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Indigenous Knowledge

Enhancing its Contribution to Natural
Resources Management

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7 Seeds of the Devil Weed: Local Knowledge and Learning from Videos in Mali

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Since 2006, the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and partners have conducted farmer field schools (FFS) to experiment with options to control striga, a weed so difficult that some call it the 'devil weed'. As a result, practical and profitable integrated striga and soil fertility management practices have been developed for pearl millet and sorghum. The farmer field school experiences provided the key building stones for a number of videos related to ISSFM. In 2011, ICRISAT approached Agro-Insight to have their staff and their partners in Niger, Nigeria, Ghana and Mali trained in the production of farmer-to-farmer training videos. When the teams went back to the farmer field schools to film the videos, and the farmers began talking about how they managed striga, ICRISAT realized how much the farmers had learned in the FFS.

The ten 'Fighting Striga' videos comprise a set that gives the background biology and ecology to help the farmers understand how control options work and also gives them clues to adapt those options to their local circumstances. The videos use an animation (a technical cartoon) to show how striga seeds germinate and attach themselves to the roots of a cereal crop (or die, if germination is stimulated by a legume, cotton or tobacco crop).

In 2012, the series of farmer training videos was translated into French, English and six

major West African languages (Bambara, Bomu, Hausa, Mooré, Peulh and Zarma). In 2013, the videos became more widely known and popular. The 8–12-minute videos were put on to a single DVD under the title 'Fighting Striga'. On the opening page, people could select any of the eight languages. The videos could be watched in any order and each one was standalone. An overview and short description of each video is given in [Box 7.1](#). To make sure the videos got into the hands of service providers and farmers, in Mali ICRISAT distributed some 10,000 copies of the 'Fighting Striga' DVDs to many organizations and individuals.

With the involvement of 173 extension agents, more than 12,000 farmers watched the 'Fighting Striga' videos through public screenings ([Table 7.1](#)). Some of the 13 villages visited in 2014 had FFS and the videos; others had only watched the videos. Most of the villages saw the videos in 2012, soon after they were released, except for two villages that saw them later.

Farmers Learn from Videos

From 10–21 November 2013, we visited 11 groups of farmers in ten villages in three regions in Mali: Sikasso, Koulikoro and Ségou to learn

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Box 7.1. Description of the ten farmer-to-farmer training videos under the 'Fighting Striga' series.

1. Striga biology

How the weed develops from tiny seeds, not from the roots, as many people think. Striga is a true parasite which attaches itself to the host's root, then remains hidden underground for weeks, so it is the last weed to emerge, and escapes the early season weeding.

<http://www.accessagriculture.org/node/241/en>

2. Integrated approach against striga

Fertilize the soil with composted manure, because striga damage is worse in poor soils. Add small doses of mineral fertilizer to the base of the plants and intercrop with legumes which kill striga. Hand pull remaining striga plants before they bear seed.

<http://www.accessagriculture.org/node/243/en>

3. Succeed with seeds

How to test crop varieties to find the ones that are the most resistant to striga and adapted to farmers' real conditions.

<http://www.accessagriculture.org/node/245/en>

4. Composting to beat striga

Tips on making compost from manure and crop residues, especially in an arid climate.

<http://www.accessagriculture.org/node/247/en>

5. Micro-dosing

Less is more; apply smaller amounts of fertilizer to the base of the plant, instead of spreading it over the whole field. This improves yields and saves money.

<http://www.accessagriculture.org/node/249/en>

6. Animals and trees for a better crop

Livestock can eat the leaves and seed pods of some trees, leaving manure to fertilize crops, especially if farmers establish friendly relationships with herders.

<http://www.accessagriculture.org/node/251/en>

7. Storing cowpea seed

Simple ways to keep insect pests out and keep cowpea seed healthy and viable, so the household has enough seed to intercrop cowpea with cereals.

