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# Attitude counts: engaging with rice farmers in West Africa

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*An international project called PADS promoted participatory learning and action research with inland valley rainfed rice farmers in West Africa. All countries received the same training, similar funding, and the same leadership. Although the staff in Ghana were conscientious and gave much training to the farmer beneficiaries, the Mali staff explicitly encouraged farmers to experiment. Farmers in Mali responded to this favourable attitude by experimenting more than those in Ghana, and in qualitatively more interesting ways. Long-term engagement with grassroots organisations may be as conducive to changing public servants' attitudes as the actual participatory approach promoted on the ground.*

***L'attitude compte: travail avec des riziculteurs en Afrique de l'Ouest***
*Un projet international appelé PADS a favorisé l'apprentissage participatif et la recherche-action avec des riziculteurs pratiquant la culture pluviale dans les vallées de l'intérieur des terres en Afrique de l'Ouest. Tous les pays ont reçu la même formation, un financement similaire et le même leadership. Alors que les membres du personnel du Ghana étaient consciencieux et dispensaient une formation considérable aux agriculteurs bénéficiaires, le personnel du Mali encourageait expressément les riziculteurs à faire des expériences. Les riziculteurs du mali ont réagi à cette attitude favorable en faisant plus d'expériences que ceux du Ghana, et ce de manières plus intéressantes sur le plan qualitatif. L'engagement à long terme avec les organisations de la base populaire peut être tout aussi propice à la modification des attitudes des fonctionnaires que l'approche participative même promue sur le terrain.*

***As atitudes contam: Engajamento com produtores de arroz na África Ocidental***
*Um projeto internacional chamado PADS promoveu uma pesquisa sobre aprendizado e ação participativa com produtores de arroz irrigado com água da chuva no interior do vale na África Ocidental. Todos os países receberam o mesmo treinamento, financiamento semelhante e a mesma liderança. Embora os funcionários de Gana estivessem cientes e oferecessem bastante treinamento aos produtores beneficiários, os funcionários de Mali incentivaram explicitamente os produtores a experimentar. Os produtores de Mali responderam a esta atitude favorável experimentando mais do que aqueles de Gana e de maneiras mais interessantes em termos qualitativos. O engajamento de longo prazo com organizações de base pode contribuir para mudar as atitudes dos servidores públicos tanto quanto a abordagem participativa real promovida na base.*



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***La actitud cuenta: el trato personal con campesinos arroceros de África Occidental***
*Un proyecto internacional llamado PADS promovió el aprendizaje participativo y la investigación-acción entre campesinos que cultivaban arroz de secano en los valles centrales de África Occidental. Todos los países participantes recibieron la misma capacitación, un financiamiento similar y las mismas orientaciones. Si bien el personal de Ghana era muy diligente y transmitió muchos conocimientos a los campesinos beneficiarios en capacitaciones, el personal de Malí se centró más explícitamente en animarlos para que experimentaran. Los campesinos de Malí respondieron a esta actitud estimuladora realizando más experimentos y de maneras cualitativamente más interesantes que los campesinos de Ghana. El compromiso de largo plazo con organizaciones de base puede ser tan importante para lograr un cambio en la actitud del servidor público como el método participativo que se promueve en la actualidad sobre el terreno.*

KEY WORDS: Gender and diversity; Labour and livelihoods; Methods; Technology; Sub-Saharan Africa



## Introduction

Since the 1980s, development workers have rediscovered farmer experiments, but the tricky part has always been how to encourage farmers and scientists to collaborate on inventing new technology. For years, the authors and others have assumed that the key was getting the right method, or research protocol. But good attitude may be at least as important.

### *Discovering farmer experiments*

In 1980, soil scientist Hugh Brammer noticed peasant farmers in Bangladesh transplanting wheat. They had taken the idea of transplanting from rice, and extended it to another cereal (Brammer 1980). Anthropologist Alan Johnson also observed farmer experiments in Brazil, and wrote one of the first papers on the subject, but Johnson was ahead of his time, and his paper remained unnoticed for perhaps 15 years (Johnson 1972). However, Paul Richards' books on experimentation among smallholder rice farmers in Sierra Leone were widely read, and showed that traditional farmers do experiment with varieties and cropping systems (Richards 1986).

After Richards, it was no longer enough to simply observe that farmers experiment. Others began to write about ways to encourage farmers and scientists to work together (e.g. Farrington 1988; there are many others which could be cited).

### *The methods evolve*

However, as Bentley (1994) observed, it was difficult for farmers and scientists to work together, because their research styles and agendas were so different. Scientists were quantitative, looking for universal, publishable results. Farmers were qualitative, trying to find innovations that would fit into one specific, existing farm. To paraphrase Paul Richards, farmers were like musicians and scientists were like music critics. And musicians do not always find critics very useful (Richards 1989).

Of the methods proposed for research with farmers, the local agricultural research committee (CIAL) has been one of the most abiding (Ashby *et al.* 2000). It has been used for nearly 20 years now, although mostly in Latin America. The CIAL organises a committee of farmers to test an innovation, and report back to their community about the results. There is a set of manuals to help facilitators lead the CIALs. However, no method for participatory research has become dominant.

