium botanist, in the coming months.

#### *Activity 2: Seed and sample collection contributing towards the Output 2 Seed banks established*

Further work on the seed collection in the later half of this year in Mali, has seen the acquisition of a further 143 samples (Koulikoro 84; Sikasso 14; Mopti 16; Sejou 16; Kayes, 8; Gao, 5) representing 102 different local names (40 from Koulikoro alone), which have been determined to approximately 28 scientific species (mostly cultivated).

Seed multiplication for both the seed bank and for further domestication trials has been ongoing. In June 2007 eleven species were sown/transplanted at the IER station at Sotuba (Bamako). Not all species germinated. The weights of harvested seeds are given in Table II. Between October 2007 and March 2008 16 seed samples were sown/transplanted over 128m<sup>2</sup> (Table III). The weight data for these latest multiplication trials were not available at the time of writing of this report.

In December 2007 seeds and plant material of five species (*Amaranthus hybridus* (Amarante rouge), *Amaranthus hybridus* (Amarante verte), *Solanum scabrum*, *Talinum triangulare*, *Celosia argentea*) were given to the head of the Fruit and Vegetable program in Niono Research Center for multiplication. This work is advancing although seed weight data are not available. The advantage of the Niono research site is the available land and irrigation which allows for larger areas to be put down to each vegetable.

The Director of the Regional Agronomic Research Center of Gao was given six species in January 2008, (*Corchorus tridens*, *Corchorus olitorius*, *Solanum scabrum*, *Gynadropsis gynandra*, *Amaranthus hybridus*, *Sesamum radiatum*) under a similar agreement, and the hope is that multiplication will continue here during the forthcoming rainy season.

In Benin, seed collection continued during the field visits to the north and the south of the country. Unfortunately, few samples were found, and once again it was not possible to find the seeds of wild species. The weight of collected seed is given in Table IV.

Seed multiplication was carried out at the Agonkanmey research station in the south (see Figure III), and in the north at the Centre de Recherche Agricole Nord (at Ina). The weight of harvested seeds is given in Tables V and VI. It was observed that in the north virtually all the plants that gave seed were cultivated species. The wild species did not result in seed. In the southern station certain wild species did produce seed but quantities (except for *Lippia spp*) were small.

Of the original seeds collected, the partners gave half to AVRDC in Mali for the back-up seed bank. The other half was split in two, with one quarter used for seed multiplication (half sent to the North and half kept in the South). So, of the species that did not produce seed, only a quarter of the original amount is retained in Benin. But for the other species, the quantities have been replenished, and where there is excess the seeds will be sent to INRAB's Pobé research station for longer-term conservation.

### *Activity 3: Domestication trials contributing to Output 3 Selected highly used and threatened species domesticated*

At the mid-project review workshop in July the Mali team had discussed the most likely candidate species and villages for the domestication trials (the team endeavoured to select threatened species which were deemed of interest by a high number of survey respondents). The team agreed to seek cooperation in the village of Tondibi (Gao region) to set up domestication trials for *Citrullus colocynthis*, *Corchorus spp*, and *Cleome gynandra*; Koyan Coura (Segou) for *Corchorus spp.*; Kalaya (Koulikoro) for *Trianthema portulacastrum*, "fokoroba", *Sesamum radiatum*, *Solanum scabrum*.

However, availability of seed for distribution to farmers was a strong constraint, particularly for the wild species (where in many cases seed had not been found in the previous collection year, and even where it was found, often it did not germinate on-station so the required quantities could not be obtained).

As a result the Mali team concentrated their work on the most highly used species. Germination trials were conducted on seven species from 13 different samples, originating from 11 different locations. Germination success with *Amaranthus hybridus* 0900 was 91%, local pepper 1504 61.5%, local okra 0648, and just 20% with *Cerathotheca sesamoides* 0368 and 13% for *Amaranthus viridis* 0009.

Because of the non-availability of seed, the on-farm domestication trials in Mali were delayed to late 2007, during the dry season. Thus domestication trials could only take place where there was adequate water for irrigation.

The small quantity of seed available has meant that an informal system of domestication has been adopted, with farmers deciding which species are of interest to them. Seed and plant recipients do the screening and seed multiplication, and are asked to harvest and pass on that seed to other farmers. The species distributed were those that IER Sotuba had either the largest amount of seed or numbers of plants of, and where they felt there would be local interest in planting (Table VII). These are reasonable criteria, however, the result is that the "domestication" efforts are restricted to a small number of the easier to propagate species, not necessarily those species of greatest conservation or biodiversity concern.

There is no formal protocol for the administration of the on-farm screening and seed multiplication and collection of resulting data, but as was seen during Dr. Ambrose-Oji's visit to the sites of Kalaya and Koyan Coura in Mali, preliminary results from the domestication have been very interesting. Farmers have expressed a strong interest in some of the species trialled, both for home consumption and for

market sale, but have been less enthusiastic about those species culturally viewed as 'poor man's' or famine foods.

In Benin, various activities have been undertaken. As mentioned earlier, INRAB and the University commissioned four research assistants to review the literature on conditions for seed conservation, germination methods, and seed viability for all the main species found in the course of the first year surveys. The resulting reports will be invaluable to help the partners set up on-station tests to try and take away seed dormancy.

The analysis of the socio-economic survey data led to the identification of five villages where there appeared to be interest on the part of villagers to domesticate a number of wild species which were reported to be disappearing. The INRAB team visited all five villages to confirm interest in participating in the trials and in the candidate species. In the end three villages were selected (Table VII): one in the south (Ayetedjou), one in the centre (Bognongon) and one in the north (Ganro). The village of Akpaté had to be discarded because the road to the village is impassable during the wet season, and even in the dry season access is very difficult. The village of Wellan was discarded because it resulted that the three candidate species are only used for domestic consumption and are not marketed, and can be found in sufficient quantities in the nearby forest. Hence, there was no interest at village level.

The INRAB partner has been carrying out seed germination tests and seed multiplication for the candidate species, and has found that, as in the case of Mali, the availability of sufficient quantities of seed and non-germination is a challenge. Samples of *Ceratotheca sesamoides* and *Crassocephalum rubens* collected during the first mission did not germinate on-station, and thus the partner carried out a repeat collection missions to find sufficient seed for the on-farm trials. The mission which was carried out in March has found a sufficient quantity of seed to start the domestication trials in Ayetedjou and Bognongon (112 g of *C. rubens*) and at a later stage in Ganro (40 g of *C. sesamoides*) and has also collected available indigenous knowledge on the sprouting, leaf and seed harvest periods, the packaging and preservation of *C. rubens* seeds. Nurseries of these two candidate species were established at Agonkanmey in mid-April. At the time of writing of the report *C. sesamoides* had started sprouting. The plot of *C. sesamoides* established following the February seed collection mission is now flowering. A domestication protocol has been developed.

In the case of *Lactuca taraxacifolia* the partner will be running trials through cuttings (an approach which has been successful on station) as the species produces seed which does not germinate if it harvested and stored.

The trial farmers in Ayetedjou and Bognongon have started fencing off the plots which will be used during the trials, and the first nurseries will be established by the end of April/beginning of May 2008. One enthusiastic farmer in Ayetedjou has already tried establishing a nursery of *Lactuca taraxacifolia* from cuttings before the formal onset of the trials, and the INRAB partners have been providing technical support for the transplanting stage.

The partners are also interested in the domestication of two important tree species in Benin, *Bombax costatum* and *Vitex doniana*. It was not feasible to set up on-farm trials within the timeframe of the DI project, but the partners felt that it would be valuable to initiate a study of the seed viability of these two species, which could underpin future research. Ms Ronaldine Ahouanmagnagahou has developed a protocol to determine the conditions for conservation of these two species in cold chamber and at ambient temperature. The first germination tests on *Bombax costatum* started in early April at the laboratory in Niaouli.

*Activity 4.1: Development of peer-reviewed publications, best practice pamphlets and radio programmes and Activity 4.2 Awareness-raising at grassroots and policy levels contributing to Output 4 Dissemination material and training for different stakeholders delivered*

These activities are not due to take place until the third year. However, certain dissemination efforts are already under-way and are discussed in the section "Dissemination".

*Activity 5: Capacity-building activities for partners contributing towards the Output 5 Training and country-to-country expertise exchange delivered*

A mid-term project meeting, was held in Mali 17-19 July 2007, hosted by IER. The meeting was attended by ten Mali participants (Binta Diallo, Daouda Dembele, Fousseini Diarra, Mrs Dolo, Kadiatou Toure Gamby, Mamadou Goita, Sidi Mohammed Keita, Haby Sanou, Abderrahame Traore, Sidiki Traore), four Benin participants (Dr Assogba-Komlan, Mr N'Danikou, Mr Achigan-Dako and Mrs Azontondé), and two

UK participants (Dr Pasquini and Dr Ambrose-Oji). Mr Achigan-Dako travelled to the meeting from Germany, sponsored to give a presentation by an International Foundation of Science travel grant.

Partners exchanged information and shared lessons concerning the survey and seed collection methods, and discussed improvements for future surveys and collection missions. As well as the experiences in both countries being compared, each team presented a preliminary analysis of the results of the surveys, looking at the distribution and species richness of traditional vegetables through each country and the potential to domesticate species according to farmer preferences and market demand. There was significant exchange of experience and opinion about the best ways in which to analyse the data and take the assessment of vegetable biodiversity further forward. The group also discussed the planned and other potential dissemination approaches which could be used in year 3 and identified the preparatory steps that would need to be taken in the remainder of year 2 and beyond. The full report can be provided to the reviewer if required; a summarised version is available on the project website.

Further capacity exchange took place in occasion of the visit by Mr N'Danikou in November 2007 (see Activity 1).

## **3.2 Progress towards Project Outputs**

### *Progress towards Output 1*

In Mali, the checklist of local names and scientific correspondence is almost complete for the whole country. The herbarium catalogue is almost finalised (Table VIII). **Following the visit by Mr N'Danikou it has become apparent that a verification of the determinations by a qualified botanist is necessary before the checklist can be deemed complete.** A protocol for establishing species richness across the different regions needs to be agreed before the catalogue can be published.