<http://www.accessagriculture.org/node/253/en>

8. Grow row by row

Cowpeas and other legumes are trap crops which stimulate striga to germinate, but not to attach to the host's roots. Intercropping and rotating with legumes kills the striga seed in the soil.

<http://www.accessagriculture.org/node/255/en>

9. Joining hands against striga

Weeding is pretty boring and tedious work, but farmers can beat the drudgery by working together.

<http://www.accessagriculture.org/node/258/en>

10. Let's talk money

A brief view of costs and benefits under farmer practice and integrated striga and soil fertility management. Managing striga costs more, but the bigger yields are worth it.

<http://www.accessagriculture.org/node/260/en>

about technical innovations and agricultural experiments farmers had undertaken after watching the training videos. We used a simple questionnaire and did follow-up phone interviews in some cases. These interviews were designed to build on quantitative data which ICRISAT is collecting. In 2014 we interviewed farmers in 13 villages (mixed groups of women and men) about social innovations they had tried after watching the videos.

Some technical innovations can be adopted by individuals; for example, a single person, working

alone, can change the sowing density of the peas, without worrying about what the neighbours are doing. Other technical innovations are obligatorily social. For example, adopting the cell phone in isolation makes little sense; the experience is greatly enhanced if one's friends and contacts also get phones and exchange numbers.

In this study we wanted to see what sorts of social innovations the villagers were trying in order to facilitate technical innovations; for example, women in Benin joined together in groups to parboil rice (Zossou *et al.*, 2010). We were also

Table 7.1. Screenings of ‘Fighting Striga’ videos in Mali, 2013 (table compiled by the authors with data provided by ICRISAT).

Number of village screenings	Men	Women	Children	Audience size
156	5309	3423	3490	12,241

looking for socio-structural change not neatly related to technology (new savings and loan groups might qualify as an example). Watching videos is an example of didactic learning, which allows farmers to incorporate outside ideas into local knowledge (Stone, 2016).

The seed growers (village of Siby)

In Siby we met a few men from a seed producers’ group CooproSem (Coopérative pour la Promotion de la Filière Semence de Mandé). Cooprosem was started in Siby in 2006 with nine farmers who had previously helped Icrisat with participatory selection of sorghum varieties (for Striga resistance and other traits). Later the farmers asked Icrisat for seeds from the selected varieties, but were told that Icrisat only had foundation seed (i.e. used to produce certified seed). So the farmers organized the cooperative to produce certified sorghum seed, by planting foundation seed from Icrisat. By 2009 CooproSem was producing certified sorghum seed on five ha, and selling it to seed companies, projects and other farmers (Dalohoun et al., 2011). This example shows that contact with research organisations can lead smallholders to make institutional innovations. As we will see later in this chapter, videos can also induce social innovations. The group recalled the content and how the part about striga biology impressed them, to know how the seeds spread and that animals could even be a vector for the striga seeds. They had also innovated. One farmer described a kind of intercropping he had innovated. He put two cowpea seeds and three or four sorghum seeds in one hole. In the next he only put sorghum. The cowpea covered the soil, and he put small doses of nitrogen fertilizer into the soil. They also waited until the ground was soft to hand pull the striga, so as not to break it off at the roots, a technique shown in the ‘Joining hands against striga’ video. One farmer also covered the crop

deeper at the time of ridging, to keep the striga from coming back up.

Innovating with seed storage (village of Sanambelé)

In Sanambelé, Karim Coulibaly (a mature man), Maimouna Coulibaly (peanut farmer and information secretary for a woman’s group) and Souleyman Sacko (youth) had adopted some ideas, mainly the use of chilli and native plants to store cowpea seed. Karim used a plant called *benefi* which he saw on the video. After threshing the cowpea, he winnowed the seed and put it in the granary with the *benefi*, one layer at a time. Maimouna used chilli powder to conserve her groundnut seeds. She put in layers of chilli in the groundnut seed, as shown in the cowpea seed storage video, and the insects did not attack. She also used the leaves of the chilli plant, which is an innovation not shown on the video.