One method that has been widely used is the participatory rural appraisal (PRA), originally devised by Robert Chambers, which is really a kind of social research, typically involving outsiders coming to live for a short period in a village, and helping residents draw maps, calendars and charts to explain their lives. For several years the word 'participation' was dreadfully overworked. Then anthropologist David Mosse gave it a new twist. He had worked for ten years as the participation expert on a project in India. Afterwards he wrote about his experiences with refreshing honesty (Mosse 2005). His writings are rich in detail, open to many readings. He had introduced Chambers' ideas of participation into the project, and then he observed that these ideas alone were not always helpful.

Each staff member on a project receives new ideas according to his or her own attitudes; they may think that 'participation' is all well and good, but not nearly as important as growing more wheat, for example. PRA missed an opportunity. It could have evolved into a new method for participatory *agricultural* research; instead it became stuck as a style of social research. Perhaps the PRA's best point was that researchers should spend a week living in a farm village, but unfortunately that was one of the 'babies thrown out with the bathwater'.

In the 1980s IPM (integrated pest management) experts in Indonesia invented the farmer field school (FFS). Like the PRA, the FFS also expressed ideas about empowering farmers, but unlike the PRA, which was social research, the FFS was a way of teaching technical information. It was originally conceived as an extension method.

In 2001 the Africa Rice Center (AfricaRice, ex-WARDA) developed an approach to improve rice cultivation. Through participatory learning and action research (PLAR), facilitators hold weekly sessions with farmers over the course of the rice growing season, and encourage farmers to experiment with new techniques (Defoer *et al.* 2004). The PLAR combined the FFS with Richards' sensitive portrayals of experimenting West African rice farmers. It also has a manual and a lesson plan for facilitators, like the CIAL, although the designers of the PLAR were not explicitly influenced by the CIAL (Marco Wopereis, personal communication). Like the FFS, the PLAR brought on board technical information about rice farming, but for the purpose of experimenting, not for extension. As described by Bentley *et al.* (2010), PLAR was inspired by FFS, but with more emphasis on farmer creativity. PLAR is based on adult learning in groups, making use of the experiences of the group members. The PLAR curriculum contains 28 modules and covers the whole cropping season; activities follow the development of the rice crop. Farmers analyse their own practices, discover problems and seek the solutions to solve them. The curriculum does teach new practices (e.g. transplanting), but the facilitators also encourage farmers to share and reflect on their own experiences, find solutions themselves and experiment with new ideas to find practical techniques adapted to local situations.

Across Africa, the agro-ecological and socio-institutional characters of inland valleys differ greatly within and between countries. As lowlands play an increasingly important role in food security; income generation; and land regulation and sustainable management of natural resources. Research into the mechanisms and outcomes of interventions in different contexts is crucial. This article compares two versions of the same project, in Ghana and Mali, which used PLAR to help farmers improve rice cultivation in the inland valleys (shallow, seasonally flooded valleys).

## Historical context of participatory research in Ghana and Mali

After the collapse of the Training and Visit (T&V) system in the early 1990s, FAO introduced the farmer field school (FFS) approach in West Africa in 1995 in an irrigated rice area in Ghana. The Ghana programme continued to expand, both geographically and into new crops. Later, the FAO started a major FFS programme in 1999 in irrigated rice, in close collaboration with the *Office du Niger* (a government structure in charge of the

irrigation scheme in the Central Delta of the Niger river) (Simpson and Owens 2002). These were the first major attempts by outsiders to improve agricultural service delivery to farmers. At about the same time, researchers were gaining experience working with farmers. Whereas in Ghana this was mostly done through donor-driven projects dealing with varietal selection and sustainable crop protection, in Mali more interventions focused on institutionalising participatory research.

Since the beginning of the 1990s (after the fall of the Moussa Traoré regime), Mali has seen a shift towards democratisation, decentralisation and a transfer of greater responsibilities to civil society, which has led to various forms of local associations. When in 1991 farmers for the first time challenged the authority of the national cotton company (Bingen 1994), the country's major crop, the national institutes quickly understood that farmers were fed up being passive 'takers'. However, Malian researchers were initially still refused formal involvement of the cotton farmers union (SYCOV) on the grounds that, as a political organisation, it was 'inappropriate' to involve it in research. Numerous NGOs and other programmes, such as those managed by the Dutch Royal Tropical Institute (KIT), were more successful in making government institutes listen to farmers (Jim Bingen, personal communication). By 1994, the national research institute (*Institut d'Économie Rurale* [IER]) established Regional and National Users' Commissions, drawing in representatives of farmer organisations, with the help of NGOs (Collion and Rondot 1998). While these formalised researcher-farmer interactions have continued to evolve over the past 15 years, FFS is still mainly portrayed and perceived as an alternative extension model rather than as a platform for collaborative learning and action research.

Those who started FFS in West Africa had hoped that field schools would help to establish more constructive relationships between farmers, extension agents, researchers, and other stakeholders. However, despite the positive changes in farmer-extension relations, vestiges of the former T&V system were still evident. In Ghana and Mali, FFS farmers seemed barely aware of their role in knowledge generation. Programme staff attributed this to the attitude of the extension staff, with their engrained patterns of 'service delivery' behaviour acquired during the previous period of T&V programmes (Simpson and Owens 2002). Changing people's attitudes may take years and whether a project sincerely engages with farmers or not may depend more on the local leadership and staff of the project than on the actual participatory approach being promoted by the project. Next, we describe the PADS project's experiences to promote farmer research in rainfed rice cultivation in West Africa's inland valleys.



