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Zooming-in zooming-out: a novel method to scale up local innovations and sustainable technologies

Paul Van Mele*

Africa Rice Center (WARDA), *01 BP 2031, Cotonou, Benin*

Based on two case studies from Bangladesh and Benin, the role of video in scaling up sustainable rice technologies is assessed. Both process and outcomes of participatory research increased the effectiveness of educational videos. At the same time, during the production of the videos researchers and development workers learnt about local innovations and changed their attitude towards working with farmers. To increase impact, learning topics should have a regional relevance. Hence a novel method called zooming-in zooming-out is presented . It starts with a broad stakeholder consultation to define regional issues. Only then are communities approached to get a better feel about their ideas, their innovations and the words they use in relation to the chosen topic (zooming-in). Key learning needs are defined and videos are produced in close consultation with the end-users. Consequently, while showing the draft videos to more villages (zooming-out), more insights are gathered about the innovations and their socio-cultural context, and further adjustments made. Based on a few well-selected local innovations, and merged with scientific knowledge, these videos were able to explain underlying biological and physical principles. The more these principles resonated with what farmers already knew and did, the more video became useful as a stand-alone method. Facilitation increased adoption of sustainable technologies, but was not always a prerequisiste.

Keywords: Video, education, extension, participatory learning, scaling up, facilitation, rice, Africa, Asia

Introduction

The communication gap between research, extension and farmers has been under serious scrutiny over the past decades. Chambers and Jiggins (1987) outlined some hopeful ideas for participatory research, citing now familiar ideas such as scientists were not working with farmers; research was reductionist and could not easily handle the complex interactions of resource-poor farming. They concluded that there were some worthy efforts, but no one was really doing research with farmers (Chambers & Jiggins, 1987). Ten years later, Jiggins and colleagues made specific recommendations to improve women's access to extension (Jiggins *et al.*, 1997), the challenges remaining high.

Currently, various mainstream agricultural research and development projects use new methods for interacting with smallholder farmers to develop and spread appropriate technology, such as farmer field schools (FFS) and local agricultural research committees (CIALs) (Bentley *et al.*, 2006; Braun *et al.*, 2000). These methods envision participatory learning and action research and rely on engaging people in experimentation, observation, measurement and other activities which allow people to draw their own conclusions. Creating tools to support participatory learning has emerged as an important challenge for scientists (Defoer, 2002; Hamilton, 1998; Seppanen, 2000; Van Mele & Chien, 2004). But then, once learning

*Corresponding author. Email: p.vanmele@cgiar.org

tools have been developed and thoroughly tested with farmers, we should be able to capture some of them with media such as radio and video. Scaling up face-to-face extension is costly and the number of people reached is often limited, therefore a closer look at mass media is called for (Snapp & Heong, 2003).

Changing farmers' behaviour in rice pest management was possible in Vietnam through radio dramas, yet the message was limited to one simple rule-of-thumb: do not spray insecticides for leaf folder control in the first 40 days after sowing (Heong *et al.*, 1998). The investment to develop this mass media campaign was justified as years of scientific research underpinned the rigidness of this heuristic across countries and rice ecologies. But for which other topics could mass media be used, and do we always have to go through the same rigorous scientific process? And to what extent is facilitation needed to scale up sustainable innovations?

Apart from radio, video has been used extensively in rural development (Besette, 2001; Coldevin & FAO, 2001; Fraser, 1987; Norrish, 1998), even including topics such as soil fertility (Protz, 1998). But video is still under-explored as a means of merging scientific with local knowledge to stimulate learning and trigger agricultural innovations in rural communities. Surely, the role of video remains to be researched along the five dimensions of the transformation to sustainable agriculture, as described by Röling and Wagemakers (1998):

(1) sustainable practices, both at the farm and higher system levels;
(2) learning those practices;
(3) facilitating the learning;
(4) institutional frameworks that support such facilitation, comprising markets, science, extension, networks of innovation, etc.
(5) conducive policies.