In Benin, the catalogue has been expanded, following the visits to the 14 new villages in the North and three in the South. A number of new herbarium specimens still need to be determined. There has been an agreement to merge the DI project information together with the information collected by Dr Alexandre Dansi (who works at the University) in an earlier project funded by an International Foundation of Science grant, to produce an illustrated catalogue of traditional vegetables in Benin. The catalogue outline has already been developed and will consist of four major parts. The introduction will provide definitions and introduce the methodology used in the data collection and the areas surveyed. The second section will comprise five sections on biodiversity and local taxonomy, nutritional values and consumption, economic, social and medicinal importance, production and marketing, and finally genetic erosion and domestication. The third section will provide short descriptions on each of the circa 200 species identified in the surveys. And the final section will present a matrix of local language names. In Benin the draft of the full publishable catalogue will be finalised by December 2008. However, until the catalogue is published the information will not be made available on the website.

### *Progress towards Output 2*

In both countries the new collections, the continuing multiplication of seeds, and the distribution of seed to regional centres has helped towards achieving this goal. All new samples have been documented and stored in the IER and INRAB fridges. However, the assumption that it would be possible to find seed of significant numbers of the wild species has not held true. Thus, Output 2 has been achieved mostly with regards to cultivated species. The partners will continue looking for additional wild species seed samples in the course of their follow-up visits to the domestication trial sites.

The assumption that electricity supply would remain stable continues not to hold true, in either of the countries. The partners are maintaining the collections through seed multiplication on the research stations.

No further progress has been made concerning making arrangements for long-term storage at AVRDC headquarters. Thus, for the time being the indicator "list of seed samples collected and stored made available through the AVRDC website" is not appropriate.

### *Progress towards Output 3*

As discussed in the Annual report 1, the selection of the species for the domestication trials was delayed in both countries, and indicator 3.1 was modified to March and May 2007 for Benin and Mali, respectively.

In Mali, the candidate species identified in March 2007 were reconfirmed following team discussions in July 2007. The domestication efforts had started with the establishment of on-station nurseries to test seed germination and to obtain sufficient quantities of seed for the on-farm trials. However, by early autumn it was clear that not all candidate species for which seed had been available in year 1 had produced seed in sufficient quantities. Furthermore, the repeat seed collection missions which were planned for September-October to find seed of candidate species which had not been found in year 1 were delayed.

Thus, the partners have shifted the focus from domestication trials to informal farmer-based seed multiplication and screening of the species for which seed and plant samples were most available on-station (and not necessarily those species of greatest conservation or biodiversity concern), which modifies Output 3. Seed and plant samples were given out in November-January to the participating farmers, and have been tested in the sites in Koulikoro and Segou regions.

In Benin the candidate species were identified in May 2007 and on-station nurseries were set up at Agonkanmey. Partners visited the potential candidate villages and confirmed the choice of species in January-February 2008. The on-farm trials are due to start with the onset of the wet season (May 2008 for Ayetedjou and Bognongon and June 2008 for Ganro). The project in Benin is on track to deliver Output 3.

#### *Progress towards Output 4*

Work towards this output is due to start in the coming period, although as reported in the activities section partners have already started undertaking certain activities (mostly in Benin). A work plan was drawn up during the July workshop.

#### *Progress towards Output 5*

The training and country-to-country expertise was delivered on target in year 2 and is expected to be delivered without problems in year 3. The assumption that aviation prices would stay stable has held true for year 2, although it might not hold true in year 3, but should not significantly affect the expertise exchange workshop, but could affect repeat visits by the UK partner.

### **3.3 Standard Measures**

**Table 1 Project Standard Output Measures**

<b>Code No.</b>	<b>Description</b>	<b>Year 1 Total</b>	<b>Year 2 Total</b>	<b>Total to date</b>	<b>Total planned from application</b>
6A	Number of people to receive other forms of education/training	8 Mali 3 Benin	-	11	Enumerators trained on surveying and seed collection techniques (6 Mali, 3 Benin)
6B	Number of training weeks to be provided	3 wks Mali 1 wk Benin	1 week Mali	5	5 weeks Mali 4 weeks Benin
8	Number of weeks to be spent by UK project staff on project work in the host country	5 wks Mali 1 wk Benin	4 wks Mali 3 wks Benin	13	17 weeks Mali; 15 weeks Benin
13A	Number of species reference collections to be established and handed over to the host country(ies)	1 IER 1 AVRDC-Mali	-	2	One species reference collection established at IER; one joint collection at AVRDC-Mali; one duplicate collection at AVRDC-HQ for long-term conservation
13B	Number of species reference collections to be enhanced and handed over to the host country(ies)	1 INRAB	1 INRAB 1 IER	2	One species reference collection enhanced at INRAB (Benin)
14B	Number of conferences/seminars/workshops to be organised to present/disseminate	-	1	1	1 conference <u>attended</u> to disseminate findings



	findings				
15B	Number of local press releases in UK	-	-	-	1 local-level press release in the UK
17B	Number of dissemination networks to be enhanced/extended	1 IER staff attended workshop	-	1	1 dissemination network ( <i>IndigenoVeg</i> ) to be enhanced by IER, Mali inclusion
19A	Number of national radio interviews/features in host country(ies)	-	1 Benin	1	6 radio features (3 Mali; 3 Benin)
20	Estimated value (£'s) of physical assets to be handed over to host country(ies)	£6215	£700 Benin (internet access)	£6915	£7415 for seed bank equipment and computing resources
23	Value of resources raised from other sources (ie. in addition to Darwin funding) for project work	£69,000 vehicle costs	£20,000 * 2 for vehicles £400 land resources	Ca. £110,000	£55,661 plus £69,000 estimated vehicle costs value plus £400 land resources

**Table 2 Publications**

Type *	Detail (title, author, year)	Publishers	Available from
Poster	Achigan-Dako GE, N'Danikou S, Assogba-Komlan F, Deleke-Koko I, Gamby K, Dolo A, Pasquini, M and Ambrose-Oji, B (2007) Contribution of tree and shrub species to household nutrition and health in West Africa: mapping utilization and developing conservation strategies	N/A	Project website (soon to be posted)
Poster	N'Danikou S., Assogba-Komlan F., Pasquini M., Azontondé R., Ambrose-Oji B., and Achigan-Dako E. (2007) "Domestication as a conservation strategy for the wild vegetable resources of Benin (West Africa)"	N/A	Project website (soon to be posted)

### 3.4 Progress towards the project purpose and outcomes

The project has continued making good progress towards its purpose of improving the conservation and sustainable use of biodiversity in Mali and Benin. In Benin the additional field visits have resulted in country-wide coverage for the catalogue of indigenous species used as vegetables. In both countries work has commenced on the domestication of threatened species. In Mali by the end of the project a first phase of on-farm screening of species and multiplication of select species will be reached. In Benin the forthcoming domestication efforts will comprise two major thrusts: on-farm domestication trials of up to two leafy vegetable species per location and on-station tests to determine optimum conservation conditions for seeds of *Bombax costatum* and *Vitex doniana*.

The project is working towards the third purpose of getting traditional vegetables on the agendas of IER and INRAB stakeholder boards, by presenting results to the relevant committees. In Benin, Dr Assogba-Komlan presented the DI project results to the Atelier Scientifique 2007 which took place 11-14 December 2007 (report and presentations in French available if required). The committee wanted to know if there were concrete development results to be passed on to the producers (e.g. the results of the domestication trials). The partners envisage that concrete results will be available in 2008, and in this case, after presentation to the Atelier Scientifique 2008, the results will be presented to the Comité Régional de Recherche Développement, a committee of farmers and scientists, which addresses specific agricultural problems on an annual basis (which will take place in January 2009).

In Mali the *Comité Régional des Utilisateurs* (Regional Committee of Users) held their annual meeting at IER in Sotuba during February 2008. The CRU is the national government supported farmers organisation which forms the interface between farmers groups and government research institutes. A total of 42 male and female farmers came to Sotuba and were shown a display of growing traditional

vegetables, the seed collection, and traditional vegetable dishes and recipes. Feedback from the meeting showed that the farmers were surprised and pleased to discover that seeds from their villages were being used by research. From their evaluations the DI project was seen as an important new departure for a government research organisation which normally concentrates on exotic crops.

The assumption that Mali and Benin governments maintain the same level of or increase financial support for agricultural research and allow this to be tied in to conservation measures is holding true. In Benin Dr. Gnaho the deputy Cabinet Director of the Ministry of Agriculture has been extremely interested in research developments on traditional vegetables and has invited Dr. Assogba-Komlan to submit a project for Ministerial public investment funds in 2009. He has also suggested that INRAB participate and showcase traditional vegetable dishes in the local food fair which will be organised by the Ministry of Culture later this year.

### **3.5 Progress towards impact on biodiversity, sustainable use or equitable sharing of biodiversity benefits**

Progress towards the DI final goal will be reported on in the final year of the project.

## **4. Monitoring, evaluation and lessons**

In this second project year, project partners have been working primarily towards output 3, and to a lesser extent 1, 2 and 5. Progress is being monitored through interim reports and direct visits to the host countries.

The indicator for output 1 is a catalogue of traditional vegetable species and disappearing species for Mali and Benin, to be verified through regional and country species lists and a list of reported threatened species. This task is almost finalised, as good progress has been made in the work of matching vernacular to scientific names in both countries. The indicators for output 2 are seed collections established in IER, INRAB and AVRDC, to be verified through lists of seed samples. Tables 2, 4, 5 and 6 show the weight of seed samples stored in the seed collections in IER and INRAB this year, obtained either through seed multiplication or repeat seed collection missions. The indicator for output 3 was the choice of one species per region for the domestication trials in both countries. The choice of candidate species and villages was finalised in March and May 2007, for Mali and Benin respectively, and is reported in the UK partner visit reports. The indicator for output 5 is a Benin-Mali-UK expertise exchange and training workshop, to be verified through the workshop minutes. The minutes for the mid-project workshop are published on the project website.

