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Videos on agroecology for a global audience of farmers: an online survey of Access Agriculture

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ABSTRACT

Video is an effective medium to reach farmers with practical, agroecological information, thanks in part to increased access to electricity, phones and the Internet. In 2021, 2,976 people from 106 countries took an online survey for Access Agriculture, a not-forprofit that manages an online platform for farmer learning videos. Most of the respondents (83%) worked in Africa, were male (85%) and over half were under 40 years old. The respondents were extensionists, farmers, and educators among other occupations. Access Agriculture videos reached an estimated 90 million people since the platform started in 2012. The respondents to the 2021 survey shared the videos with farmers, youths, extensionists, students, women's groups, and with broadcasters. People use the videos to learn ideas to share with others, to screen in rural communities, to share with organisations, to share on social media and to distribute on memory cards for mobile phones. Ninety-nine percent of respondents thought that the videos had made a positive impact on farmers' lives. Since 2018 at least 5,000 organisations have received the videos.

KEYWORDS

Videos; farmer learning videos; agroecology and sustainable agriculture; online extension

1. Introduction

Agroecology is crucial for making food systems more resilient and sustainable, with its respect for science and local knowledge, natural inputs and closer connections between producers and consumers (Pimbert et al., 2021). Agroecology can be taught by public-sector extensionists, but budget and personnel cuts are limiting their number (Boyd & Spencer, 2021; Van Mele et al., 2018). It has long been difficult for extension services to reach farmers at scale with appropriate information (Steinke et al., 2019, Davis & Place, 2003). Transportation is limited, especially in Africa. Salaries are low and extensionists receive few rewards or recognition (Davis et al., 2020). Most extensionists have been trained in conventional, chemical-based agriculture and have limited knowledge of agroecological practices (Anderson et al., 2021). Farmers often rely on other sources of advice, including friends, neighbours, radio, and television (Chowdhury et al., 2011; Okry et al., 2014; Rahman et al., 2016; Rao, 2015). However, some popular sources of advice, such as local agro-input shops, have a vested interest in recommending chemical inputs (Majuga et al., 2018).

Even as extension services have stagnated or declined, digital communication has become easier, even for smallholders in remote parts of southern countries (Sousa et al., 2016; Van Mele et al., 2018). Solar panels, internet connectivity and inexpensive cell phones allow videos to reach more smallholders in Africa and elsewhere (Steinke et al., 2019; Tinzaara et al., 2021; Van Mele et al., 2018). Videos have certain advantages over other extension methods. For example, videos reach large audiences in many locations, are suitable for communities with low literacy, and they can foster knowledge sharing

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(Bentley et al., 2016; Bello-Bravo et al., 2019; Chivers et al., 2021; Davito et al., 2017). Videos are also low-cost, and they convey information in the visual channel (Chivers et al., 2021; Davito et al., 2017; Van Mele, 2011; Zossou et al., 2009). Effective extension videos are practical, filmed to a high quality, with relevant information and no advertisements, while demonstrating how to do something (Chivers et al., 2021; Maredia et al., 2018; Thomas et al., 2018). Effective videos merge scientific with local knowledge, explain underlying scientific principles and encourage farmers to experiment (Van Mele et al., 2018).

Videos may even out-perform face-to-face extension (Bello-Bravo et al., 2019; Chowdhury et al., 2015; Fry & Thieme, 2019; Thomas et al., 2018; Van Mele et al., 2005; Zossou et al., 2009). A video featuring farmers speaking in the local language (Lusoga) significantly increased Ugandan smallholders' knowledge of maize and their adoption of technology, while interactive voice response (IVR) and SMS messages made little difference (Van Campenhout et al., 2021). In a comparison of farmer field schools (FFS) and videos in Kenya, farmers who watched videos were as likely as their peers who attended an FFS to apply striga (weed) control technology: e.g. hand-pulling and manure application (Ongachi et al., 2017). In Nigeria, farmers learned more and preferred watching a video than being taught by extensionists (Oladele, 2008).

A study in Uganda compared the ability of radio, SMS messages and video screenings in villages to increase farmers' knowledge and management of fall armyworm. While radio had the greatest reach, video had a stronger impact. Farmers learned the most about armyworms when radio and videos were combined (Tambo et al., 2019). Farmers in Burkina Faso who watched animated videos (scientific cartoons) on cell phones were as likely to adopt the triple bag technique to control insect pests in stored cowpea as were farmers who had received a visit from extensionists (Maredia et al., 2018). In 2017–2018 in Northern Ghana, videos on soybeans were screened to teach farmers new sustainable practices, such as inoculating soybean seed with rhizobia. A survey of 3009 farmers found that video was by far the most effective method for sharing information (Kansiime et al., 2021).