In this paper, two case studies from Asia and Africa are presented that deal with developing, testing and disseminating educational videos. Processes that contribute to scaling up sustainable rice technologies are analysed. The next sections highlight key elements of effective videos, followed by how videos were used and what effect they had. Lessons are drawn on how higher impact can be achieved faster.

The process: zooming-in zooming-out

All videos on rice seed (Bangladesh) and rice post-harvest management (Benin) covered a specific subject, addressing a need with a high regional relevance. Developing effective and efficient learning material requires considerable human input and is relatively time-consuming, so the need to start by assessing topics of high regional relevance cannot be over-emphasized. Hence, we coin an approach called zooming-in zooming-out (ZIZO) (Figure 1).

A broad multistakeholder consultation process helped to define regionally relevant learning needs. This was followed by in-depth interactions with a few communities to get a better feel about their ideas, their innovations and the words they use related to the learning subject. Only after having zoomed-in, the exact content of the video was decided upon. Fine-tuning of the learning tools happened during the scaling-up or zooming-out phase. This zooming-in zooming-out approach will be illustrated by two case studies from Asia and Africa.

Case study 1: Bangladeshi seed health videos

In Bangladesh, multistakeholder analyses identified poor rice seed health as a nation-wide constraint, and as such became a major topic under the Poverty Elimination Through Rice Research Assistance (PETRRA) project. Building on experiences of working with farmers since 2000, the four seed health videos were developed and tested in 2002–2004. The video project was coordinated by CAB

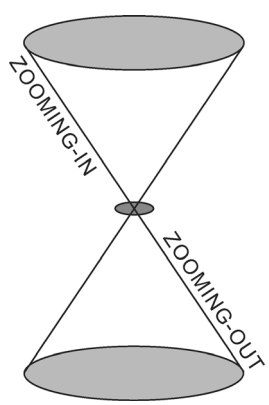

Figure 1 Zooming-in zooming-out: a new method for prioritizing, developing and fine-tuning learning tools

International (CABI), and implemented by the Rural Development Academy (RDA) and Thengamara Mahila Sabuj Sangha (TMSS), a national women's non-governmental organization (NGO). For a full description of the video production process, please consult Van Mele *et al.* (2005b). In what follows, the importance of zooming-in zooming-out when developing learning materials is illustrated.

Under PETRRA, training on seed sorting and flotation had been going on for several seasons, when the author initiated the development of discovery learning exercises with national scientists and university staff. These exercises form the core of education approaches such as farmer field schools (van de Fliert, 1993). Based on his life-long experience, one of the senior entomologists was strongly convinced that women in the village did not know the relationship between seed moisture content and insect infestation level. However, developing this into a user-friendly discovery learning exercise, proved such a challenge that the idea was omitted at the end of the two-day workshop. Only a year later when we started our script research for the videos on seed health, and assessed women's knowledge in a few communities in more detail, we found out that they all knew that high seed moisture leads to high insect infestation. So what had we learnt?

Although the topic of storage insect pests and their control was highly relevant, during prior training and community interactions, scientists had not paid enough attention to unravel women's knowledge in sufficient detail. Village women indeed did not know that with higher humidity insects lay more eggs and go through their life cycle faster, but they knew about the cause–effect through experience. What we learnt by interacting more in-depth was that they did not know that air could still pass through their earthen pots after they had carefully closed the lid. Only then did we understand that the subject should not be on insect life cycles and their ecology, but on porosity and how to make seed storage containers more airtight. As will be discussed later, various local innovations emerged, further emphasizing the need to zoom-in sufficiently before developing learning tools.

Once national or regional needs have been identifed, use face-to-face methods to learn about local knowledge and to develop and test technologies. For instance, rural women who featured on the seed sorting videos had gone through two seasons of participatory research and hence had acquired ownership over this newly introduced technology. In the programme, they honestly shared the constraints and benefits of seed sorting, and invited other farmers to test it and witness the difference in their own fields.