## Brief history of the PADS project

The PADS (Participatory Adaptation and Diffusion of Technologies for Rice-Based Systems) project began in 2000 and was funded by the International Fund for Agricultural Development (IFAD). The project was hosted at AfricaRice (ex-WARDA), headquartered in Côte d'Ivoire, with activities there and in The Gambia, Ghana and Guinea. Following 'the crisis' (civil war) in Côte d'Ivoire in 2002, AfricaRice moved their headquarters to Mali (and later to Cotonou, Benin). Mali replaced Côte d'Ivoire as one of the four countries participating in the PADS project.

After the first years' experience in the two sites near its headquarters, AfricaRice organised several two-week training workshops in 2002 for researchers, extension agents and NGOs from Benin, Burkina Faso, Côte d'Ivoire, Guinea, Mali, Togo and Senegal. Two individuals from Mali took the course: Rosaline Maiga Dacko (at the time working for the NGO Jèkasy) and Kalifa Yattara from the national research institute (IER). Course participants then established two PLAR sites in Mali, as well as others in Côte d'Ivoire, Togo, Guinea, and Benin. Work in these sites was funded by the Inland Valley Consortium (IVC), hosted by AfricaRice.

Although the south coast of Ghana is more humid than inland West Africa, most of Ghana and Mali are semi-arid, with a long dry season. In both countries rice is grown in uplands (slightly higher areas in the rolling hills) as well as in inland valleys (*bas-fonds*), seasonally flooded, low-lying areas between the small hills. The two Mali sites were villages in the semi-arid rolling hills of the southwest, Zéguesso and Zamblara, near the city of Sikasso. From 2005–07, activities under PADS continued in Ghana, Mali, The Gambia, and Guinea, focusing entirely on inland valley rice cultivation.

## Project implementation in Ghana and Mali

Both versions of the PADS project had the same coordinator at the international level, based in AfricaRice. Ghana is Anglophone and Mali is Francophone, and local languages vary. The annual review and planning workshops at AfricaRice came with simultaneous translation to facilitate cross-country exchanges of experiences. The projects in Ghana and Mali had the same manual for facilitators (French and English versions, respectively), with a sensitive curriculum for learning with farmers and experimenting with appropriate technology through PLAR (Defoer *et al.* 2004). In each country the project had similar levels of funding and the project beneficiaries were smallholder farmers growing rice in inland valleys (besides other field crops and some livestock).

However, the two versions of the project were different. From the onset, each country was asked to establish a 'multi-stakeholder platform' to manage the project. In Ghana the project was operated through government agencies, while in Mali a consortium of NGOs, farmer organisations and government agencies ran the project (Figure 1). Although AfricaRice usually nominates national agricultural research institutes to coordinate projects, in Mali IER agreed to let the NGO Jèkasy take the lead. Jèkasy, funded by the Swiss Agency for Development and Cooperation (SDC), had been a member of the Inland Valley Consortium (IVC) in Mali from the start and contributed rich experience of institutional strengthening at village level around natural resource management. The decision making on the composition, coordination and communication of the PADS multi-stakeholder platform was a direct spin-off of the proper functioning of the IVC in Mali. For over a decade, IVC itself has been a well-functioning multi-stakeholder platform dealing with management aspects of inland valleys. In Ghana, however, IVC proved less active, had less experience of involving grassroots organisations and suffered from tensions between two competing research institutes, the Savanna Agriculture Research Institute (SARI) in Tamale (in the north) and the Crops Research Institute (CRI) in Kumasi (in the Ashanti region in central Ghana). Although initially, both institutes were

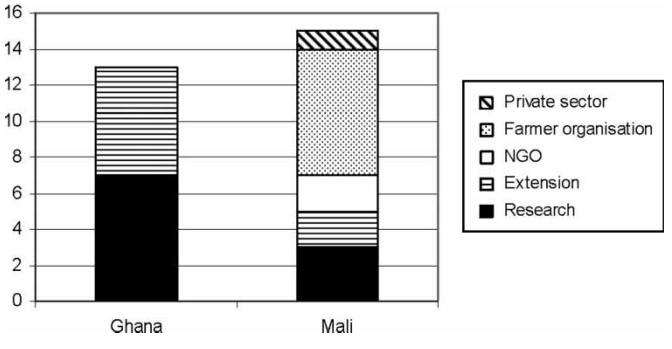


**Figure 1:** Composition of national PADS project management committees

involved in PADS, from 2005 onwards it was coordinated by CRI alone. During a regional project meeting, AfricaRice asked the Ghana team to partner with farmer organisations and NGOs. Despite the promises made, grassroots organisations were never involved in the planning and field activities of the project, likely also because there was a new national coordinator appointed mid-way through the process.

In Ghana, the project coordinator had changed several times and the last one had only led the project for about a year at the close in 2008. He was a sensitive agricultural scientist who understood the importance of farmer experiments, and had tested several of them himself on-station, before joining the project. But one person is not always enough, especially when he joins a project nearing its end. In Mali, the coordinator had been in place since the first days of the project. At the NGO Jèkasy she had worked with rice farmers for several years. Whereas in Ghana only one woman was a member of the national project management committee, Mali had seven women out of the 15 members. One was an extension agent, another worked for a local NGO. The other five women were all rice growers, four of whom were PLAR farmer trainers.