Cropping patterns (village of Yorobougoula)

The village had a farmer-trainer from the NGO Mobiom, Bakary Diallo, who showed the videos in the village. The farmers recalled a lot, such as how the video showed working together as a community to control striga. The people put many ideas into practice. For example, Bakary Diallo started making compost out of manure after watching the video, but he made it on top of the ground, instead of in a pit. This innovation saved him the work of digging a pit. He had tried micro-doses of fertilizer in sorghum, as discussed in the video, but also in cotton, which was his own innovation. Sira Diakité, a farmer and small-scale merchant, tried intercropping cowpea with sorghum, but she put in three lines of cowpea for each one of sorghum, because she wanted more fodder for her animals. People adapted the ideas for their own needs, specifically the intercropping

technique. Fanta Diallo remembered inter-planting sorghum and millet with groundnut and cowpea, which is a good point, since the video only mentions groundnut in passing, while stressing cowpea, so she was paying attention. She had experimented with a new way of intercropping millet with cowpea, and sorghum with cowpea, and had seen that the cowpea kept the soil humid. Intercropping allowed her to earn more, because besides her cereal harvest, she got the cowpea crop residues to feed to her livestock. She also remembered the integration of livestock and agriculture. They had practised that for a long time here, but now people understood that the two really were compatible and people were improving their arrangements between pastoralists and farmers. Now farmers had more crop residues and so they could give some to people who had animals.

Video and Farmer Field School

Representatives from FFS groups in Makandiana, near Siby, said that:

- the videos allowed them to see how the striga seeds spread, which can be in an animal's dung, making livestock a vector for striga; and
- before, they used to leave striga in the field after weeding it, but now they see that it is necessary to take it out of the field and burn it.

When we asked what they wanted for future videos, local farmer Bamory Camara had invented a new way of intercropping sorghum and cowpea, by planting the cowpea 15 days after the sorghum. He said he wanted to make one on the intercropping style he had invented. That shows a lot of self-confidence and that they know that the farmers in the videos are real, not a sham.

In Gnamana village near San, the FFS farmer-facilitators sat waiting in the shade of a millet storage platform. They were dignified elder men who all had a notebook or a sheaf of papers. They had led an intensive cluster of five FFS for their neighbours. The first year was a conventional FFS on integrated striga management, sponsored by International NGO World Vision and supported technically by ICRISAT. By the second year they had received the striga videos and showed them all.

In Gnamana village, a farmer called Mama Fabe said that he had not realized that striga came from seeds until he saw the videos. Not to have noticed this key bit of bio-ecological background was quite an admission for a person who had already received training and then led an FFS on striga, but not everything can be observed with the naked eye in a field of sorghum. Scientists have the time and use the tools to observe these difficult-to-observe truths. Striga seeds are so small that they look like powder. They easily escape notice. Through the videos, scientists can explain this fact to a large audience.

The videos had also helped the expert farmers, because they all did experiments. In Gnamana village, one farmer named Bouba Tangara tried micro-doses of 6 g of mineral fertilizer per millet hill. He measured the 6 g by taking three pinches with three fingers. Another farmer called Mama Fabe intercropped two lines of millet with three of cowpea, leaving no space for striga and obtaining a good production. He also intercropped his maize with cowpea. Local farmer Brama Tangara mixed urea and mineral fertilizer in a micro-dose with cowpea seed. At only 7 kg per 0.25 ha, he was surprised at how much the yield improved. He mixed the seed with the fertilizer in a small container and planted them together.

Gnagalé Camara, the leader of a women's group called Gneléni (which means 'light'), watched all ten videos at home, twice, by borrowing her brother's laptop. She used a lot of hand pulling, and she had innovated by using a short-handled hoe in her right hand to get under the roots, as she plucked up the plant with her left hand. It is a clever adaptation not shown on the videos. This would help in developing future videos.