Other reports, which are not mentioned in the logframe include interim reports of the four seed and sample collection missions in Benin; eleven mission reports in Mali; reports of the visits by the UK partners in July 2007 and March 2008 to Mali; May 2007 and March 2008 to Benin; miscellaneous progress emails and reports by the INRAB and IER partners. All these can be provided if required (partner reports may be in French or English).

## **5. Actions taken in response to previous reviews (if applicable)**

The reviewer flagged the need to ensure that the domestication trials start no later than May 2007 and requested an update in the half year report. This was done, and further developments have been described elsewhere in this report. The review report was circulated to the partners by email, and summarised in the project management presentation at the mid-project review workshop.

## **6. Other comments on progress not covered elsewhere**

All comments on progress have been covered elsewhere in this and other reports.

## **7. Sustainability**

Promotion of the DI work has been on-going in both countries. The INRAB partner is keeping various stakeholders informed about project progress at the farmer, research (University and Bioversity), and policy-making levels (Ministry of Agriculture and Ministry of Environment), through various meetings. The most recent meeting which drew on the DI project data (focusing on traditional vegetables particularly in urban and peri-urban agriculture) with representatives from the two afore-mentioned Ministries (Dr Ghaho and Dr Dossou), the Ministry of Health (Mr Tchibozo), the Union Communale des Producteurs de

Cotonou (Mr Deguenon), INRAB senior-level staff (Dr Koudandé) and the University (Dr Djego) took place on the 14 January 2008. By engaging with relevant stakeholders, the partner is generating considerable interest and support, for example, at the Ministry of Agriculture level, as mentioned in section 3.4.

The partner is also applying for INRAB “competitive funds”. Together with one of the literature review students, Ms Honfoga, Dr Assogba-Komlan has developed a protocol to investigate the pesticidal and nematocidal properties of *Lactuca taraxacifolia* and test whether it is effective at protecting *Solanum macrocarpon* from pest attack when intercropped. The protocol has passed the first selection stage, and the partner had started preliminary tests on the leaf extract to clarify if it is an insect repellent or insecticide.

In Mali, a new collaboration has started with the University of Copenhagen, which involves Mrs Dolo from IER looking at the ecology, taxonomy and ethnobotany of wild melons. This collaboration has come about as a direct result of the Darwin surveys which are the first to have mapped out the distribution of wild melons countrywide. The partner has also been promoting the project with the *Comité des Utilisateurs* (see section 3.4).

As reported in Annual Report 1 the exit strategy rests upon five elements. This report will only provide an update on the fourth element, namely the enhancement of partners' capacity. In Benin, over these two years the project leader has given the opportunity to several young researchers to participate in different phases of the project, thereby building their capacity on traditional vegetable research. Several of these young researchers are extremely keen to continue working in this new field and are actively pursuing interesting opportunities. For example, Mr N'Danikou was involved in the first year surveys, and although this year he started a new job in extension, he took time out to produce a poster and participate in a workshop in Mali (see Dissemination), and he will be one of the editors for the Benin catalogue. Since January 2008 the INRAB partner has been supported full time by two new young researchers who were involved earlier in the year on short tasks. Ms Honfoga got involved through the literature review, and is now working on station with the three candidate domestication species, and has developed the protocol for further research on *Lactuca taraxacifolia* mentioned above. Mr Eusèbe Avohou who was involved on the repeat identification and seed collection missions is acting as a supervisor of the on-farm trials. The UK partners will help build the capacity of these young researchers in particular, by delivering in the coming year a grant proposal skills seminar, which will be helpful to secure further funding after the DI project comes to an end, and training on the use of Access, which will improve their data analysis skills.

These developments are indicating that the outcomes and impacts of this DI project will be sustained beyond the lifetime of the project itself.

## 8. Dissemination

Besides the awareness-raising activities mentioned in section 3.4 and 7, partners have been engaged in various other dissemination activities targeting a scientific audience primarily, but also a general farmer and consumer audience.

Partners have developed two posters for events in the UK and in Mali. The first poster entitled “Domestication as a conservation strategy for the wild vegetable resources of Benin (West Africa)” (authors: N'Danikou S., Assogba-Komlan F., Pasquini M., Azontondé R., Ambrose-Oji B., and Achigan-Dako E.) was presented by Dr Ambrose-Oji at the Darwin Initiative workshop held on 03 October 2007 in London. The second poster entitled “Contribution of tree and shrub species to household nutrition and health in West Africa: mapping utilization and developing conservation strategies” (authors: Achigan-Dako GE, N'Danikou S, Assogba-Komlan F, Deleke-Koko I, Gamby K, Dolo A, Pasquini, M and Ambrose-Oji, B.) was presented by Mr N'Danikou and Dr Ambrose-Oji at the regional workshop “Agroforestry policy and research options for improving nutrition, health and livelihood of the rural poor in West and Central Africa” organised by ICRAF on 12-14 November 2007. This poster was voted best poster of the workshop.

In Benin, Dr Assogba-Komlan presented DI project second year activities internally to INRAB collaborators through a review meeting on the 19 November 2007 comprising all INRAB staff from the Programme Diversifications Cultures Maraichers and Programme Palmiers a Huile, with two external consultants.

In order to reach a broader international audience, a summary of the DI project was published in the database of the Global Facilitation Unit for Underutilized species (see: <http://www.underutilized-species.org/MasksSearch/SearchProjectDetail.aspx?id=270>).

With regards to reaching a more general audience (farmers and consumers), in Benin a brief radio emission was developed on the 23 May 2007 when Mr Felix Houinsou from Radio Immaculée Conception visited the Programme Cultures Maraîchères to interview Dr Assogba-Komlan, Mr Achigan Dako and Dr Pasquini about the project objectives, activities and results for its programme “La Graine” (which seeks to promote rural development by broadcasting information programmes on various agricultural and health of communities topics). The Darwin Initiative recording was aired on the 12 of June (an audio copy of the programme was given to the partners and can be made available).

The project has built in dissemination through several different channels in year three. In addition, Dr Gnaho from the Ministry of Agriculture, has indicated that promoting traditional vegetables and new developments in research could be done through the Ministry resources and contacts for dissemination. It is likely, therefore, that the partners will be able to continue disseminating beyond the lifetime of the project.

## 9. Project Expenditure

Please expand and complete Table 3.

**Table 3 Project expenditure during the reporting period (Defra Financial Year 01 April to 31 March)**

Item	Budget (please indicate which document you refer to if other than your project application)†	Expenditure	Balance
Rent, rates, heating, overheads etc	11512	11482	30
Office costs (eg postage, telephone, stationery)	1149	1149	0
Travel and subsistence	21594	21520	74
Printing	800	800	0
Conferences, seminars, etc	2413	2453	-40
Capital items/equipment	700	700	0
Others	12952	13031 (14294)*	-79
Salaries (specify)	23819	23808	11
<b>TOTAL</b>	<b>74939</b>	<b>74942</b>	<b>- 3</b>

\*Real expenditure was higher because the audit fee was £1762.5. However, only the £500 contribution by Darwin has been included in the table.

†This budget refers to a revised budget. An email requesting permission to revise the vire between headings and explaining why, was sent to the Secretariat on 04 May 2007. Permission to vire was received from Margaret Okot on the 25 of June 2007 with a request for the budget implications. The revised budget was sent to the Secretariat on 01 August 2007.

## 10. OPTIONAL: Outstanding achievements of your project during the reporting period (300-400 words maximum). This section may be used for publicity purposes

I agree for ECTF and the Darwin Secretariat to publish the content of this section.

There are no outstanding achievements in this reporting period.

## Annex 1 Report of progress and achievements against Logical Framework for Financial Year: 2007/08

Project summary	Measurable Indicators	Progress and Achievements April 2007 - March 2008	Actions required/planned for next period
<p><b>Goal:</b> To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but constrained in resources to achieve</p> <p>The conservation of biological diversity, The sustainable use of its components, and The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources</p>		<p>It is too early to report on progress towards the DI final goal. However, the project is aiming to support the first goal, through the conservation of biological diversity of indigenous vegetables.</p>	<p>(do not fill not applicable)</p>
<p><b>Purpose</b> Improved conservation &amp; sustainable use of biodiversity in Mali &amp; Benin by cataloguing indigenous vegetable (IV) species, domesticating selected species &amp; promoting their value to producers &amp; consumers</p>	<ul style="list-style-type: none"> <li>• Comprehensive list of indigenous species used as vegetables in Mali &amp; Benin produced</li> <li>• Domestication trials of threatened species initiated</li> <li>• IV research included as a priority topic by the end of yr 3 by IER &amp; INRAB boards</li> </ul>	<p>The project has made good progress towards its purpose of improving the conservation and sustainable use of biodiversity in Mali and Benin by collecting country-wide information to produce a catalogue of indigenous species used as vegetables in the two countries, and setting up short-term seed banks. The choice of species for the domestication trials was made and germination and seed multiplication tests took place. In Benin the on-farm trials are scheduled for the onset of the wet season. In Mali the on-farm trials have already started but have taken the form of informal screening and seed multiplication. Promotion of the value to producers and consumers has started in both countries, particularly Benin, but the bulk of activities will be in the coming year.</p>	<ul style="list-style-type: none"> <li>• Initiate on-farm trials (Benin)</li> <li>• Carry out research into the optimum conservation conditions for <i>Bombax costatum</i> and <i>Vitex doniana</i></li> <li>• Continue seed multiplication and repeat seed sample collection in occasion of the domestication follow-up visits to build up the short-term seed banks</li> <li>• Make arrangements to send seed samples for long-term conservation</li> <li>• Organise at least one major awareness-raising workshop in both countries</li> <li>• Develop and distribute pamphlets on conservation needs, cultivation techniques, preparation and recipes produced for both countries</li> <li>• Develop three ½ hour radio programmes</li> </ul>
<p><b>Output 1.</b> Catalogue of IV biodiversity richness, uses &amp; threats produced.</p>	<p>Catalogue of IV biodiversity &amp; disappearing species available for 6 regions in Mali &amp; northern Benin by end yr 2</p>	<p>Partners have continued progressing with the creation of a catalogue of IV biodiversity. In Mali repeat visits have allowed for scientific identification of a number of missing species. There are still instances where taxa could be identified to genus but not species level. <b>The herbarium catalogue requires verification by a qualified botanist.</b> In Benin the catalogue was extended to certain regions in the North which had not been covered in the previous surveys. Most new herbarium specimens have been determined, but work is on-going. Disappearing species have been identified for Benin. The indicator for this output is appropriate, although the catalogue has been expanded to comprise the whole of Benin and the full output will be developed mid year 3.</p>	