## Organising participatory learning and action research

The difference in project management composition and style was also reflected in the way PLAR sessions were organised on the ground. Although in both countries, sessions were facilitated by two facilitators, in Ghana these were all staff from the national extension system (under the Ministry of Food and Agriculture [MOFA]), whereas in Mali the teams were mixed: one extension agent worked alongside a facilitator from a local NGO or a farmers' association, with leadership being assigned to the most dynamic of the two. This differed from site to site.

Both countries also had a different approach in covering the various PLAR modules (see Tables 1 and 2). The facilitators in Ghana dutifully covered all 28 of the PLAR modules. In Mali, at the two earlier sites, Zéguesso and Zamblara, the facilitators covered all modules, in half-day sessions, giving one per week. The new sites that were added from 2005 onwards usually received only seven or eight modules, especially ones dealing with some new technology.

**Table 1:** PLAR training sessions in Ghana

| Region | Site | Year of training | No. of men | No. of women | Total participants |
|---|---|---|---|---|---|
| Western | Kobina-Anokrom | 2003 | 8 | 2 | 10 |
| Western | Badukrom/ Antseambua | 2005 | 11 | 0 | 11 |
| Western | Ohiamadwen | 2004 | ? | ? | 16 |
| Ashanti | Biemso | 2004 | 22 | 0 | 22 |
| Upper East | Bandema | 2004 | 8 | 15 | 23 |
| Upper East | Sinyangsa | 2004 | 5 | 12 | 17 |
| Upper East | Nanjopiung | 2005 | 13 | 13 | 26 |
| Upper West | Busa | 2004 | 18 | 7 | 25 |
| Upper West | Karni | 2004 | 7 | 18 | 25 |
| **Total** | | | **92** | **67** | **175** |

Participants received all 28 modules

Some villages received only three modules. The staff in Mali actually skipped most of the modules designed to enhance farmers' observation skills or experiments.

Also, the selection of participants differed. Probably inspired by earlier involvement in FFS, the facilitators in Ghana put the official membership of each group at a maximum of 25. Additional members were accepted and recognised as 'observers'. The number of participants per site in Mali was more influenced by the size of the inland valley. Inland valleys are generally larger and flatter as one moves from the humid forest zone (Western Region, Ghana) towards the savannah (Upper East and Upper West, Ghana and Mali). The inland valleys in Mali were larger, with the largest one, Bafaga covering four groups, with nearly 300 farmers (Table 2). Here only three PLAR modules were covered along with early evening public screenings of rice seed health videos.

The Ghana team established farmer groups between 2003 and 2005, mainly for the purpose of the project. They selected farmers who were cultivating the land (Western Region), who had participated in a previous inland valley development project (Ashanti Region), or who were part of water-use associations and involved in dry season gardening (Upper East and Upper West). The team in Mali worked mainly with farmers interested in learning and who were part of existing village groups. This was the case for all the sites apart from Zianso, where a new group was established. In Zéguesso, the only project village where animism is the main religion, various traditional groups were in place (women, youth, hunters and others). Prior to the project, the NGO Jèkasy had started to encourage interaction between these groups to better manage their inland valley in an equitable and sustainable way. They had learnt the hard way that collective action is needed. As Soungalo Dembelé, the president of their inland valley village committee explained:

> *We established rules to allocate land, those who do not maintain his or her land are sanctioned and have to pay a fine of 5000 CFA (USD 10). If it does not improve in the second year, the farmer will lose his or her plot, and the land will be allocated to someone else.*



**Table 2:** PLAR training sessions in Mali

| Region | Site | Intensity of training | No. of men | No. of women | Total participants |
|---|---|---|---|---|---|
| Sikasso | Zéguesso | Received all 28 modules starting in 2002-03, and had refresher training with PADS project since, including seed health videos | 45 | 101 | 146 |
| Sikasso | Zamblara | | 2 | 37 | 39 |
| Sikasso | Zianso | Started during PADS II, about 2005. Received 7-8 modules and seed health videos | 14 | 65 | 79 |
| San | Tafla | | 51 | 18 | 69 |
| Ségou | Mantoura | | 32 | 9 | 41 |
| Sikasso | Leresso | Started late, in 2006, received 3 modules on seed (including videos), seedbed and transplanting | 28 | 4 | 32 |
| Ségou | Somo | | 43 | 15 | 58 |
| San | Djénéna | | 50 | 11 | 61 |
| Sikasso | Bafaga | Started late, in 2007, same as interventions as above | 19 | 278 | 297 |
| **Total** | | | **284** | **538** | **822** |

**Table 3:** Well-being classes in PLAR sites in Ghana

| | Very poor (%) | Poor (%) | Moderate (%) | Rich (%) | Total (n) |
|---|---|---|---|---|---|
| People in PLAR sites | 19.1 | 43.6 | 33.7 | 3.7 | 629 |
| PLAR participants | 8.0 | 55.4 | 32.6 | 4.0 | 175 |
| PLAR farmer trainers | 0.0 | 38.9 | 44.4 | 16.7 | 18 |

> *All farmers now take good care in keeping their fields clean. Because of this, rice production has increased in the village. After we established the rules, many improved their cultivation practices. Everyone knows that when a plot is not well kept, it will not give the same yield as a clean field . . . and no-one wants to stay behind.*

In both countries, PLAR facilitators and farmers assessed the well-being status of their respective communities, the PLAR group members and farmer trainers (Tables 3 and 4). Most participants were poor to moderately well off. PLAR farmer trainers were selected by the farmers themselves. Although Ghana had a longer experience with PLAR, the government extension agents were less active in selecting and training farmer trainers than the Mali team, where local NGOs were working alongside the extension agents.