Based on new insights that 'seed placed on the earthen soil can absorb water', women in Bangladesh developed multipurpose seed drying tables (Van Mele & Zakaria, 2005). The video was able to capture this key concept visually, and featured a family producing their own seed drying table. Characteristics of the four seed health videos are described in Table 1.

The examples show how outputs from participatory research (e.g. on seed storage and seed flotation) and participatory technology development (the drying tables) were integrated with 'digestible' scientific information. The technologies presented are sustainable practices. The videos help to strengthen low-external input systems by injecting new ideas and providing a platform for local innovations. Storage insects and diseases are managed without chemicals, seed is dried using low-cost, locally available materials, and rather than promoting plastic drums, people learn how to make their storage container more airtight.

The objective of the videos is to enhance learning. Differences in adoption helped us to pinpoint which technologies would need additional facilitation and which subjects could use videos as a stand-alone method (see section on impact). Another dimension to which video can contribute to sustainable agriculture is related to institutions.

In 2005–2006, the four videos were further disseminated and tested for impact at a regional level in South Asia under the Good Seed Initiative, coordinated by CABI in collaboration with the International Rice Research Institute (IRRI), RDA, TMSS and another NGO, the Agricultural Advisory Society (AAS). Links to the national farmer field school (FFS) programme were established and by the end of 2006 the videos featured on a daily basis on the national TV.

In 2005, the author moved to the Africa Rice Center (WARDA). After having shown the videos to rural women in The Gambia, and witnessing their response, a local team decided to translate the videos into Mandinka, a language spoken mainly in The Gambia and Guinea. In 2006, this

Table 1 Rice seed health innovations shown in Bangladeshi videos

	Seed sorting	***Seed flotation***	***Drying***	***Storage***
Brief description of technology	Manually remove diseased seed	Add salt or urea to a bucket of water until an egg floats; drop rice seed in the water and remove the bad ones that will float to the surface	Make a bamboo table or bench for drying rice; it can be quickly moved indoors in case of rain	Paint an earthen pot; fill it with rice seed and do not leave a dead air space; add leaves of neem or *bishkatali*; seal pot and place it off the ground
Learning messages	Spotted and discoloured seeds are unhealthy; these cannot be removed by winnowing or seed flotation; seed sorting improves yield	Winnowing does not remove all insect-damaged and partially filled seed	Seeds absorb moisture from soil; wind helps in drying seed; a drying table has many other uses than just drying rice seed	Pots absorb moisture, which paint prevents; completely filled pots are dryer than half empty ones; some kinds of leaves repel storage insects
Local knowledge and innovations	Women have little knowledge about seed-borne pathogens	Women already soak seed in water prior to sowing; flotation with salt or urea is a small modification of existing practice	Drying tables were designed with the full participation of local women and men	Traditionally, some people sealed pores of earthen pots with used oil; only a few people use botanicals

version was shown to women's groups in two different zones in Mali. Again, positive feedback made the team decide to translate them into Bambara. Although the videos contained local innovations from a different continent, the common need for improved seed health along with visually strong images helped to bridge the communication gap to a large extent.

Case study 2: West-African videos on rice post-harvest handling

To select the video topics in West Africa, in mid 2005 we embarked on a broad consultation process, through email correspondence and meetings with representatives from research institutes, NGOs and farmer organizations in Benin. Only then we held focal group discussions in a number of communities across the country. A similar approach of first tapping into the knowledge of those working closely with rural communities was used by Boa *et al.* (2001).

In West Africa, rice post-harvest handling is of regional importance: for local rice to compete with the imported product, its quality has to be improved. One way of improving quality, both in terms of reduced breakage rate and reduced nutrient losses during milling, is parboiling: pre-soaking rice in water after which it is steamed. In many West African countries it is a traditional process that consumes a lot of fuel and, as the bottom of the rice lies in the water during steaming, part of the rice is cooked leading to an uneven quality when milled. Various projects in the region have tried to improve the parboiling method, often as part of a broader programme to stimulate income-generating activities for rural women.