<p><b>Activity 1. Surveys</b></p>		<p>Repeat identification missions in Mali took place from October 2007 to January 2008. In Benin new identification missions took place to 14 villages in the North and the work of matching local names reported in the socio-economic surveys to scientific names took place in five villages in the South and three in the North, in January-February 2008.</p> <p>Progress was made in the data analysis for both countries and results were reported in July 2007 at the mid-project meeting. However, the need to be able to relate a local name to a scientific name constrained further progress in this task. Following the repeat identification missions, the databases were updated in March 2008. Work will continue in the coming period, and the information will be incorporated in the planned catalogue for Benin.</p> <p>In the next period, the focus will be on finalising data analysis (working within the constraints posed by the names which could not be determined because specimens could not be found).</p>
<p><b>Output 2. Seed banks established.</b></p>	<p>Seed samples collected country-wide in Mali and Benin documented &amp; stored in fridges in IER &amp; INRAB &amp; backup at AVRDC by Feb 07</p>	<p>A second batch of seed samples has been collected country-wide in Benin and Mali, stored at IER and INRAB. The collections have been augmented for certain species through on-station seed multiplication. However, finding seed of wild species continues to be a challenge, and thus the collections represent only a small portion of the countries' biodiversity. Partners will continue looking for seed samples in the course of their visits to follow the on-farm domestication trials. The indicator was achieved (as far as it could be achieved) in March 2008.</p>
<p><b>Activity 2. Seed &amp; sample collection</b></p>		<p>Seed collection missions in Mali took place from October 2007 to January 2008, and resulted in 143 samples representing 28 species. In Benin four seed collection missions took place between January and March 2008, resulting in 30 samples representing approximately 18 species (a number are still to be identified).</p> <p>Seed multiplication started in June 2007 in Mali at Sotuba and has continued throughout the year. Between December and January seed and plant samples were given to farmers in the three domestication location to initiate on-farm seed multiplication. In Benin seed multiplication started with the wet season 2007 at Agonkanmey (South) and at Ina (North) research stations, and has been on-going.</p> <p>Seed multiplication will continue. In Benin excess seed will be sent to Pobé research station for longer-term conservation. New back-ups will be sent to AVRDC. Discussions for long-term conservation at AVRDC headquarters will be initiated again.</p>
<p><b>Output 3. Selected highly used and threatened species domesticated</b></p>	<p>3.1 At least one species for domestication trials per region in Benin and Mali selected by Jan 07</p> <p>3.2 Results from domestication trials with different field techniques available by Jan 09</p>	<p>Candidate species for the domestication trials were selected in March and May 2007 for Mali and Benin, respectively. Domestication through seed germination and seed multiplication was started on-station in both countries with the onset of the wet season. However, in Mali the the on-farm domestication focus shifted to on-farm screening and seed multiplication.</p> <p>The 3.2 indicator is appropriate for Benin, but no longer for Mali.</p>
<p><b>Activity 3. Domestication trials</b></p>		<p>Domestication trials through germination tests and seed multiplication started in the wet season 2007. On-farm work started in Mali in November 2007-January 2008, through distribution of seed and plant samples which were available in sufficient quantities on</p>

		<p>station. In Benin visits to secure the cooperation of candidate villages and confirm the species for the trials took place in January-February 2008. The candidate villages and the village of Gbeko were visited again in March to collect additional seed samples, and to collect indigenous knowledge on the leaf and seed harvest times, and any seed conservation knowledge. Trial farmers have started fencing off plots. A protocol for the on-farm trials has been developed. A protocol to investigate the optimum seed conservation conditions for <i>Bombax costatum</i> and <i>Vitex doniana</i> has been established.</p> <p>The next period will see the establishment of the on-farm trials in Benin (April/May 2008) and the onset of the research project on conservation of <i>Bombax costatum</i> and <i>Vitex doniana</i> seeds.</p>
<p><b>Output 4.</b> Dissemination material and training for different stakeholders delivered</p>	<p>4.1 At least one major awareness-raising workshop delivered in both countries by Nov 08</p> <p>4.2 Pamphlets on conservation needs, cultivation techniques, preparation and recipes produced for both countries by Nov 08</p> <p>4.3 In each survey village pamphlets distributed and training delivered by Mar 09</p> <p>4.4 Three ½ hour radio programmes produced and aired by Apr 09</p>	<p>Work towards this output is not due to start until the third year.</p>
<p><b>Activity 4.1.</b> Development of peer-reviewed publications, best practice pamphlets and radio programmes</p>		<p>These activities are not due to take place until the third year. Radio Immaculée Conception interviewed the INRAB project partner about the DI project for its programme "La Graine".</p>
<p><b>Activity 4.2.</b> Awareness-raising at grassroots and policy levels</p>		<p>These activities are not due to take place until the third year.</p>
<p><b>Output 5.</b> Training &amp; country-to-country expertise exchange delivered</p>	<p>5. Benin-Mali-UK-expertise exchange &amp; training workshops carried out once a year</p>	<p>The country-to-country expertise was delivered on target in year 2 and is expected to be delivered on target in year 3.</p>
<p><b>Activity 5.</b> Capacity-building activities for partners</p>		<p>The mid-project Benin-Mali-UK expertise exchange workshop took place in Bamako, Mali, 17-19 July 2007 (2 and ½ days). The group exchanged information and shared lessons concerning the survey and seed collection methods, and discussed improvements for future surveys and collection missions. As well as the experiences in both countries being compared, each team presented a preliminary analysis of the results of the surveys, looking at the distribution and species richness of traditional vegetables through each country and the potential to domesticate species according to farmer preferences and market demand. The group also discussed the planned and other potential dissemination approaches which could be used in year 3 and identified the preparatory steps that would need to be taken in the remainder of year 2 and beyond</p> <p>The next period will see the closing meeting, scheduled to be held in Feb 09 in Mali (but most probably moved to Benin) to allow partners to exchange information on and compare project progress in the two countries, and consider ways forward for future collaboration.</p>

## Annex 2 Project's full current logframe

Project summary	Measurable Indicators	Means of verification	Important Assumptions
<b>Goal:</b> <b>To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but poor in resources to achieve</b> <ul style="list-style-type: none"> <li>the conservation of biological diversity,</li> <li>the sustainable use of its components, and</li> </ul> <b>the fair and equitable sharing of benefits arising out of the utilisation of genetic resources</b>			
<b>Purpose</b> Improved conservation & sustainable use of biodiversity in Mali & Benin by cataloguing indigenous vegetable (IV) species, domesticating selected species & promoting their value to producers & consumers	<ul style="list-style-type: none"> <li>Comprehensive list of indigenous species used as vegetables in Mali &amp; Benin produced</li> <li>Domestication trials of threatened species initiated</li> <li>IV research included as a priority topic by the end of yr 3 by IER &amp; INRAB boards</li> </ul>	Research programme reports IER & INRAB board reports	Mali & Benin governments maintain the same level of or increase financial support for agricultural research & allow this to be tied in to conservation measures
<b>Outputs</b> <b>1</b> Catalogue of IV biodiversity richness, uses & threats produced.  <b>2</b> Seed banks established.  <b>3</b> Selected highly used & threatened IV species domesticated  <b>4</b> Dissemination material & training for different stakeholders delivered	<b>1</b> Catalogue of IV biodiversity & disappearing species available for 6 regions in Mali & northern Benin by end yr 2  <b>2</b> Seed samples collected country-wide in Mali and Benin documented & stored in fridges in IER & INRAB & backup at AVRDC by Feb 07  <b>3.1</b> At least one species for domestication trials per region in Benin & Mali selected by Jan 07  <b>3.2</b> Results from domestication trials with different field techniques available by Jan 09  <b>4.1</b> At least one major awareness-raising workshop delivered in both countries by Nov 08  <b>4.2</b> Pamphlets on conservation needs, cultivation techniques, preparation & recipes produced for both countries by Nov 08  <b>4.3</b> In each survey village pamphlets distributed & training delivered by Mar 09  <b>4.4</b> Three ½ hour radio programmes produced & aired by Apr 09	The following information will be made available on the project web-site, which will feature the DI logo:  Regional & country species lists & reported threats published  Reports on cultivation practices published  Uses & preparation manuals, recipe collections published  List of seed samples collected & stored made available through the AVRDC website  Domestication trial reports  Workshop minutes & reports published (website)  Radio programme material  Articles published in newsletters & peer-reviewed journals	Farmers are willing to cooperate with the enumerators during the survey  Plants which have gone to seed can be found for seed collection  Electricity supply is stable  Sufficient numbers of policy makers can attend the workshops  Farmers find the training sessions sufficiently valuable to attend  Radio stations are interested in broadcasting the dissemination programmes  Aviation and other fuel prices do not rise unexpectedly (affecting travel costs)