Groups also evolved over time. For instance, in Zamblara, Mali, from an original group of 27 people, the association has grown and now is formed of four groups of 115 women and two men. In Mali most women's groups have at least some men in them. In this one, the village chief is the honorary president and another man attends to monitor the women's activities. They all feel that the group has helped improve relations between men and women. The group gives the women a place where they can talk about their problems with men, and give each other advice. In the group women develop self confidence and are more outspoken in village meetings, participating more actively in them, and contributing when decisions are made. The village men now accept the womens' association, and are willing to leave them land to grow a crop. The PLAR groups that were formed in Zamblara each had a farmer-facilitator, a woman selected by other members of the association. Although the PLAR modules were written in French, they have been (verbally) translated into the local language, Bambara. The women have adapted the content, composing songs and poems about the rice-farming modules (Wanvoeke *et al.* 2008).



## Changing attitudes towards gendered local knowledge through video

When Van Mele took over as project coordinator in 2005, he realised that the project staff could benefit from a more positive attitude towards farmer knowledge and local innovations, and that gender aspects of the project needed more attention. He proposed enriching the curriculum with

**Table 4:** Well-being classes in PLAR sites in Mali

| | Very poor (%) | Poor (%) | Moderate (%) | Rich (%) | Total (n) |
|---|---|---|---|---|---|
| People in PLAR sites | 7.9 | 33.4 | 44.1 | 14.6 | 859 |
| PLAR participants | 6.9 | 33.8 | 42.0 | 17.3 | 393 |
| PLAR farmer trainers | 2.3 | 23.3 | 58.1 | 16.3 | 34 |

information about on-farm seed conservation (the often neglected period between harvest and planting), which traditionally is a women's domain. He had just worked on a project in Bangladesh where farmers and scientists had collaborated on developing appropriate seed technology, which the rural women later explained in their own words, on video.

Van Mele suggested dubbing the videos into African languages. Some AfricaRice colleagues were initially sceptical, because of the obvious differences between South Asia and West Africa. But after having tested them in two sites and having received positive feedback from rural women, the national PADS staff decided to translate the Bangladeshi rice seed health videos into Bambara, a major language in Mali. The Malian farmers responded warmly to the videos, and downplayed obvious cultural differences (e.g. in dress), while noticing similarities of smallholder rice farming on both continents (e.g. some farmers in Mali and Bangladesh save seed in ceramic pots) (Van Mele *et al.* 2010). The national project team then showed the videos at all of the project sites, as well as in various other villages, and shared them with many organisations and farmer associations.

In Ghana, there are more local languages, and the staff translated the videos into four of them. For this and other reasons the videos were just being finished as the project ended. Most villagers in Ghana had not seen them by the end of the project.



## Project staff document local knowledge and innovations

Project staff in Ghana and Mali had received the same training on PLAR and on identifying and appreciating local knowledge and innovations. As in Ghana, the staff in Mali organised a contest in 2006, with cash prizes for the best farmer innovations, an initiative taken by AfricaRice. Submitted stories were collated and sent to three independent evaluators (one from Prolinnova, one anthropologist and one sociologist, all with considerable experience of local innovations).

Although project staff in both countries were equally motivated when they started the contest, none of them were quick to send in 'their stories' (short written descriptions of the innovations) to the international project coordinator at AfricaRice. Ghana reported nine original practices, one of which described an innovation by a woman farmer, whereas the Mali team eventually reported 17 examples of creative solutions, of which four were from women dealing with seed management (see Table 5). The Mali team had shown the Bangladeshi videos, in the project villages which probably contributed to project staff and village women being more engaged in the exercise, especially for seed topics.

In Ghana there was little follow-up to the 2006 farmer innovation contest, and by 2008 most staff had forgotten it. In Mali the staff recalled the contest easily, because the prizes for farmer innovations were given at a meeting of the PADS multi-stakeholder platform. The farmers explained the innovations before a large audience of farmers and researchers, many of whom were pleasantly surprised at the originality of the farmer experiments. This event helped project partners in Mali to remember the farmer innovations and they continued being receptive to creative farmer practices. Some of the innovations were magical rather than scientific, but project staff nevertheless documented them. For instance, some farmers in Zianso deposit bits of hair of blind people in the four corners of their rice field, saying that when birds

**Table 5:** Types of local innovations documented by project staff (2006)

| Country | Seed management | Pest control | Termite control | Cropping systems |
|---|---|---|---|---|
| Ghana | - | 2 | 5 | 2 |
| Mali | 7 | 4 | 2 | 4 |

arrive they lose their direction. When people use magic in agriculture they may be expressing anxiety about something over which they feel they have insufficient control (see Malinowski 1948). Documenting these practices is a first step to finding a technical solution. As this example shows, birds are a serious problem in tropical agriculture, and they demand much more attention from research than they now receive.