Zero Budget Natural Farming (ZBNF – now called Andhra Pradesh Community-Managed Natural Farming) is an agroecological practice spreading in India, encouraged by the state government of Andhra Pradesh. Since 2016 farmers have learned about natural farming in training workshops, held by the Farmers' Empowerment Organisation (RySS). By 2019, around 580,000 farmers in Andhra Pradesh were practising ZBNF, up from 163,000 in 2017–2018. The RySS community resource persons (CRP) organise a study circle in a village, and visit farmers' fields for trouble shooting in the afternoon. In the evening the CRPs show videos which farmers discuss. Exposure to video is part of the participatory learning ecosystem that also includes interaction with peers and others, media and training camps (Bharucha et al., 2020). Access Agriculture translated ten of its videos into the Telegu language (spoken in Andhra Pradesh) for the RySS programme (Bentley, 2020). Later, Access Agriculture translated 70 more videos to support the natural farming programme (Van Mele, personal observation).

The above studies are site-specific. We ask if videos can reach a large, worldwide, audience? Access Agriculture was the first organisation to offer freely downloadable farmer learning videos globally, over the Internet, starting in 2012. This was an innovative approach to information dissemination because at that time cell phones, Internet and even electricity were still missing from vast parts of the Global South, especially sub-Saharan Africa. At first, the founders of Access Agriculture thought that mainly extensionists would download videos from www.accessagriculture.org, and screen them in communities, where men and women farmers could discuss the ideas (Van Mele et al., 2016).

While Access Agriculture was built on respect for local knowledge, some other video providers 'are quick to demean and misconstrue local decision processes' (Stone, 2022). For example, the leaders of Digital Green explain that 'One of the major problems lies in poor knowledge about farming itself. Farmers tend to find refuge in their own intuition and the hearsay of fellow villagers, which sometimes results in a downward spiral of poor decision-making' (Gandhi et al., 2007; cited in Stone, 2022). Ironically, Gandhi and colleagues are actually misquoting Stone himself, who said nothing of the kind (Stone, 2022, pp. 17–18).

Stone (2022) warns that digital technologies may 'deskill' farmers, mining them for data, to sell them corporate goods and services. Access Agriculture aims to do the opposite, by encouraging farmers to experiment with the ideas shown on the videos. Many of the videos on its platform include examples of farmers supporting each other in groups, of local food processing and care for the environment.

Access Agriculture videos do offer technical suggestions for solving problems. For example, Access Agriculture videos show how striga (a noxious parasitic weed, widespread across Africa) can be controlled by fertilising with compost, or with a legume intercrop. However, the videos also include ecological and other scientific background that help farmers decide when to follow a recommendation or how to adapt it to their own context. E.g. the striga videos explain that the powder on the plant is really made up of hundreds of thousands of tiny seeds. This background scientific information helps farmers understand why hand-pulling the weed before it flowers will help to eliminate it from a field (see videos e.g. *Striga biology* and *Joining hands against striga* on www.accessagriculture.org). Follow-up studies in West Africa showed that farmers were not following advice blindly, but were modifying the suggestion to hand-pull striga e.g. by forming groups of women who could remove striga from others' fields for a fee (Bentley et al., 2017; Guindo, 2016).

Farmers prefer short videos, but not too-short (Bliss et al., 2019; Chivers et al., 2021; Thomas et al., 2018; Van Mele, 2011; Wright et al., 2018). Farmers in Africa often criticised videos that were under six minutes (Van Mele, personal observation). Short videos (10 to 15 min) can seem a bit dense, but farmers manage this by rewatching them. Bangladeshi farmers who were interested in conservation agriculture would watch a video on machine tillage several times, to study it (Bentley et al., 2016). Some British farmers also like being able to watch videos several times, to master the content better (Chivers et al., 2021).

From the start, Access Agriculture realised that a global service would need to be in multiple languages. All of the videos were available in English and French, but many were also translated into other languages as well, including local ones. Some of the videos were in over 20 languages. Realising the importance of radio for reaching rural audiences (Adamides & Stylianou, 2018; Fadairo & Oyelami, 2019), Access Agriculture included audio tracks that broadcasters could download and play on the air. Each video also came with a factsheet, a one-page PDF that could be downloaded as a memory aid.

While the videos were in many languages, at first the interface itself was only in English and French. Interfaces in other languages were added in 2018 (Spanish), in 2020 (Bengali, Hindi), and in 2021 (Portuguese). By 2021, the platform had videos in over 90 languages. Any language version could be selected from any of the six interfaces; e.g. one could pick an English-language video on the Hindi interface, or a Hindi video from the English menu.