Table 7.2 summarizes farmer experiments with new ideas, after watching the videos.

Institutional Change in Villages

Several of the villages had groups of women and youths that did wage labour, and they added hand pulling of striga to the roster of services they offer. Table 7.3 gives a list of institutional changes. The cooperatives in the village of Sirakélé added hand pulling of striga as a reciprocal service between members. Someone reports striga and the others go to the field to help pull up the weeds, which is a kind of early-warning striga control. In the village

Table 7.2. Farmer experiments after watching 'Fighting Striga' videos.

Village and farmer group	Compost	Micro-dosing	Hand pulling	Intercropping	Storing cowpea seed	Varietal testing
Siby Seed producers, Cooprosema	Making good compost in a pile on top of the ground		After hand pulling place soil over the base of crop to keep striga plants from emerging	Several sorghum with cowpea mixes, with nitrogen. Maize with cowpea and with groundnut		
Siby Gneléné women's group			Lots of hand pulling. Uses hoe to avoid breaking striga			
Makanjana Representatives from several FFS ^(a)	Making compost, but applying it to tomatoes			Experiments with sorghum with cowpea		
Sanambelé Villagers (not organized)					Stored cowpea seed with repellent plant. Mixed chilli powder with groundnut seed in storage to discourage insects	
Yorobougoula Some people linked to Mobiom and other neighbours	Making compost pit. Also making compost on top of the ground	Micro-doses of organic fertilizer on sorghum and cotton		Experiments with millet and sorghum with cowpea		
Nampossela FFS ^a group (they learned these ideas in the FFS; only one of them saw the video)	Good compost controlled striga and raised yields. Less striga germinates		Many use hand pulling and it does control striga	Cowpea with sorghum and with maize lowered the germination of striga	Triple sack to store cowpea seed	

Continued

Table 7.2. Continued.

Village and farmer group	Compost	Micro-dosing	Hand pulling	Intercropping	Storing cowpea seed	Varietal testing
Sirakelé Women's group and other groups	Four people have made compost pits	Micro-doses of compost	The community organizes to hand pull striga		Double sack	
Yorosso Ben Kadi	Good compost stops striga from germinating	Micro-doses of compost	Hand pulling striga			
Souara Farmers who helped make video on compost	Many make compost pits. They know compost helps control striga		The village does hand pulling	Sorghum with cowpea and with groundnut		
Gnamana FFS ^a farmer facilitators	They learned about compost in the video	Micro-dose of mineral fertilizer and urea		Millet with cowpea prevents striga from growing		
Wakoro People from two FFS ^a and some variety testers	Several made compost, but because of a lack of water some made it once instead of twice during the year	Micro-dose of urea, and planting seed closer together. Micro-dose of mineral fertilizer mixed with seed	Uses hand pulling with micro-dose	Sorghum with cowpea		Testing new sorghum varieties. Watched video to help select seed. In an FFS ^a they chose six varieties. After the film they selected varieties based on yield, resistance to striga and ease of drying

^(a)FFS, farmer field school

Table 7.3. Institutional change in the villages after watching the videos.