## Validation of local innovations

Differences in attitude between the Ghana and Mali team are also reflected in the mechanisms they used to validate promising local practices. Whereas in Ghana there was little or no follow up to the contest, the team in Mali introduced some of the local practices to other PADS villages where interested farmers decided to test them. For instance, 15 farmers in two villages tested powder made from a plant (*Hyptis spicigera*) to preserve seeds and harvested rice. Additional experiments were conducted in other villages as shown in Table 6.

The late Djeli Karia Koîta, who was in charge of storing communal seeds in Djénéna village in Mali, had much experience in seed conservation. After sun-drying the seed, she took some of the fine earth from beneath a mortar at a grinding area. This earth was carefully sifted to remove all small stones, short sticks and other debris. The powdered earth makes it physically unable for storage insects to push their way through and expells air from the storage container, as such suffocating any insect present. It is a clever, traditional practice observed in other African and Asian countries to control storage pests. When PLAR facilitators shared this knowledge during one of their sessions, four women decided to test it. The powdered earth probably has the same effect as diatomaceous earth (a naturally occurring, soft, chalk-like sedimentary rock that is easily crumbled into a very fine powder), which is used in pest management. As the fine powder absorbs lipids from the waxy outer layer of insects' exoskeletons, this causes them to dehydrate. Another local practice with the wild grape or *m'pékou* plant (*Lannea microcarpa*) raised interest among PLAR farmers in four villages. The peel is removed, pounded and dried in the sun. The dried powder is sieved and mixed with seed for storage in a firmly closed container. Many of the entries to the contest dealt with seed conservation, a task entirely undertaken by women. Seed conservation is a kind of 'hidden technology' ignored by village men and by formal agricultural R&D. The Bangladeshi videos helped bring this subject into the open.

PADS also mobilised scientists at IER to conduct systematic trials to control *diga* or wild rice (*Oryza longistaminata*), based on the farmer innovation that won the contest. The effect of different salt concentrations (applied as spot applications) to kill wild rice rhizomes needs further testing to validate this cheap solution that may help to control a noxious weed in inland valleys. On the other hand, even if salt does help control wild rice, it may damage the soil, and so should not be encouraged.

**Table 6:** Experiments facilitated by PADS team in Mali for control of termites[(1)] and rice storage pests[(2)]

| **Type of treatment** | **Kitchen salt[(1)]** | **Powder from the dried plant *Hyptis spicigera*[(2)]** | **Powdered earth collected beneath the mortar[(2)]** | **Bark of the *Lannea microcarpa* plant[(2)]** |
|---|---|---|---|---|
| Villages | 3 | 2 | 1 | 4 |
| No. of farmers | 27 | 15 | 4 | 32 |

## Farmers' response to new rice technologies

Throughout the project, the national project teams held regular PLAR sessions in several sites. In Mali, PADS taught farmers various technologies. The PLAR modules covered: transplanting in lines, application of mineral and organic fertilisers, and enhanced knowledge of insect pest ecology, among other topics. The videos showed four techniques of seed management: seed sorting, seed flotation, seed drying and conservation, all of which are important to smallholder farmers across the developing world (Van Mele 2006).

The farmers liked mineral fertiliser, and some farmers in all the villages said that occasionally they could afford it. Some of the rice-farming households in Mali also grow cotton, supported by a government agency which gives formal credit for cotton. The credit includes loans in fertiliser. Some rice farmers admitted that they exaggerated their cotton acreage to get extra fertiliser to apply on their rice. Overall, there was more use of fertiliser in Mali than in Ghana.



## Experiments

In Ghana, farmers experimented less with new ideas than those in Mali (see Table 7). Farmers in Ghana tended to do simpler, adaptive experiments. For example, rather than applying animal manure across the field, farmers in Bandema, Upper East, Ghana, applied it to patches in the field where the soil had a crusty white surface. Farmers noticed that rice would not grow in white soil, but manure improved it. They adapted what they had learnt from PLAR to their own knowledge of soils. Of course adaptive experiments are still useful, and creative. Related changes on soil fertility management triggered by improved farmers' knowledge had equally been observed in Kenya (Ramisch *et al.* 2006).

In both Ghana and Mali, when labour shortage was a constraint, farmers modified the project idea of transplanting in lines using a string. Instead, they often planted rice much faster, saving on labour, by transplanting the seedlings uniformly, at an equal distance but not in lines.

Experiments by farmers in Mali tended to be more original than those in Ghana. For example, in Zianso, Mali, local farmer Cissé Dramane invented a wooden stick to guide him so he could transplant rice in straight lines. The stick was just over two meters long, with a branch at one end, like a handle on a walking cane. The little branch at the end helped Mr. Dramane get the distance right between furrows. The main part of the stick had nails pounded in it, 20cm apart, to mark the distance between rice hills. The planter places the stick on the ground and transplants a hill of rice at each nail, then moves the stick backwards and plants another set of seven hills of rice. He invented this in 2005, has used it ever since, and other farmers are starting to show interest in making copies of the stick. This invention is indicative of the pressure on labour: whereas in Asia rice transplanting is often done in groups, poorer African farmers are often constrained to mobilise a labour force at crucial times. PLAR farmers in Madagascar invented a similar stick, called *fomby*, to guide one-person transplanting (Toon Defoer, personal communication).