Amateur videos may have problems, like wind noise, which farmers find annoying (Chivers et al. 2021), and which Access Agriculture avoids by using only professionally-filmed videos. Real farmers appear on camera, explaining and demonstrating the innovations, which makes the videos more convincing (Chivers et al., 2021; Riley, 2008; Van Mele, 2011; Van Campenhout et al., 2021). The narration can also merge scientific with local knowledge, using easy-to-understand language. Many of these farmers are women and almost all are smallholders.

Access Agriculture's central theme is agroecology, covering family farming, natural resource management, as well as food processing and local marketing. The videos are organised into 14 major topics: cereals; roots, tubers & bananas; vegetables; legumes; fruits & nuts; other crops; livestock; aquaculture; sustainable land management; plant health; equipment; business skills; approaches (e.g. extension, seed); and other. Most topics are split into several sub-categories, e.g. 'equipment' is divided into 'farm devices' and 'machines & implements'.

Most of the people who use Access Agriculture simply find it via search engines. Then they register themselves (in order to download videos) with no personal contact with Access Agriculture (Bentley et al., 2019). The first on-line survey in 2015 found that Access Agriculture's users came from research, extension, NGOs and farmers' associations (Bentley et al., 2015) i.e. not from farmers, but from other people who could share videos with smallholders. Nearly one in four of the users surveyed shared the videos with colleagues in other organisations. They reached about 750,000 people by screening the videos for small groups, in communities and in classrooms. An estimated 42 million people watched the videos on TV or listened to the audio track on the radio. Even in 2015, people were starting to watch Access Agriculture videos on tablets and cell phones. Although the platform already featured videos in many languages, users wanted more, and requested translation into Hindi, Spanish, Arabic, Swahili, Bangla, Luganda, Portuguese and many other languages. Users wanted videos on more topics. And they thought that Access Agriculture should more actively promote

itself. They added that the videos should be easier to download. In 2015 there were only 2533 registered users of Access Agriculture.

Three years after Access Agriculture's first on-line survey in 2015, registered users of the platform had tripled to almost 8000, in part because more people were getting online. Over 80% of the respondents to the 2018 survey were new, since the 2015 survey (Bentley et al., 2018). Most of them worked in Africa, 85% were male and over half were under 40 years old. They were researchers, extensionists, educators, and farmers, in that order. For the first time, farmers themselves appeared as a major user group of the service. The respondents in 2018 had reached another 21 million people, including six broadcasters who between them reached an estimated 20 million people. Most of these users downloaded the standard videos, although a remarkable 29% downloaded cell phone versions (3gp), which had only been introduced two years previously. Almost a third were also downloading factsheets and other publications from Access Agriculture.

Follow up studies in the field reconfirmed that farmers who watched videos with no facilitation from extensionists benefited. For example, in Benin, farmers who bought an Access Agriculture DVD from private vendors watched the videos on vegetable production. They blended the new information with their own knowledge to experiment (e.g. inventing new techniques for drip irrigation). Eighty-five percent reduced their dependence on agrochemicals (Zoundji et al., 2018). Women farmers in Benin who watched videos on rice parboiling (screened by NGOs in their communities) were more likely to form groups to process and sell rice than were groups visited by extensionists (Zossou et al., 2010). In Bangladesh, videos were demonstrated to be an effective method for communicating complex issues such as the biological and physical knowledge underlying pest management innovations (Chowdhury et al., 2015).

Access Agriculture videos shown in villages in Mali contributed more to the adoption of agronomic practices for men than for women. But videos on managing money enabled more women than men to enhance their cost–benefit accounting to improve income (Zoundji et al., 2017). Rice farmers in Uganda validated videos as an effective extension method, which stimulated their discussions and group learning (Karubanga et al., 2019). Self-motivation helps to improve the impact of videos; farmers in West Africa who bought Access Agriculture DVDs in a shop tended to view the videos, share them and experiment with the ideas. Farmers who received the DVDs from NGOs committed to the topic (striga) experimented and shared a bit less. Farmers who got the DVDs for free were the least likely to use the videos (Zoundji et al., 2020).

By 2018, farmers (and their representatives) were the largest group registering for Access Agriculture, so the authors conducted an online survey, only of farmers. They were generally well-educated, younger people, but they were clearly working on the land, and they were also eager to share information with their neighbours. The farmers used the videos creatively e.g. to start a family business selling high-value products like dairy, mushrooms or vegetables (Bentley et al., 2019).

New users are attracted in part because Access Agriculture has consistently added videos to its platform (Table 1).