In Benin, a first prototype of an improved parboiler, developed in 2002 by the national research institute (INRAB), had not only been introduced in the central and northern regions, but also in the south, where women were not familiar with the technology. The interest of processing groups was high, both for home consumption and to accommodate growing market demand (Figure 2). In early September 2005, staff from WARDA, INRAB and the NGO Sassaka Global 2000 (SG2000) collected feedback on this prototype from a few communities across the country (zooming-in) and learnt that the technology still had some major shortcomings.

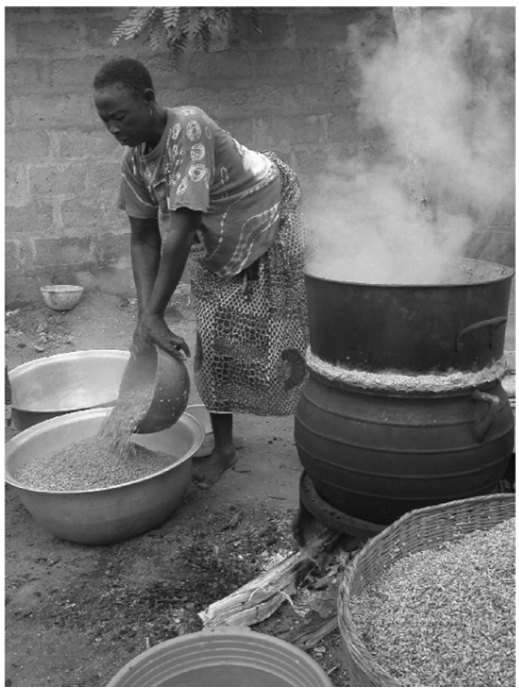

Figure 2 Edith is president of a women's food processing group in the Oueme valley, southern Benin. Three years ago they learnt to parboil rice as one of their income-generating activities, and they continue to do so. But before a video could be produced to scale up the technology, the prototype apparently had to be fine-tuned

Fine-tuning through participatory technology development (PTD) had to take place within a very short time: the rice harvesting season was approaching, during which the video had to be produced. Rather than sending the comments back to the national research institute, as suggested by INRAB staff, two weeks after the survey we organized a multistakeholder workshop, involving millers and local artisans from different parts of the country, and jointly adapted the model (Figure 3). Major improvements ensued: the reduction of vapour loss through the junction between the parboiler and cooking pot; a better closure of the lid; and an increased diameter of holes in the bottom of the parboiler.

In October 2005, the video captured the parboiler with its latest improvements. Apart from the three partner organizations involved in PTD, a second NGO called Songhai was involved in the video production. The speedy process differed from the one in Bangladesh, affecting the

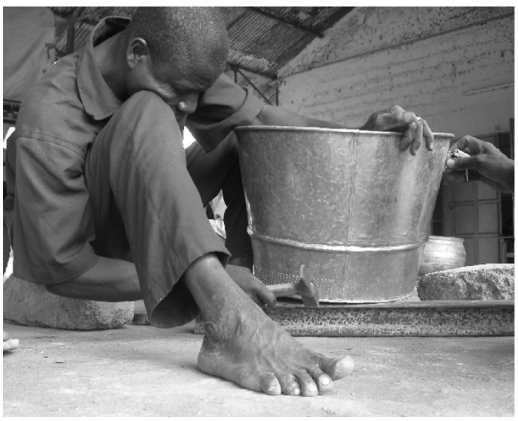

Figure 3 Based on feedback from village women, local artisans inject their skills and ideas to improve the rice parboiler. Until a technology is thoroughly tested by its end-users and fine-tuned, it cannot feature in a video

level at which participatory approaches were institutionalized among the partners.