In Zéguesso, one of the first two PLAR villages, farmers showed the authors how they use their feet as a guide while transplanting, in order to keep the rice (more or less) in lines (see Table 8).

In Mali, farmers and facilitators did trials of new rice varieties in some villages (e.g. Zianso, Tafla and Mantoura). Apart from comparative trials, many experiments were based on trial and error. To reduce bird damage the president of the group in Zianso modified the planting date of his Nerica (New Rice for Africa, a range of inter-specific varieties developed by AfricaRice and its partners) to ripen slightly after his adjacent maize field. He installed old fishing nets between

**Table 7:** A selection of farmer innovations in Ghana (2008)*

| Location | Innovation | Discussion |
|---|---|---|
| Biemso No. 1, Ashanti Region and elsewhere | Transplant seedlings at two weeks | When farmers started transplanting at three weeks, by the time they finished the plants were four weeks old, and too big to transplant |
| All three sites in Western Region | Transplant uniformly, not in lines | Farmers can plant rice much faster, saving on labour, if they plant the seedlings uniformly, at an equal distance and not in lines |
| Kami, Upper West | Direct seeding with hoes instead of dibble | Farmers already had the hoes, knew how to use them. They could easily dig a hole with one hand and flick seed in from a bowl held in their other hand |
| | Refilling bare spots. Farmers wait for the rice to germinate, then return and pluck plants from hills with too many, transplanting them to places where seed did not sprout | Increases yields (probably based on an earlier farmer practice of filling in bare spots following broadcasting of seed) |
| | Piling cut weeds in small mounds in the field, covered with soil, as compost | Saves much labour for digging and hauling |
| Bandema, Upper East | Animal manure applied to patches in the field where the soil had a crusty white surface | Farmers noticed that rice would not grow in white soil, but manure improved it (and they did not have enough manure for the whole field) |

Modified from Bentley et al. (2010)



the two fields. When the birds moved from the maize onto his Nerica field they became trapped in the nets. The farmer combined this with scarecrows and also relied on his children hitting empty cans when the flocks arrive.

The farmers in Zamblara, Mali (almost all women) organised a trial to compare manure versus mineral fertiliser versus a blend (manure plus mineral fertiliser). As a result they now favour compost mixed with small amounts of urea and rock phosphate. While manure will not solve all soil fertility problems, it is affordable, accessible and an increasingly important part of soil management in West Africa.

In another invention, when the farmers in Zamblara learned about insect ecology (from the project) they realised that rice stemborers hatch from eggs laid by moths. They observed the moths in weedy plants at the edges of their field, and started weeding these field edges to control stemborers by eliminating the habitat of the adults.

Farmers in Zéguesso, Mali, learned from the Bangladeshi seed health videos that neem and other plants can help to conserve rice seed. So the people of Zéguesso began experimenting by adding local plants and ash to their stored rice seed. In scientific trials in other African countries ash proved to kill weevils in stored sorghum and maize.

The older PADS villages apparently had more innovations than those which had less contact. This is probably the result of three things: (1) villages with more contact had more time to experiment with new ideas; (2) more contact stimulated more innovations; and (3) the more contact villagers had with receptive project staff, the more they realised that the staff wanted to hear about their innovations.

**Table 8:** A selection of farmer innovations in Mali (2008)

| Location | Innovation | Discussion |
|---|---|---|
| Zamblara, Sikasso | Botanical insecticide made from neem, or from a local plant (*soso gèna*). A powder is mixed with water and applied to the rice plant with a whisk | The farmers already knew that *soso gèna* ('fly chaser') repelled insects. Applying the idea to rice was an innovation |
| | Homemade insecticide, brewed from powdered laundry detergent and kerosene, mixed together and cooked on a fire. Later applied to rice plant with a whisk | The authors could not verify the efficacy of this invention, and homemade chemicals are arguably no better than bought ones. This one may also be dangerous to make, but is original |
| | Cutting weeds around field edges to prevent stemborers in rice | Farmers learned about insect ecology in the course and then invented this technique after observing adult moths in the weeds. It is highly creative |
| | Transplanting, but not in lines | Adaptation of project innovation (transplanting in lines). Not planting in lines saves labour, which is crucial |
| | In a simple trial, compared chemical fertiliser with manure and with a mix of both | The farmers now favour manure mixed with rock phosphate and urea (when they can afford it) |
| Zéguesso, Koutiala | Apply dried plants, e.g. *dapa* (*Hyptis spicigera)* to bags of stored rice | Local invention, now used by various farmers in this village |
| | Apply cooled wood ash from the kitchen stove to bags of stored rice | Ash is non-toxic, and available locally at no cost |
| | Using one's feet as a guide to plant in lines | The lines are not perfectly straight, but farmers say the method is quick enough that they use it |
| | 2007 was a dry year, and farmers dug small canals on the valley bottom to distribute scarce water | A sensible, local innovation. Shows group solidarity |
| Zianso, Sikasso | Homemade insecticide, neem mixed with laundry detergent | Authors did not verify efficacy of this |
| | *Maio turu yiri* (rice planting stick) described above | An original guide which helps to save time while transplanting in lines |
| Tafia, San | Laundry detergent to control insects | |
| | Local earthen granaries, used to save seed | Not highly original, but is low cost and may keep insects out of stored seed |
| Mantoura, San | Compared broadcasting of rice seed with dibbling and transplanting | Transplanting had highest yields. Adaptive trial, not highly original |
| | Tried to multiply high-yielding seed (Nerica) in small trials | Lost the seed to drought but are still interested in acquiring more |
| Leresso, Sikasso | Transplant in lines, but according to intuition | Farmers understood the benefits of transplanting, but could not afford the time to set out straight lines |
| | Powder of dried neem or *Andropogon* grass mixed with rice seed | Citronella oil is known to repel insects, now applied to their rice seed |
| Bafaga, Bougouni | No farmer innovations documented | Farmers planned to apply what they learnt in 2008 season |