<p><b>5</b> Training &amp; country-to-country expertise exchange delivered</p>	<p><b>5</b> Benin-Mali-UK-expertise exchange &amp; training workshops carried out once a year</p>		
<p><b>Activities</b></p> <p><b>1</b> Surveys</p> <p><b>2</b> Seed &amp; sample collection</p> <p><b>3</b> Domestication trials</p> <p><b>4.1</b> Development of peer-reviewed publications, best practice pamphlets &amp; radio programmes</p> <p><b>4.2</b> Awareness-raising at grassroots &amp; policy levels</p> <p><b>5</b> Capacity-building activities for partners</p>		<p><b>Activity Milestones</b></p> <p><b>1</b> Survey enumerators trained (6 in Mali, 3 in Benin) by June 06 &amp; questionnaires agreed; surveys to identify IV species found in six regions in Mali &amp; three in Benin, describe cultivation practices &amp; uses &amp; preparation of IVs completed by <b>Mar 07</b>; data inputting &amp; analysis by Jul 07; data write-up by May 08</p> <p><b>2</b> Seed bank facilities established Jun 06; <b>seed &amp; sample collection largely completed by Feb 07</b> (but repeat visits may occur later depending on seed production periods)</p> <p><b>3</b> IVs for domestication trials selected in Jan 07; domestication trials begin May 07; trials for report write-up completed by Jan 09.</p> <p><b>4.1</b> Reports/peer-reviewed publication joint write-up commences May 08; pamphlets prepared by Nov 08; pamphlets distributed by Mar 09; radio programmes prepared by Dec 08; radio programmes aired Jan-Apr.</p> <p><b>4.2</b> Sourcing further funding commences Sep 07; awareness-raising workshop for policy makers Nov 08; training sessions on the need for IV conservation, cultivation techniques, preparation techniques, recipe exchanges, delivered in each survey village by Mar 09.</p> <p><b>5</b> Introductory Benin-Mali-UK expertise exchange workshops in May 06 to finalise Detailed Work Plan. Mid-term meeting in Aug 07; final summary workshop Feb 09. Partners to be in close e-mail contact through-out.</p>	

## Annex 3 onwards – supplementary material (optional)

**Table I: Traditional vegetable species richness in 14 villages in northern Benin**

Village	Sociocultural groups	Species count
Zougou-Pantrosi	Bariba	30
Tankongou	Bariba	27
Loumbou-loumbou	Gourmantché	21
Garou-tédji	Djerma	11
Kargui	Dendi	23
Torozogou	Dendi	22
Kérérou	Bariba	19
Poto	Bariba	22
Sobado	Bariba	29
Dabou	Bariba	37
Akaradé	Kotokoli	34
Pénélan	Anii	28
Tcembéré	Kotokoli	62
Kodowari	Anii	29

**Table II: Weight of seeds harvested from first multiplication round (Sotuba, Mali)**

Species	Label	Origin	Surface (m <sup>2</sup> )	Weight of seeds harvested (g)
Amarante rouge	0013	Sotuba/ Koulikoro	1	0.3 g *
Amarante verte	0011	Massigui/ Koulikoro	6	1 130g *
Amarante verte	0002	Mourdiah/ Koulikoro	6	1 400 g *
Amarante verte	0007	Siby/ Koulikoro	4	270 g *
Amarante rouge	0009	Siby/ Koulikoro	6	830 g *
<i>Ceratotheca sesamoides</i>	1205	Diéma/ Kayes	2	8 g *
<i>Ceratotheca sesamoides</i>	0370	Kaboila/Sikasso	4	200 g *
<i>Ceratotheca sesamoides</i>	0368	Kaboila/ Sikasso	6	355 g *
<i>Corchorus</i> spp.	1204	Yelimané/ Kayes	1	0.7 g #
<i>Abelmoschus esculentus</i>	0648	Benebourou/Mopti	2	200 g #
<i>Abelmoschus esculentus</i>	0614	Tougoumé/ Mopti	21	270 g #
<i>Cleome gynandra</i>	0905	Koyan-Coura/ Segou	2	8 g *
<i>Cleome gynandra</i>	0906	Koyan-Coura/ Segou	2	66 g *
Piment local	1504	Ansogo/ Gao	6	160 g #
Courgette locale	1505	Ansogo/ Gao		-
Courgette locale	1201	Yelimané/ Kayes		-
Pastèque locale	1203	Yelimané/ Kayes		-

**Table III: Areas transplanted in second multiplication round (Sotuba, Mali)**

<b>Species</b>	<b>Localities</b>	<b>Area</b>
<i>Talinum triangulare</i>	N° 0392 /Kaboila/Sikasso	2 m <sup>2</sup>
<i>Solanum scabrum</i>	N° 0098 /Souban/Koulikoro	8 + 8 + 8 = 24 m <sup>2</sup>
<i>Citrullus lanatus</i>	N° 0932 /Bamada/Niono/Ségou	2 + 6 = 8 m <sup>2</sup>
Amarante verte	N° 0002 /Mourdiah/Koulikoro	6 m <sup>2</sup>
<i>Ceratotheca sesamoides</i>	N° 0370 /Kaboila/Sikasso	6 + 2 = 8 m <sup>2</sup>
Amarante rouge	N° 0900 /Zembougou/Ségou	14 m <sup>2</sup>
<i>Solanum scabrum</i>	N° 0393 /Kaboila/Sikasso	8 + 10 = 18 m <sup>2</sup>
<i>Ceratotheca sesamoides</i>	N° 0368 /Kaboila/Sikasso	6 + 4 = 10 m <sup>2</sup>
Amarante verte	N° 0007 Kalaya/Siby/Koulikoro	4 m <sup>2</sup>
Amarante rouge	N° 0009 Kalaya/Siby/Koulikoro	2 m <sup>2</sup>
<i>Cleome gynandra</i>	N° 0905 /Kouya Coura/Ségou	6 m <sup>2</sup>
<i>Celosia argentea</i>	N° 0030 /Massigui/Koulikoro	4 m <sup>2</sup>
<i>Lycopersicum esculentus</i>	N° 1506 /Ansogo/Gao	4 m <sup>2</sup>
<i>Solanum aethiopicum</i>	N° 0044 Kalaya/Siby/Koulikoro	4 m <sup>2</sup>
<i>Hygrophylla difformis</i>	Kalaya/Siby/Koulikoro	2 m <sup>2</sup>
Amarante verte	N° 0101 Kalaya/Siby/Koulikoro	2 m <sup>2</sup>

First seeding: le 13/11/2007

First transplantation: 24/12/2007

**Table IV: Weight of seeds collected in year 2 missions in Benin**

N°	N° d'accession	Scientific species	Quantity (g)	Village
1	08PCM500	Solanum macrocarpon	7,2	Ayétédjou
2	08PCM501	Citrullus lanatus	9	Ayétédjou
3	08PCM502	Cucurbita moschata	30,5	Ayétédjou
4	08PCM504	Cucumeropsis manii	32,6	Ayétédjou
5	08PCM505	Solanum sp	2,2	Ayétédjou
6	08PCM506	Lagenaria siceraria	0,4	Ayétédjou
7	08PCM507	Lagenaria siceraria	1,4	Ayétédjou
8	08PCM508	Lagenaria siceraria	3,4	Ayétédjou
9	08PCM510	Ocimum basilicum	0,2	Ayétédjou
10	08PCM513	Adansonia digitata	12,2	Ayétédjou
11	08PCM533	Hibiscus sabdriffa	11,1	Ganro
12	08PCM535	Hibiscus asper	0,7	Ganro
13	08PCM536	Lagenaria sp	13,4	Ganro
14	08PCM537	Citrullus lanatus	9,3	Ganro
15	08PCM538	Cucumeropsis edulis	12,2	Ganro
16	08PCM544	Hibiscus sabdriffa	7,2	Soubado
17	08PCM547	Hibiscus sabdriffa	3	Dabou
18	08PCM548	Lagenaria sp	23,5	Dabou
19	08PCM555	Ricinus communis	5,5	Akaradé
20	08PCM600	Identification en cours	45	Kodowari
21	08PCM610	Cucurbitaceae		Kargui
22	08PCM614	Identification en cours		Loumbou-Loumbou
23	08PCM627	Identification en cours		Poto
24	not available yet	Crassocephalum rubens		Bognongon
25	not available yet	Lactuca taraxacifolia		Bognongon
26	not available yet	Sesamum alatum		Kotto
27	not available yet	Ceratotheca sesamoides		Banté
28	not available yet	Crassocephalum rubens		Ayetedjou
29	not available yet	Crassocephalum rubens		Gbeko
30	not available yet	Sesamum alatum		Gbeko

**Table V: Weight of seeds harvested at Agonkanmey research station**

<b>N°</b>	<b>Scientific name</b>	<b>Accession N°</b>	<b>Quantity (g)</b>
1	<i>Hibiscus spp.</i>	06PCM 136	255.60
2	<i>Sesamum spp.</i>	06PCM 055	124.60
3	<i>Hibiscus Sabdariffa</i>	06PCM001	169.60
4	<i>Justicia Tenella</i>		42.00
5	<i>Struchium sparganophora</i>		8.70
6	<i>Sesamum spp.</i>		52.90
7	<i>Sesamum spp.</i>		100.00
8	<i>Hibiscus spp.</i>	06PCM129	235.70
9	<i>Hibiscus Sabdariffa</i>		63.00
10	<i>Lippia multiflora</i>	06PCM 072	1,000.00
11	<i>Talinum triangulare</i>	06PCM 088	14.10
12	<i>Heliotropicum indicum</i>		100.00
13	<i>Vernonia spp.</i>		
14	<i>Lactuca Taraxacifolia</i>		
15	<i>Occimum gratissimum</i>		
16	<i>Basella Alba</i>		
	<b>TOTAL</b>		<b>2,166.20</b>

Table 5: Species highlighted in red are wild species; no seeds were obtained for *Basella alba* as the plants were killed by nematodes; the seeds for *Vernonia spp.* were harvested and sown too early; the quantity of seed obtained for *Lactuca taraxacifolia* was insignificant.