Region and village	Change	Notes
Mopti		
Promani	Strengthened groups	They formed groups during the FFS ^(a) , with AKF ^(b) , but after watching the videos they made special women's groups; 20 new men and 25 additional women joined the groups. These changes were probably stimulated by AKF
Madiama	Strengthened groups	After the videos their groups were strengthened and they started a large cooperative. Probably due more to the organizational efforts of AKF ^(b) than to watching the videos. Women's group tends a collective field using striga control and puts the money from the harvest in their <i>caisse</i>
Kouna	Video committee	After the first screening, village leaders organized a video committee, which played the videos every night for 2 weeks, and took them to outlying hamlets, so that everyone saw the videos
Torokoro Orgnon	None Women's savings and loan	They claim to have started small groups for women after the videos. The women claim that they organized a savings and loan group as a result of watching the video. The president of the women's association recalled the video 'Let's Talk Money' and claimed that it helped them
Ségou		
Dobo	Hand pulling striga (from FFS)	The groups already existed. Some were organized spontaneously and some with outside help. After the videos, each one also organized to hand pull striga, which is now institutionalized in the village, but the villagers attribute it more to the FFS ^(a) than to the videos
Hasso	Hand pulling striga and compost	The groups already existed but were strengthened, e.g. adding tasks like hand pulling striga and making compost which are difficult to do alone. Groups that already did tasks like weeding fonio and harvesting groundnut began to cooperate to dig compost pits and transport manure
Daga	Hand pulling striga	Groups of women and youth that already existed to do farm work for pay. After watching the videos, these groups added hand pulling of striga to the list of services they offer, and farmers hired them to do it. They are not always able to meet the demand from farmers (Guindo, 2016)
Togo	Hand pulling striga	No new groups were formed, but existing ones were strengthened. Groups of women who did farm work for wages added hand pulling as one of their services. It is now much in demand
Sikasso		
Nampossela	Slight	The groups that already existed grew crops to sell, bought and sold cereals, or did farm work for cash
Zantiela	None	
N'Tonasso	New women's groups formed	Groups started by AMEDD ^(c) because of their experience with FFS and filming the videos
Sirakélé	Hand-pulling striga and counting money	Both cooperatives now pull striga. If a member reports striga, the others help to pull it up. One of the women's groups piles striga and burns it. The women say that the 'Let's talk money' video has helped them to analyse their accounts and tell if they have made money or not

^(a)FFS, farmer field school^(b)AKF, Aga Khan Foundation^(c)AMEDD, *Association Malienne d'Eveil au Développement Durable*

of Togo, about 80% of the people in the village had seen the videos. The groups of women who were already organized to work for wages (e.g. doing weeding and harvesting) added pulling up striga to their repertoire. Some people worked in groups to make compost, or to haul it.

Small groups and a long-running field school (village of Promani)

The president of the cooperative (Fig. 7.1) and the president of the FFS and three of the FFS trainers said that, in the videos, they saw that some women were organized into women's groups, so they decided that they could do that too. After creating a special group for women it grew from just the five trainers to include a total of 30 women in 2014. The cooperative grew from 30 to 50 people. That is one of the institutional changes which the villagers themselves attributed expressly to the video. As we have seen in Benin, just seeing people do certain things

together may be enough to stimulate thoughts of emulating them (see Zossou *et al.*, 2010).

The FFS graduates are still doing experiments. The head of the cooperative, Bakar Coulibaly, showed us one of his. This millet field had been split into plots. The thriving millet on the right side was fertilized with micro-doses of compost, while on the left side the millet was intercropped with cowpea, but not fertilized (farmer experiments often test two variables at once). (Fig. 7.2). People were still experimenting, years after first learning to manage striga. Gorou Traoré, president of the local farmer field school, said that striga was their worst problem, except for rain, and no one could control the rain. Koumba Daou showed us her field of millet and cowpea: one row of cowpea and two of millet, with some goat manure, so the videos really had inspired technical change. She said she no longer had striga problems. The videos were actually designed to include women-friendly technologies. When the video makers showed the rough edit of the livestock video in northern Ghana, women suggested adding footage of small livestock like goats,



Fig. 7.1. Farmers like field schools and, if given the chance, may participate for years, adding new, creative experiments along the way.



Fig. 7.2. A farmer experimental field, with millet fertilized with a micro dose of compost on the right, and unfertilized millet intercropped with cowpea on the left.

otherwise the film might have inadvertently implied that soil fertility can only be improved with cow manure, which is men's property.