A similar process was initiated as in Bangladesh: two local video teams were established and trained for two weeks by a video consultant from Country-wise Communication, Ms Josephine Rodgers, the same person who trained the teams in Bangladesh. During the training, each team developed one video dealing with rice post-harvest handling (Table 2).

Features of an effective video

Build on outputs from participatory processes

Doing research with farmers, developing technologies with them or running farmer field schools, all contribute to building trust and to ensuring the technologies are in tune with the farming system. Although outputs from participatory work with communities often have mainly local relevance, for the production of videos aiming at farmer education, topics need to be identified that have a wider relevance and that are unlikely to have adverse effects in diverging environments. The approach of zooming-in zooming-out described in this paper offers some guidance.

The human and social capital built during the technology development and social learning phase will facilitate a better understanding between actors when developing educational videos. Hence,

Table 2 Rice post-harvest innovations shown in West African videos

	Parboiling	***Rice quality***
Brief description of technology	Wash paddy thoroughly; remove floating material; presoak paddy overnight in hot water; steam paddy for about 30 min	Avoid introduction of impurities throughout period from harvesting to milling; properly dry and store paddy
Learning messages	Parboiled rice, if processed correctly, is free of impurities, such as stones and unfilled husks; parboiled rice is more nutritious; breakage rate is lower when milled; demand is growing in region	Drying, winnowing and threshing on earth or tarmac road introduces stones and other impurities; drying in hot sun for too long causes small cracks in rice grain, resulting in increased breakage during milling
Local knowledge and innovations	Women in south Benin do not parboil traditionally; women developed finger-test to test temperature of water during pre-soaking; improved parboiler was evaluated for three years and fine-tuned by local artisans	Setting up protected threshing area in field; women and millers use various techniques to test grain dryness

people who are involved in those participatory processes should be a part of the video team.

Visualise local innovations

Video gives you the guarantee that the learning subject you intend to get across will be conveyed in the same way over and over, and as such is a perfect support tool for facilitators. Likewise, when farmers have to train others on several topics, you lose control about what will be taught. Although farmer-extensionists in Bangladesh showed several seed drying tables in the village common ground, at village cross roads and at market places, the tables were mostly covered up, used to display other materials, so farmers could not see what they were for.

While making the seed health videos in Bangladesh, we learnt of a farmer who lit a candle in a seed storage pot as she closed it. This burned out the oxygen, and made the container even less insect-friendly. As this practice was highly relevant to illustrate and re-emphasize the need for airtight seed storage, we decided this innovation had to be included in the video.

While showing the videos in numerous villages the following years (zooming-out), the Bangladeshi team learnt about many more local innovations, not only dealing with rice. One of the farmers informed them that she stored seed in a bottle gourd (*Lagenaria siceraria*). The fruit, once the flesh has been removed and dried, provides an airtight container that is also rat proof and available at no cost. Not only had the team developed a trained eye and ear to spot interesting innovations, but after having seen the videos, village women were also more keen to share their ways of thinking and doing with the wider group. Tacit knowledge developed around in-house technologies, such as seed storage, are more difficult to assess because of their private nature and hence often remain in-house. Our videos facilitated the discussion on such topics. As the videos are in a digital format, additional innovations can always be added along the way.

Use appropriate language and symbols

Producing videos in West Africa proved more challenging than in Bangladesh as the diversity of languages is vast: in one and the same village, three or more local languages may be spoken. To get feedback on the rough edit from both the scientific community and end-users, the team decided to produce two versions simultaneously: one in French and one in Fon, a major language spoken in Benin. Language not only complicated the communication between the video team members and the villagers, but also increased the need to let women fully demonstrate their practices (Figure 4).

When embarking on the production of videos, getting to know the end-users is crucial to get the learning content right. While conducting script research in Bangladesh, project staff probed village women about their knowledge related to seed moisture. It seemed to be a difficult concept to communicate. For two years project staff had been training

them on seed health practices, even conducting joint experiments, only now to discover that village women used very specific words to explain seed dryness; they had no words for seed moisture content.