**Table VI: Weight of seeds harvested at Ina research station**

<b>N°</b>	<b>Scientific name</b>	<b>Accession N°</b>	<b>Quantity (g)</b>
1	<i>Hibiscus esculentus</i>	06PCM 136	35.00
2	<i>Lagenaria Siceraria</i>	06PCM 053	11.90
3	<i>Hibiscus Sabdariffa</i>	06PCM001	154.50
4	<i>Amaranthus spp</i>	06PCM 009	133.50
5	<i>Amaranthus spp</i>	06PCM 0089	198.00
6	<i>Hibiscus esculentus</i>	06PCM129	44.00
7	<i>Hibiscus esculentus</i>	06PCM007	1.50
8	<i>Amaranthus spp</i>	06PCM 183	149.70
9	<i>Citrullus lanatus</i>	06PCM 089	75.60
10	<i>Citrullus lanatus</i>	06PCM 088	119.90
11	<i>Amaranthus spp</i>	06PCM 035	171.50
12	<i>Citrullus lanatus</i>	06PCM 126	189.70
13	<i>Lagenaria Siceraria</i>	06PCM 005	50.90
14	<i>Hibiscus esculentus</i>	06PCM 182	14.20
15	<i>Amaranthus spp</i>	06PCM 24	116.40
16	<i>Solanum spp</i>	06PCM 37	4.90
17	<i>Hibiscus esculentus</i>	06PCM 003	12.50
18	<i>Hibiscus esculentus</i>	06PCM 002	610.00
19	<i>Picinus Communis</i>	06PCM 138	390.00
20	<i>Hibiscus esculentus</i>	06PCM 003	460.00
21	<i>Hibiscus sabdariffa</i>	06PCM 052	330.00
	<b>TOTAL</b>		<b>3,273.70</b>

Table VI: Species highlighted in red are wild species; species highlighted in blue were harvested twice.

**Table VII: Villages and species selected for domestication in Mali and Benin**

<b>Village and participants</b>	<b>Species</b>
Kalaya (Koulikoro, Mali) Women's Association of Kalaya	14/11/2007 seeds received for: <i>Talinum triangulare</i> <i>Solanum scabrum</i> <i>Sesamum radiatum</i>  29/12/2007 plants received for: <i>Solanum scabrum</i> : <i>Celosia argentea</i> <i>Talinum triangulare</i> : Amarante rouge Amarante verte
Koyan Coura (Segou, Mali) Two male farmers	23/12/2007 seeds received for: <i>Solanum scabrum</i> :  23/12/2007 plants received for: <i>Talinum triangulare</i> : <i>Amaranthus hybridus</i> (red) <i>Amaranthus hybridus</i> (green)
Tondibi (Gao, Mali) Extension agent to contact farmers	12/01/2008 seeds received for: <i>Corchorus tridens</i> N° 0070 <i>Corchorus olitorus</i> N° 0002 <i>Solanum scabrum</i> N° 0395 <i>Cleome gynandra</i> N° 0640 <i>Cleome gynandra</i> N° 0906 <i>Amaranthus hybridus</i> N° 0002 <i>Amaranthus hybridus</i> N° 0009 <i>Sesamum radiatum</i> N° 0368
Ayetedjou (Benin) 7 farmers (4 female)	<i>Crassocephalum rubens</i> <i>Lactuca taraxacifolia</i> .
Bognongon (Benin) 6 farmers (3 female)	<i>Crassocephalum rubens</i>
Ganro (Benin) 5 farmers (3 female)	<i>Ceratotheca sesamoides</i>

**Table VIII: Herbarium catalogue Mali**

Accession number	Date of collection	Scientific name (nom scientifique)	Family	Local name (nom locale)	Language (en quelle langue?)	Region of collection	Village of collection	Name of collector (nom de la personne qui a collectionné la plante)	Name of person determining (nom de la personne qui a identifié la plante)	Name of person verifying determination (nom de la personne qui a vérifié l'identification)
9	20/08/2006	<i>Acalypha ciliata</i>	Euphorbiaceae	Sekoro gnoukou	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	
21	14/11/2007	<i>Acalypha ciliata</i>	Euphorbiaceae	Sekôô gnoukou	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	
54	14/08/2006	<i>Amaranthus graecizans</i>	Amaranthaceae	Bourabouraba	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	
14	20/08/2006	<i>Amaranthus hybridus</i>	Amaranthaceae	Poron	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	Daouda dembélé
56	14/08/2006	<i>Amaranthus hybridus</i>	Amaranthaceae	Poron djèma	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	N'danikou	Daouda Dembélé
69	01/12/2007	<i>Amaranthus hybridus</i>	Amaranthaceae	Poron Bléma	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	Aminata Dolo
70	01/12/2007	<i>Amaranthus hybridus</i>	Amaranthaceae	Poron djèma	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	Aminata Dolo
71	01/12/2007	<i>Amaranthus hybridus</i>	Amaranthaceae	Poron djèma	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	Aminata Dolo
108	05/12/2007	<i>Amaranthus hybridus</i>	Amaranthaceae	Gnougouba blé	Bambara	Kayes	Founya Moribougou	Fousseyni Diarra	Daouda Dembélé	



110	05/12/2007	Amaranthus sp	Amaranthaceae			Kayes	Founya Moribougou	Fousseyni Diarra	Fousseyni Diarra	Aminata Dolo
19	14/11/2007	Amaranthus spinosus	Amaranthaceae	poron	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Daouda Dembélé, Aminata Dolo	N'Danikou
44	14/08/2006	Amaranthus spinosus	Amaranthaceae	Bourabouraba	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	Mamadou coulibaly
51	14/08/2006	Amaranthus spinosus	Amaranthaceae	Bourabouraba	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	Mamadou coulibaly
61	01/12/2007	Amaranthus spinosus	Amaranthaceae	Bourabouraba	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	Aminata Dolo
109	05/12/2007	Amaranthus spinosus	Amaranthaceae	Poron fing	Bambara	Kayes	Founya Moribougou	Fousseyni Diarra	Fousseyni Diarra	
5	20/08/2006	Amaranthus viridis	Amaranthaceae	Poron	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	Daouda Dembélé, Aminata Dolo
15	20/08/2006	Amaranthus viridis	Amaranthaceae	Poron	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	Daouda Dembélé
17	14/11/2007	Amaranthus viridis	Amaranthaceae	Poron dèma	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	N'danikou	Daouda Dembélé
32	14/11/2007	Amaranthus viridis	Amaranthaceae	poron	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	Mamadou coulibaly
58	14/08/2006	Amaranthus viridis	Amaranthaceae	Poron djèma	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	Mamadou coulibaly
65	01/12/2007	Amaranthus viridis	Amaranthaceae	Bourabouraba	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	Aminata Dolo
67	01/12/2007	Amaranthus viridis	Amaranthaceae	Bourabouraba	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	Aminata Dolo
6	20/08/2006	Amaranthus	Amaranthaceae	Poron	Bambara	Koulikoro	Kalaya	Daouda	N'Danikou	Daouda

	6	hybridus						Dembélé, Aminata Dolo		Dembélé, Aminata Dolo
105	16/01/2008	Blighia sapida	Sapindaceae	Finzan	Bambara	Sikasso	Tienso	Sidi M, Keita	Aminata Dolo	
7	20/08/2006	Boerhavia diffusa	Nyctaginaceae	michini coumbéré	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Daouda Dembélé, Aminata Dolo	
40	29/12/2007	Boerhavia diffusa	Nyctaginaceae	michini coumbéré	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	
81	24/08/2006	Boerhavia diffusa	Nyctaginaceae	michini coumbéré	Bambara	Koulikoro	Massigui	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	Mamadou coulibaly
82	27/08/2006	Boerhavia diffusa	Nyctaginaceae	michini coumbéré	Bambara	Koulikoro	Massigui	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	
107	05/12/2007	Boerhavia diffusa	Nyctaginaceae	michini coumbéré	Bambara	Kayes	Founya Moribougou	Fousseyni Diarra	Daouda Dembélé	
123	07/10/2006	Boscia senegalensis	Capparaceae	Bélé ou Niampo		Mopti	Torokoro	Binta Diallo, Abdrahamane Traoré		
111	05/12/2007	Capsicum sp	Solanaceae	Froto	Bambara	Kayes	Founya Moribougou	Fousseyni Diarra	Fousseyni Diarra	Aminata Dolo
112	05/12/2007	Capsicum sp	Solanaceae	Froto	Bambara	Kayes	Founya Moribougou	Fousseyni Diarra	Fousseyni Diarra	Aminata Dolo
2	20/08/2008	Cassia mimosoides	Leguminosae-Caesalpinioideae	Fara nèrè	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	N'danikou	Daouda Dembélé
16	18/08/2006	Cassia mimosoides	Leguminosae-Caesalpinioideae	Fara nèrè	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	N'danikou	Daouda Dembélé
138	26/01/2007	Cassia mimosoides	Leguminosae-Caesalpinioideae	Karou, Kakarou	Sonrai	Gao	Ansongo	Fousseyni Diarra, Sidiki Traoré		
90	13/11/2007	Cassia occidentalis	Leguminosae-Caesalpinioideae	Balan balan	Bambara	Koulikoro	Massigui	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	
3	20/08/2008	Cayratia gracilis	Vitaceae	Toula dah	Bambara	Koulikoro	Kalaya	Daouda Dembélé,	N'danikou	Daouda Dembélé

								Aminata Dolo		
77	25/11/2007	Celosia argentea	Amaranthaceae	Gnougouba blé	Bambara	Koulikoro	Massigui	Daouda Dembélé, Aminata Dolo	Gamby Kadiatou Touré	Daouda Dembélé
87	25/01/1900	Celosia argentea	Amaranthaceae	Gnougouba blé	Bambara	Koulikoro	Massigui	Daouda Dembélé, Aminata Dolo	Gamby Kadiatou Touré	Daouda Dembélé
8	20/08/2006	Celosia sp	Amaranthaceae	Soumagnou gnoukou	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	N'Danikou	Daouda Dembélé, Aminata Dolo
22	14/11/2007	Celosia trigyna	Amaranthaceae	Soumagnou gnoukou	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	
34	29/12/2007	Celosia trigyna	Amaranthaceae	Soumagnou gnoukou	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	
38	29/12/2007	Celosia trigyna	Amaranthaceae	Soumagnou gnoukou	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	
92	14/01/2008	Celosia trigyna	Amaranthaceae	Bassakènè		Sikasso	Ganamerila	Sidi M, Keita	Daouda Dembélé	
122	18/10/2006	Celtis integrifolia	Ulmaceae	Kamiya		Mopti	Torokoro	Binta Diallo, Abderrahman e Traoré		
4	20/08/2006	Ceratoteca sesamoides	Pedaliaceae	Lélé	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	N'Danikou
13	20/08/2006	Ceratoteca sesamoides	Pedaliaceae	Lélé	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	N'Danikou
116	03/11/2006	Ceratoteca sesamoides	Pedaliaceae	N'tekou	Bambara	Kayes	Fankouné Massassi	Fousseyni Diarra, Sidiki Traoré	N'danikou	Daouda Dembélé
59	01/12/2007	Citrullus colocynthus	Cucurbitaceae	Michibo zara	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Aminata Dolo	Daouda Dembélé
63	01/12/2007	Citrullus colocynthus	Cucurbitaceae	Michibo zara	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Aminata Dolo	Daouda Dembélé