## Attitudes

There was one important difference in attitude between Ghana and Mali. In Ghana the staff thought of PLAR as an extension method for teaching rice technologies to farmers; in Mali the staff understood that PLAR was an approach for mutual learning and that it was meant to develop and test technical and institutional innovations with farmers. In Ghana the staff prompted farmers to say they had adopted project recommendations without change. In Mali the project staff were proud of farmer innovations and asked farmers to describe them to the project evaluators.

In the broader institutional context, while Ghana has many research institutes, Mali has only one. Since the mid-1990s the government of Mali has sought large-scale decentralisation, and encouraged women to hold political office (Wing 2008). This is reflected in increasingly decentralised, locally-prioritised agricultural research. The favourable mentality in Mali has been nurtured by the political will to decentralise power, along with long-term external interventions focusing on institutionalising researcher-farmer linkages. Even market reform has been seen as an ongoing process whereby learning-by-doing has been considered more important than doctrinaire approaches (Dembélé and Staatz 2000).

The Mali PADS coordinator, Maiga Dacko, continuously cultivated an appreciative attitude towards farmer innovation among all project partners. The training and then the contest on local innovations led everyone, especially the scientists, to reflect on the social context of farm technologies. She also regularly reminded project staff of the importance of working with women. Although women's role in African agriculture is generally accepted by development practitioners, donors and government agencies may need occasional reminders (Thomas-Slayter and Sodikoff 2001). The PADS leadership in Mali was stable, included women, NGOs, farmers and just one research agency. The Mali project had a more inclusive attitude than the Ghana one, where the leadership had a high turnover, was mostly male, and included government representatives and several competing research agencies. The next challenge is to ensure that new institutional arrangements promote local innovations as part of normal research and extension (van Huis *et al.* 2007) and this will require long-term engagement with grassroots organisations. Examples of self-sustaining multi-stakeholder platforms in developing countries are scarce. Apart from the IVC in Mali, the Northwest focal area forum in Bangladesh is another good example. It was established during the life of a project (PETRRA), subsequently endorsed by the government in 2004 and continues to influence the attitudes of formal research and development agencies (Van Mele *et al.* 2005, Salahuddin *et al*. 2008).



## Discussion

The PLAR approach reflects a sophisticated understanding of farmer experiments, clearly stated in its manual (Defoer *et al.* 2004). At most of the sites in Ghana, extensionists taught all 28 modules systematically. In Mali, most villages received only a few of the modules, usually the more technical ones, not the ones ostensibly designed to stimulate observation or experiments. Yet the mixed teams of extension and local NGO staff in Mali valued farmer experiments more and the farmers in Mali did more original experiments, while the farmers in Ghana did more adaptive experiments – much more modest adaptations of the technologies, which the staff barely noticed.

The project staff in Mali valued farmer innovations and farmers in Mali were pleased to discuss them. This encouragement was important. An appreciative attitude motivates people to speak out. In Mali there were more farmer experiments and they were qualitatively more unique (i.e. more creative) than the ones in Ghana. However, most experiments were documented in Zéguesso and Zamblara, the first two project sites in Mali, the ones with the most contact

with facilitators and the ones which did receive all 28 of the PLAR modules. This suggests that more information and interaction does actually help people to be more creative. Well-designed projects offer an environment for people to experiment, whether it is with new techniques, methods or novel organisational styles.

## Conclusions

PLAR did stimulate farmers to experiment with new ideas and technologies, especially when the facilitators themselves valued these local experiments. It is little surprise that a positive attitude towards farmers' knowledge and practices helped to nurture mutual learning. The authors were puzzled that some staff could go through the entire PLAR manual without gaining a respect for farmer experiments. As David Mosse has also observed, project staff bring their own baggage on board, and project policy may only have a slight effect on staff thinking. We found that the project staff in Mali were simply more open to the idea that smallholder farmers are thoughtful people who will create new ideas worth noticing. In Ghana the staff were certainly well intentioned, competent and equally idealistic in their own way (e.g. committed to poverty alleviation, higher rice yields and modern technology), yet there was a less favourable attitude towards farmer experiments, and that made a difference. While a positive attitude towards farmer creativity may have more to do with broader attitudes in society than in project policy, multi-stakeholder platforms (that include women, NGOs, and farmers) and promote a long-term engagement with grassroots organisations may be as conducive to changing public servants' attitudes as the actual participatory research or development approach promoted on the ground.



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