Preparing and storing seed is largely women's work in Bangladesh. The women who appeared on-camera from Maria village in Bogra district were authentic. The fact that they had worked with rice seed all their lives no doubt helped win the sympathy of their audience. When the NGO AAS later used the video in more than 30 villages in Sylhet district, none of the participants complained they could not understand the accent of the women. However, another video, showing a local troupe from Bogra performing songs specifically designed around seed health issues, was hard to understand when shown in Sylhet. Many things influence whether or not people understand the dialect of another region. It helps if they are motivated by an interesting topic, if the speech is clear, and if there are visual clues such as painted pots and drying tables. These factors need to be considered when assessing the scaling-up potential of videos that involve local communities in the production.

Images can be more universal than language. Video can bring messages across in a visual way that is hard to achieve through face-to-face extension. How can one teach that seed absorbs moisture when dried on the floor? Having one of the farmers sit on the earthen floor and showing his wet *lungi* was a memorable image and provoked hilarious laughter (Figure 5). Surely this is something people will talk about.

Figure 4 Letting women express themselves and show how they do things helps to overcome language barriers

Stimulate negotiation between actors in the value chain

When researchers in Benin questioned farmers about the reasons why milled rice had such a high breakage rate, they mentioned poor milling equipment as a prime cause. Millers, on the other hand, blamed farmers for bringing in poor quality rice; apart from impurities, the paddy is often inproperly dried (Houssou & Amonsou, 2005).

Video helps to negotiate between actors: not only can it provide a balanced view by carefully selecting interviewees, it also allows the presentation of scientific results in a visual way. Scientific research revealed that drying in the hot sun for too long causes minute cracks in the grain, and although this is invisible to the naked eye, it is one of the main causes of high breakage during milling. The video talks about improved practices of drying paddy and refers to cracks in earthen pots or clay when dried in the scorching sun (Figure 6). Interviews with rice farmers, processors,

Figure 5 Hatem, one of the farmers in Bogra, Bangladesh, shows his wet *lungi* after sitting on the earthen floor. This powerful image in the video evokes laughter, and opens up the discussion on drying seed on tables instead of on the floor during the rainy season

millers and sellers, along with scientific information presented in a digestible form, helps the various actors in the rice value chain to understand each other better.

Cultivate ownership

Creativity and flexibility is needed to better respond to different groups of people, to varied learning situations and to resources that can reach the broadest public (Debouvry & Weiss, 2003). Video allows one to develop a broad range of short learning modules that can be assembled and adapted to locally appropriate training curricula. Voice overs can be translated into local languages, as was the case when the Bangladeshi seed health videos made their way into West Africa.

A challenge of any participatory method is to maintain high quality when scaling up. Feder *et al.* (1999) suggested that the generic problem of scaling up in extension could be partly overcome through mobilizing other players in extension, empowering farmers and their organizations, decentralization and use of appropriate media. Apart from this, we also learnt that a feeling of ownership over the learning materials plays a crucial role in the consequent use of the videos. Selecting appropriate partners and working in a mutually respectful mode during the video production is therefore crucial to initial scaling up. Similar conclusions were drawn in other mass media campaigns (Escalada & Heong, 2004).

Figure 6 Using analogy to communicate scientific results: rather than trying to show minute cracks in overdried paddy grains, we use cracks in clay soil to get our message across

Build strategic partnerships

To obtain videos that are suitable for scaling up, the teams went through a process of rigorous script research, identified local innovations, transformed scientific ideas in a digestible format, and presented this alongside local innovations and outputs from participatory research and technology development. But what is the 'context roof' or level to which scaling up can take place within a given set of policies, markets and institutions? And what strategic alliances are needed? These and other questions form the subject of many recent debates dealing with innovation systems and learning alliances (Adolph, 2005; Bawden, 1994; Coldevin & FAO, 2001; Hall *et al.*, 2003; IIRR, 2000).