30	14/11/2007	Cleome gynandra	Capparaceae	Nazébé	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Daouda Dembélé, Aminata Dolo	Mamadou coulibaly
66	01/12/2007	Cleome gynandra	Capparaceae	Nazébé	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	Aminata Dolo
20	14/11/2007	Commelina bengalensis	Commelinaceae		Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Daouda Dembélé, Aminata Dolo	N'Danikou
28	14/11/2007	Commelina bengalensis	Commelinaceae		Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Daouda Dembélé, Aminata Dolo	
106	05/12/2007	Commelina bengalensis	Commelinaceae	Banfora	Bambara	Kayes	Founya Moribougou	Fousseyni Diarra	Daouda Dembélé	
118	28/10/2006	Corchorus fascicularis	Tiliaceae	Sènèmènè	Bambara	Kayes	Dougoubar a	Fousseyni Diarra, Sidiki Traoré	Daouda Dembélé	
37	12/11/2007	Corchorus olitorius	Tiliaceae	Zofon	Bambara	Koulikoro	Bamako	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	Aminata Dolo
50	14/08/2006	Corchorus olitorius	Tiliaceae	Zaba ou Nadé	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	Daouda Dembélé
53	14/08/2006	Corchorus olitorius	Tiliaceae	Nadé	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	Mamadou coulibaly
78	25/08/2006	Corchorus olitorius	Tiliaceae	Zobo	Bambara	Koulikoro	Massigui	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	Mamadou coulibaly
102	26/10/2007	Corchorus olitorius	Tiliaceae	Zofon	Bambara	Sikasso	Kaboila	Sidi M, Keita	Daouda Dembélé	Aminata Dolo
117	28/10/2006	Corchorus olitorius	Tiliaceae	Loupa	Bambara	Kayes	Fankouné Massassi	Fousseyni Diarra, Sidiki Traoré	Mamadou Coulibaly	
121	28/10/2006	Corchorus sp	Tiliaceae	Sènèmènè	Bambara	Kayes	Dougoubar a	Fousseyni Diarra, Sidiki Traoré	Daouda Dembélé	

39	29/12/2007	Corchorus tridens	Tiliaceae	zébè	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	
68	01/12/2007	Corchorus tridens	Tiliaceae	Zobon micèni	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	Aminata Dolo
73	01/12/2007	Corchorus tridens	Tiliaceae	Zobon micèni	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Daouda dembélé	Aminata Dolo
84	25/11/2007	Corchorus tridens	Tiliaceae	Zobon micèni	Bambara	Koulikoro	Massigui	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	Aminata Dolo
119	28/10/2006	Corchorus tridens	Tiliaceae	Loupa	Bambara	Kayes	Dougoubara	Fousseyni Diarra, Sidiki Traoré	Fousseyni Diarra	
55	14/08/2006	Crotalaria lathyaoides	Leguminosae-Papilionoideae	Diacouma kataka	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	
64	01/12/2007	Crotalaria lathyaoides	Leguminosae-Papilionoideae	Diacouma kataka	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	
60	01/12/2007	Cucurbita moshata	Cucurbitaceae	Djé	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Aminata Dolo	
137	17/01/2007	Cuminum cyminum	Umbelliferae	Alkfoune	Sonrai	Gao	Ansongo	Fousseyni Diarra, Sidiki Traoré	Fousseyni Diarra	
98	14/01/2008	Ficus dicranostyla	Moraceae	Soro	Bambara	Sikasso	Ganamerila	Sidi M, Keita	Aminata Dolo	
89	14/11/2007	Ficus gnafalocarpa	Moraceae	Toro	Bambara	Koulikoro	Massigui	Daouda Dembélé, Aminata Dolo	Aminata Dolo	
125	12/10/2006	Cleome gynandra	Capparaceae	Nazébé	Bambara	Mopti	Bénébourou	Binta Diallo, Abderrahmane Traoré	Daouda Dembélé	Aminata Dolo
24	19/12/2007	Hygrophila diformis	Acanthaceae	Mourou bounzan	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Gamby Kadiatou Touré	
25	14/11/2007	Hygrophila	Acanthaceae	Mourou	Bambara	Koulikoro	Kalaya	Sidiki Traoré	Gamby Kadiatou Touré	

	7	diformis		bounzan				Daouda Dembélé, Aminata Dolo		
26	14/11/2007	Hygrophila diformis	Acanthaceae	Mourou bounzan	Bambara	Koulikoro	Kalaya	Sidiki Traoré Daouda Dembélé, Aminata Dolo	Gamby Kadiatou Touré	
27	19/12/2007	Hygrophila diformis	Acanthaceae	Mourou bounzan	Bambara	Koulikoro	Kalaya	Sidiki Traoré Daouda Dembélé, Aminata Dolo	Gamby Kadiatou Touré	
31	29/01/2007	Hygrophila diformis	Acanthaceae	Mourou bounzan	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	
1	20/08/2006	Ipomea aquatica	Convolvulaceae	Nakanakaba bulu	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	
139	26/01/2007	Ipomoea aquatica	Convolvulaceae			Gao	Ansongo	Fousseyni Diarra, Sidiki Traoré		
36	06/12/2007	Ipomoea batatas	Convolvulaceae	Wosso	Bambara	Koulikoro	Bamako	Sidy Mohamed Keita	Sidi Mohamed Keita	Aminata Dolo
18	14/11/2007	Ipomoea sp	Convolvulaceae	Nakanakaba bulu	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	N'danikou	
120	28/10/2006	Ipomoea sp	Convolvulaceae	Loukoulaka	Bambara	Kayes	Dougoubar a	Fousseyni Diarra, Sidiki Traoré	Daouda Dembélé	
74	01/12/2007	Ipomoea wagans	Convolvulaceae	Woulouni clo	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	
42	09/12/2007	Lagenaria siceraria	Cucurbitaceae	Pénéri	Bambara	Koulikoro	Kalaya	Sidy Mohamed Keita	Daouda Dembélé	
11	20/08/2006	Leptadenia hastata	Asclepiadaceae	Sognoukou	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	Daouda Dembélé, Aminata Dolo
23	14/11/2007	Leptadenia	Asclepiadaceae	Sognoukou	Bambara	Koulikoro	Kalaya	Daouda	N'danikou	Daouda

	7	hastata						Dembélé, Aminata Dolo		Dembélé
48	14/08/2006	Leptadenia hastata	Asclepiadaceae	Zondjè	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	Daouda Dembélé
79	24/08/2006	Leptadenia hastata	Asclepiadaceae	Zoyé	Bambara	Koulikoro	Massigui	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	Mamadou coulibaly
80	25/08/2006	Leptadenia hastata	Asclepiadaceae	Zoyé	Bambara	Koulikoro	Massigui	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	Mamadou coulibaly
95	14/01/2008	Leptadenia hastata	Asclepiadaceae	Sowè		Sikasso	Ganamerila	Sidi M, Keita	Daouda Dembélé	Aminata Dolo
127	18/01/2008	Leptadenia hastata	Asclepiadaceae	KomaKolô	Dogon	Mopti	Tougoumé	Abderrahmane traoré, Gamby Kadiatou Touré, Sidiki Traoré	Aminata Dolo	
130	16/01/2008	Leptadenia hastata	Asclepiadaceae			Mopti	Tougoumé	Abderrahmane traoré, Gamby Kadiatou Touré, Sidiki Traoré		
132	18/01/2008	Leptadenia pyrotechnica	Asclepiadaceae	Saabé	Sonrai	Gao	Tondibi	Abderrahmane traoré, Gamby Kadiatou Touré, Sidiki Traoré		
143	19/01/2008	Leptadenia sp	Asclepiadaceae	Sirafaté	M	Kayes	Founya Moribougou	Fousseyni Diarra	Fousseyni Diarra	
96	14/01/2008	Lycopersicum esculentum	Solanaceae	Tomotiki	Bambara	Sikasso	Ganamerila	Sidi M, Keita	Aminata Dolo	Daouda Dembélé
97	14/01/2008	Lycopersicum esculentum	Solanaceae	Tomotiki	Bambara	Sikasso	Ganamerila	Sidi M, Keita	Aminata Dolo	Daouda Dembélé
128	16/01/2008	Maerua angolensis	Capparaceae			Mopti	Tougoumé	Abderrahmane traoré, Gamby Kadiatou Touré, Sidiki Traoré		
45	14/08/2006	Maerua crassifolia	Capparaceae	Kalé	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	
72	01/12/2007	Maerua crassifolia	Capparaceae	Kalé	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	Aminata Dolo
135	26/01/2008	Maerua crassifolia	Capparaceae	Hassou	Sonrai	Gao	Ansongo	Abderrahmane traoré, Gamby Kadiatou Touré, Sidiki Traoré		