Gorou Traoré showed us his plot. He put 2 kg of mineral fertilizer on a 300 m² plot; another field had two rows of millet and one of cowpea (Figs 7.3 and 7.4). The Aga Khan Foundation (AKF) extension agent came about once a month to advise them on their experiments. Gouro was testing the millet varieties Toroniou and Guéfoué 16, with the cowpea variety Dunafana.

Koumba Daou was intercropping two rows of millet with one of cowpea, fertilized with goat manure. It was the fourth time she had done it and the two techniques had reduced the striga infestation. The women had to go through men to get a field. One year they may get a field and manage the striga and then the next year they may get a different field full of striga. Land tenure is key.

The video committee (village of Kouna)

In the village of Kouna they did not have FFS. But when an extensionist brought the striga videos in 2012, the village leaders watched

them, and although they invited 40 people, more than 40 came. They liked the videos so much that they decided to show them to everyone; they set up a special video committee and screened them in the *place publique* for 2 weeks, until everyone in this large village had seen them. They got 11 copies of the DVD. People from the nearby hamlets came to watch the videos in the village centre, and people took the DVDs to watch in the further hamlets.

Strengthening cooperatives and groups (village of Sirakélé)

This village organized a large screening of 500 people, attended by ICRISAT, AMEDD (*Association Malienne d'Eveil au Développement Durable*) and AMASSA (*Agence Malienne pour la Sécurité et Souveraineté Alimentaire*). Then they watched the videos three times in small groups of 30. They remembered the video contents well. They were organized into cooperatives. One had 26 men who sold grains to the World Food Programme (WFP) and produced millet seed to sell to farmers. A women's cooperative worked a collective



Fig. 7.3. Millet and cowpea.



Fig. 7.4. In another plot, Koumba Daou intercropped two rows of millet with one of cowpea, fertilized with goat manure.

field, and they harvested for other farmers for wages. It was an old group and there were also older groups of women. The cooperatives have had a lot of input from the non-governmental organizations (NGOs). If a member reported striga, the men's group went to his field and pulled it up, because it was tedious to do alone. And they wanted to pull it up before it went to seed. Knowing about striga seed may be the key drive to act speedily, stimulating people to act in groups rather than alone. In two villages (Orgnon and Sirakèlè), young women said that they had paid more attention to their accounting after watching the video 'Let's Talk Money'. It helped them to do their own analysis of costs and benefits when selling food to the WFP.

Farmers continued to experiment with the techniques they learned in the videos and FFS. Many were trying hand pulling, intercropping, micro-dose and crop rotation. The farmers already knew that composted manure enriched the soil, but they rarely had enough compost. From the videos, people learned that they could add vegetal waste, especially cereal stalks, to the compost and they were pleased that they could now make more organic fertilizer.

Conclusion

In village after village, even if people had only watched the videos once, they always had something intelligent to say about the contents, even 2 years after the screening. In each of the villages visited, farmers tried out new ideas they had learned from the videos. Farmers were not passive observers and were sensitive to observe social dynamics presented in videos. Farmers also made

social innovations, even though the videos were not intended to trigger social change. In a previous study, women in Benin watched a video on parboiling rice, which showed a small group of women doing the job together. This had a great impact on women in the audience, who decided that they would no longer process the rice individually but rather in a group (Zossou *et al.*, 2010). In this study in Mali, farmers were quick to notice that striga weeding can be effectively done in groups and started organizing themselves to do so. There are several accounts from Niger where the 'Joining hands against striga' video sparked similar dynamics to the extent that even special village days were organized to hand pull striga. All farmers learned from the videos that the battle against striga can only be won when they join forces and apply many technologies together.

All of the villages were changed in some ways, either by solving their striga problems, or by changing their organizations, or both. Like FFS, the videos do more than just explain technology. Farmers learn background biological and ecological information, and then use that to conduct their own changes.

The main technical changes included: hand pulling of striga; making compost; micro-dosing fertilizer and intercropping with legumes. Organizational changes included: strengthening women's groups; groups adding striga pulling to their repertoire of services and organizing to watch videos.

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