Building strategic alliances for the video production and ensuring a feeling of shared ownership over the end-product surely were keys to the success in Bangladesh, where two years after the production of the videos more than 130,000 households had seen the videos. By the end of 2006, an estimated one million farmers will have seen the seed health videos in South Asia, and an anticipated 10,000 in West Africa. To scale up, 'ambassadors' are needed at global, regional, national and organizational level. Box 1 summarizes how to stimulate and scale up learning for sustainable agriculture.

Use of videos

In both cases presented in this paper, the videos were used in a wide range of settings, including training-of-trainers sessions. Considering their relevance to resource-poor farmers, a large number of organizations started showing them to farmer groups of varying size and composition. The main question to be answered when considering scaling up of sustainable practices is not only their context-specificity, as suggested by Lee (2005), but also their relevance and attractiveness to intermediaries or service providers. Linked to this is the question whether extension materials developed to support sustainable agriculture can be used as a stand-alone, or whether facilitation is required.

Box 1. Ten rules to enhance learning for sustainable agriculture:

(1) Conduct actor analysis.
(2) Build capacity to identify and stimulate local innovations.
(3) Create early, low-budget opportunities for multiple actors to learn to work together.
(4) Do not rush participatory research and technology development.
(5) Increase the creative thinking capacity among actors.
(6) Build experiential learning principles into mass media programmes.
(7) Involve communication specialist, broad-based professionals with experience in learning approaches and end-users in developing communication strategies.
(8) Opt for quality in partnerships, not quantity. Expand gradually.
(9) Ensure local ownership over technologies, extension methods and materials.
(10) Support institutional learning continuously.

In Bangladesh, as part of our 'extension research', a knowledge, attitude and practices (KAP) baseline and post-intervention survey was carried out covering 12 districts, 50 villages and 1252 women. Seven villages served as control villages, in 15 villages videos were shown by stand-alone method and in 28 villages video shows were followed up by group discussion.

Our target group were resource-poor women, identified through well-being analysis. This participatory learning tool stimulates the community to define well-being, set criteria and classify the households themselves (Islam *et al.*, 2004). It is a simplified version of wealth ranking described by Pretty *et al.* (1995). In each village, 25 resource-poor women from the lowest strata were selected based on their involvement in rice cultivation and willingness to take part in the surveys. This approach allowed us to organize project-funded video shows for relatively small, yet targeted audiences.

The time and location for the video shows were agreed upon in each community. The majority of shows were organized in the courtyard of one of the women, followed by government primary schools, non-government primary schools and non-formal education schools.

Impact

Changing farmers' knowledge and behaviour

Analysing differences in adoption helps in developing extension strategies by pinpointing for which technologies or learning modules additional facilitation is needed. The videos on seed sorting and seed flotation especially seemed to require additional follow-up by group discussion (Table 3). This being said, all four videos significantly triggered changes in knowledge, irrespective of facilitation. The translation in changed behaviour may thus be only a matter of time. Future research will tell.

The videos on drying and storage triggered changes in practice, even without facilitation. Women store seed in a wide range of receptacles and after having seen the video many changed to smaller and more airtight containers. Only 3% started to paint their earthen pot when videos were shown without facilitation, compared to 32% when followed up by group discussion. Irrespective of facilitation, more than 90% had learnt how to expell air from their storage container.

Facilitation has an overall positive effect on the rate of adoption, but if video is used as a stand-alone method it can trigger change in a community, albeit small; its potential to have an impact when used as mass media is huge. A good video gets its ideas into the heads of some community members, who will experiment with them. By then, the video has already played its role. Adoption and diffusion will depend on how functional and profitable the technologies are in the given context.