140	26/01/2007	Maerua crassifolia	Capparaceae	Hassou	Sonrai	Gao	Ansongo	Fousseyni Diarra, Sidiki Traoré	Mamadou Coulibaly	
88	14/11/2007	Maerua oblongifolia	Capparaceae	Bélé Bélé	Bambara	Koulikoro	Massigui	Daouda Dembélé, Aminata Dolo	Aminata Dolo	
100	14/01/2008	Maerua oblongifolia	Capparaceae	Bélé Bélé	Bambara	Sikasso	Ganamerila	Sidi M, Keita	Mamadou Coulibaly	
12	20/08/2006	Melochia corchorifolia	Sterculiaceae	Fara gouan	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	Daouda Dembélé, Aminata Dolo
33	18/08/2006	Melochia corchorifolia	Sterculiaceae	Fara gouan	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	N'danikou	Daouda Dembélé
124	18/10/2006	Melochia corchorifolia	Sterculiaceae	Faraguan	Bambara	Mopti	Torokoro	Binta Diallo, Abderrahman e Traoré		
141	26/01/2007	Momordica charantia	Cucurbitaceae	Béna Kortou	Sonrai	Gao	Ansongo	Fousseyni Diarra, Sidiki Traoré	N'danikou	Daouda Dembélé
142	19/01/2008	Momordica charantia	Cucurbitaceae	Béna Kortou	Sonrai	Gao	Tacharane	Gamby Kadiatou Touré, Sidiki Traoré	Sidiki Traoré	Daouda Dembélé
83	25/08/2007	Moringa olifera	Moringaceae	Bachi jirini	Bambara	Koulikoro	Massigui	Daouda Dembélé, Aminata Dolo	Gamby Kadiatou Touré	Aminata Dolo
35	14/11/2007	Nelsonia canescens	Acanthaceae	Kononi kadoulô	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	
43	29/12/2007	Nelsonia canescens	Acanthaceae	Kononi kadoulô	Bambara	Koulikoro	Kalaya	Sidiki Traoré, Daouda Dembélé	Daouda Dembélé	
52	14/08/2006	Portulaca oleracea	Portulacaceae	michini coumbéré	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	Mamadou coulibaly
41	18/08/2006	Senna obtusifolia	Leguminosae-Caesalpinioideae	Gélou	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	Mamadou coulibaly



86	24/11/2007	Senna obtusifolia	Leguminosae-Caesalpinioideae	Soka tika	Bambara	Koulikoro	Massigui	Daouda Dembélé, Aminata Dolo	Daouda Dembélé	
136	26/01/2007	Senna obtusifolia	Leguminosae-Caesalpinioideae	Agargar	Sonrai	Gao	Ansongo	Fousseyni Diarra, Sidiki Traoré	N'danikou	
46	14/08/2006	Sesamum radiatum	Pedaliaceae	N'dekou	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	
47	14/08/2006	Sesamum radiatum	Pedaliaceae	Lélé	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	
57	14/08/2006	Sesamum radiatum	Pedaliaceae	N'dekou ou lélé	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	
62	01/12/2007	Sesamum radiatum	Pedaliaceae	N'dékou	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Aminata Dolo	
85	24/11/2007	Sesamum radiatum	Pedaliaceae	Nogolan Djolé	Bambara	Koulikoro	Massigui	Daouda Dembélé, Aminata Dolo	Aminata Dolo	
103	30/07/2008	Sesamum radiatum	Pedaliaceae	Lélé	Bambara	Sikasso	Kaboila	Sidi M, Keita	Aminata Dolo	
104	30/07/2006	Sesamum radiatum	Pedaliaceae	Lélé	Bambara	Sikasso	Kaboila	Sidi M, Keita	Aminata Dolo	
115	03/11/2006	Sesamum radiatum	Pedaliaceae	N'tekou	Bambara	Kayes	Fankouné Massassi	Fousseyni Diarra, Sidiki Traoré	Fousseyni Diarra	Aminata Dolo
10	20/08/2006	Sida carpinifolia	Malvaceae	Fala Boua	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	
113	05/12/2007	Solanum aethiopicum	Solanaceae	Djagaro	Bambara	Kayes	Founya Moribougou	Fousseyni Diarra	Fousseyni Diarra	Aminata Dolo
75	14/11/2007	Sterculia apetala	Sterculiaceae	kirfogo ou Kounko sirani	Bambara	Koulikoro	Massigui	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	
76	14/11/2007	Sterculia apetala	Sterculiaceae	kirfogo ou Kounko sirani	Bambara	Koulikoro	Massigui	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	

29	18/08/2006	Trianthema portulacastrum	Aizoaceae	Kolofara gnoukou	Bambara	Koulikoro	Kalaya	Daouda Dembélé, Aminata Dolo	N'danikou	Daouda dembélé
49	14/08/2006	Trianthema portulacastrum	Aizoaceae	Banè	Bambara	Koulikoro	Mourdiah	Daouda Dembélé, Aminata Dolo	Mamadou Coulibaly	
126	12/10/2006	Tribulus terrestris	Zygophyllaceae	Silgnaga		Mopti	Bénébourou	Binta Diallo, Abderrahmane Traoré	Mamadou Coulibaly	
91	23/07/2006	unidentified		Sokoroguè	Bambara	Sikasso	Ganamerila	Binta Diallo, Sidi M, Keita		
93	14/01/2008	unidentified				Sikasso	Ganamerila	Sidi M, Keita		
101	14/01/2008	unidentified		Sokoroguè	Bambara	Sikasso	Ganamerila	Sidi M, Keita		
114	05/12/2007	unidentified				Kayes	Founya Moribougou	Fousseyni Diarra		
129	16/01/2008	unidentified		BanKalé		Mopti	Tougoumé	Abderrahmane traoré, Gamby Kadiatou Touré, Sidiki Traoré		
131	16/01/2008	unidentified		Pili	Dogon	Mopti	Tougoumé	Abderrahmane traoré, Gamby Kadiatou Touré, Sidiki Traoré		
133	18/01/2008	unidentified		orgué	Sonrai	Gao	Tondibi	Abderrahmane traoré, Gamby Kadiatou Touré, Sidiki Traoré		
134	18/01/2008	unidentified				Gao	Tondibi	Abderrahmane traoré, Gamby Kadiatou Touré, Sidiki Traoré		
94	14/01/2008	Zanthoxylum zanthoxyloides	Rutaceae	Wô	Bambara	Sikasso	Ganamerila	Sidi M, Keita	Aminata Dolo	
99	14/01/2008	Zanthoxylum zanthoxyloides	Rutaceae	Wo	Bambara	Sikasso	Ganamerila	Sidi M, Keita	Aminata Dolo	

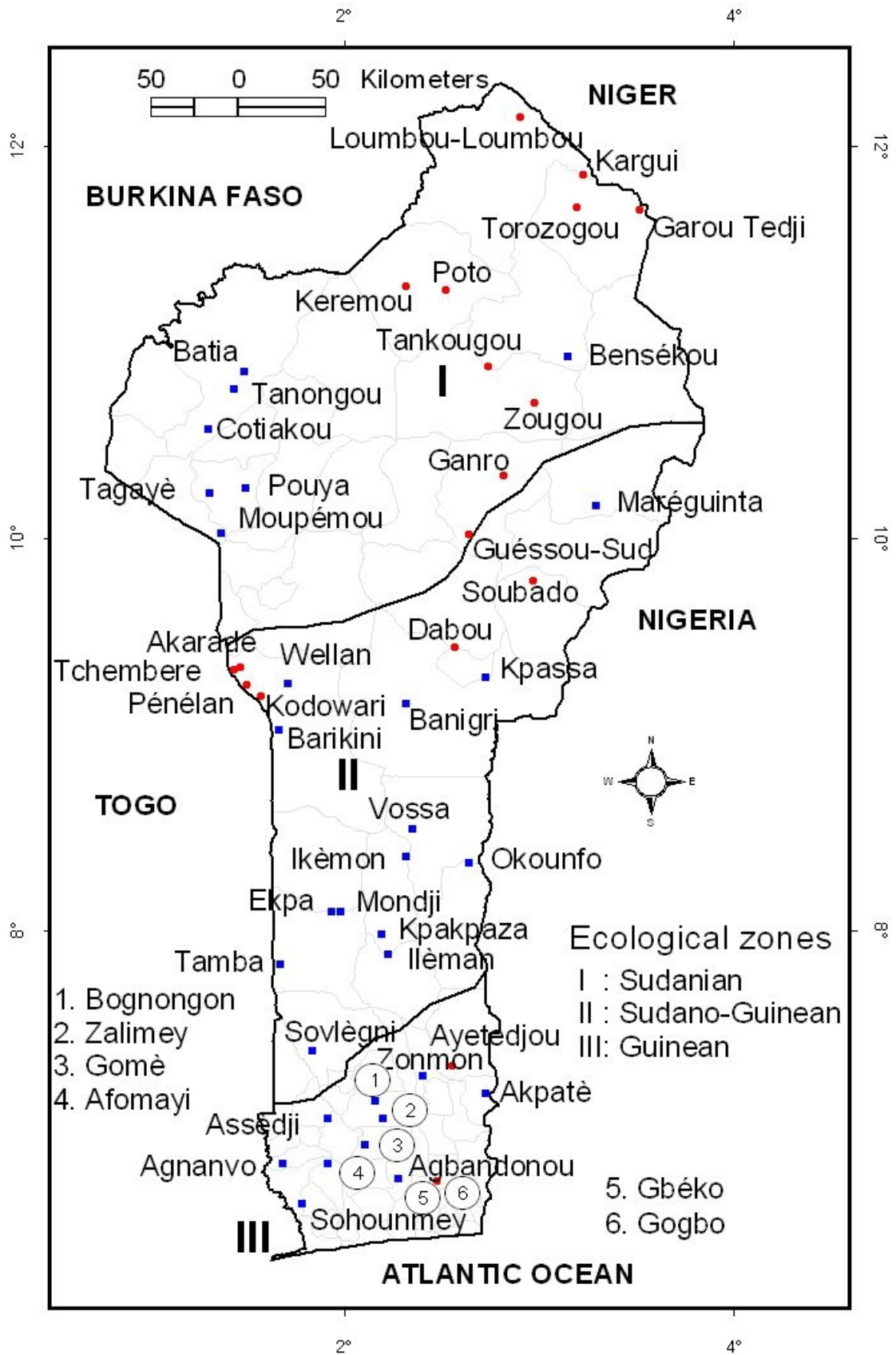
Figure I: Focus group with farmers in Ayetedjou (Benin)



Figure III: Traditional vegetable garden at Agonkanmey research station (Benin)



**Figure II: Villages surveyed in Benin (year 1 mission in blue, year 2 mission in red)**



### ***Checklist for submission***

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