Changing attitudes of researchers and service providers

Morris *et al.* (2005: 77) stated: 'Researchers and technical staff must recognise that farmers are experts in their domain and will ultimately determine research impact. They must be disposed to learning from them.' Although the main objective of the videos is to enhance rural people's understanding and change their behaviour towards certain practices, during the production of the video the mindset of researchers and development workers also changed.

Table 3 Percentage women practicing seed health technologies before and after video shows in Bangladesh, 2005

	Video followed by group discussion		***Video only***		***Control***	
Number of villages	28		15		7	
Number of farmers	699		378		175	
Seed health practices	*Before*	*/After*	*Before*	*/After*	*Before*	*/After*
Manually sort seed	0	37	0	1	3	0
Float seeds in water with salt	0	47	0	1	0	0
Dry seed on a mat or table*	17	90	27	94	16	26
Use teeth to test seed dryness	91	100	83	100	87	91
Store seed in painted earthen pot*	0	32	0	3	0	0
Use storage additives such as neem	12	88	2	29	9	7

*These were open questions in questionnaire, but we have simplified it here.

After having produced the videos, researchers started using farmers' concepts and innovations in explaining rice post-harvest processes to other communities. In Benin, NGO staff who train women groups to parboil rice, no longer mentioned that the water for presoaking the rice has to be heated to 60–80°C. They had learnt that women use their fingers to test the temperature. When the water gets so warm they can no longer dip their fingers into it, they remove the cooking pan from the fire.

Researchers and development workers learnt to better listen to farmers and to use their language. Seed moisture content was not known to women in Bangladesh and, although perceived as important by scientists, was not included in the video; instead they used the women's concept of seed dryness.

Changing people's attitudes is a long-term process, and well-targeted interventions are needed to increase the critical mass within the research and extension system. When we showed the Bangladeshi videos to WARDA partners in various capacity-building workshops on documenting and enhancing local innovations, we observed an increased interest in learning from local people: a first step towards institutionalizing participatory learning and action research.

Conclusion

According to the Food and Agriculture Organization (FAO), sustainable agricultural technologies are resource-conserving, environmentally non-degrading, technically appropriate, and economically and socially acceptable. In his review on agricultural sustainablity and technology adoption for developing countries, Lee (2005) lists a wide range of technologies without mentioning on-farm seed health management. According to him, critical limitations to the diffusion of sustainable practices are their context-specificity. The zooming-in zooming-out method presented in this paper may partly overcome this. Our videos on rice seed health management quickly made their way to hundreds of thousands of farmers in Asia and Africa. Considering their beneficial effect on crop performance and reduced pest incidence in the field, seed health management should be added to the list of sustainable agricultural practices with a high adoption potential.

Apart from technologies, also learning, facilitation, institutions and policy contribute to the transformation to sustainable agriculture (Röling & Wagemakers, 1998). Well-made videos, showing functional technologies and their underlying principles, can help a good part of the audience to adopt and adapt these technologies, and it can do so much easier and probably cheaper than face-to-face extension. Efficient videos visualize the key learning matter in a locally appropriate way, reinforces this with a few well-selected examples of local innovations and invites the viewer to try them out. Empirical evidence suggests that the more the underlying scientific principles presented in the video resonate with what farmers know and do, the more video becomes useful as a stand-alone

method. Facilitation increases adoption of sustainable technologies, but is not always a prerequisiste.

Röling and Jiggins (1998) have argued for some time that more professionalism is needed in thinking about people if sustainable development is to be reached. Learning about people helps to manage institutions that drive innovation systems, and requires specific tools to facilitate this (Van Mele *et al*., 2005a). We have shown that participatory research, participatory technology development and videos can contribute to this, and more so when these methods are integrated. Participatory processes increase the efficiency and impact of educational videos.

Alternatively, video production based on principles described above can equally lead to doing science in a different way. While women smallholder farmers and rice processors were our main target audience, the actual video production process equally contributed to attitude change among research and development actors. To scale up sustainable agricultural practices, we need to integrate the best of all disciplines.

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