1.1. Objectives of this study

In 2021, the authors conducted another online survey (Bentley et al., 2021). Previous ones (Bentley et al., 2015, 2018) had not focussed enough on women and youth, and it was important to see if they were being reached, especially because young farmers may be more able than their elders to find online videos (Chivers et al. 2021). The 2021 study also asked how the videos were impacting the lives of farmers, especially if they were farming profitably, and sustainably. Since audience size is a clear indicator of the usefulness of the videos, this study estimates how many farmers watched the videos, while also painting a qualitative picture. How did the videos influence people's lives? How did users judge the videos?

2. Method

The survey questions were designed in English and translated to French and Spanish. The questions

Table 1. Growth in number of video titles on Access Agriculture.

Year	Number of video titles	Video versions (1 title in 2 languages = 2 versions)	Number of languages
2012	31	221	18
2015	112	795	65
2018	189	1362	76
2021	219	2773	90

were entered into Survey Monkey, a web-based questionnaire platform. See Annex 1 for the list of questions.

We sent survey invitations to 31,733 email addresses, from our own contacts, and to the 18,306 people who were then registered users of Access Agriculture. Registrations had more than doubled since the 2018 survey, and were seven times higher than in 2015. The owners of each email address received an invitation in English, French and Spanish to take the survey. The invitation was sent over four days (4, 5, 8 and 9 February 2021). On 23–26 February, we sent the first reminder to everyone who had not yet taken the survey. We sent the second and final reminder from 9 to 11 March. We also sent invitations via several social media connections. The survey was closed on 6 April 2021; 2976 people took it, a response rate of 6% (apparently, few felt obligated to take the survey).

To incentivise people to take the survey, the invitations said that 'The first 1000 people who complete this survey will be entered into a draw. One winner will receive a free smart projector'. In fact, over 1000 people took the survey before all the invitations had been sent, so Access Agriculture drew the winner (a female schoolteacher in Kenya) from the first 2000 respondents.

The final section of the survey asked people to give us their contact details if they were willing to hear from us again, and 2335 people (78%) did so. We emailed some of them, especially those who needed videos in a specific language. For example, if a person said she needed videos in Kiswahili, we would send her a link to videos in that language. We also contacted respondents who had reached over 10,000 people (but had not specified how many), to get a more accurate number of the total audience size. Some respondents also agreed to be interviewed on the phone.

Most (87%) of the respondents were from Access Agriculture's audience of farmers, extensionists, educators and others. Only 13% had never used the videos, and they were automatically diverted to question 10 (suggestions for improving the platform), skipping the sections on using the videos. The results were analysed using software on Survey Monkey, which include descriptive statistics (e.g. number of responses, percentages) and charts and tables. This software allows for results to be filtered, e.g. one could screen out all respondents except for extensionists.

3. Results

3.1. Who uses Access Agriculture

The typical users of Access Agriculture are men under 40, mostly in Africa, working in extension, farming, teaching, or research. Of the 2976 people who took the survey, 78% (2335) completed it. They came from 106 nations, from Africa (83%), but also from Asia-Pacific (7%), Latin America and the Caribbean (6%), Europe (1%), North America (0.5%) and 2% who worked on more than one continent. The platform and its videos were clearly reaching people in the Global South (the target audience), with more potential to expand in the Americas and Asia. Many of the initial videos were filmed in Africa, were available in various African languages, and Access Agriculture had promoted the platform more across Africa from the onset, but now that video versions are being added in languages spoken on other continents, the platform may soon enjoy a greater appeal in Asia and Latin America as well.

In 2012, Access Agriculture did not anticipate that educators would be a large part of the audience, but they are (Figure 1). University and secondary school teachers find the videos useful in class: of the 305 educators who took the survey, 66% (201) reported sharing the videos with students. Educators also have basic computer skills and equipment. It probably also helps that many universities have free Wi-Fi (Ohei & Brink, 2021).

Farmers were tied for second place, with extensionists, educators and others. When Access Agriculture was formed in 2012, few rural people had access to computers or smart phones. At that time, the organisation anticipated that extensionists would download videos and show them to farmers. In less than 10 years, access to the Internet has improved so much that many of the platform's users are now farmers, who do not necessarily need mediation by an extensionist to access online information.

Over half (56%) of the respondents were under 40 years old (Figure 2), a slight increase since 2018 (then 52%). (The 2015 survey did not ask respondents to list their age). Only 16% of the survey-takers were women, as in 2018, even though Access Agriculture has made a big effort to hire female members of staff, to feature female farmers in the videos, and to host videos on topics that appeal to women (such as raising vegetables and small livestock). According to the African Union Commission (2021) young African men (ages 15–29) are more likely than

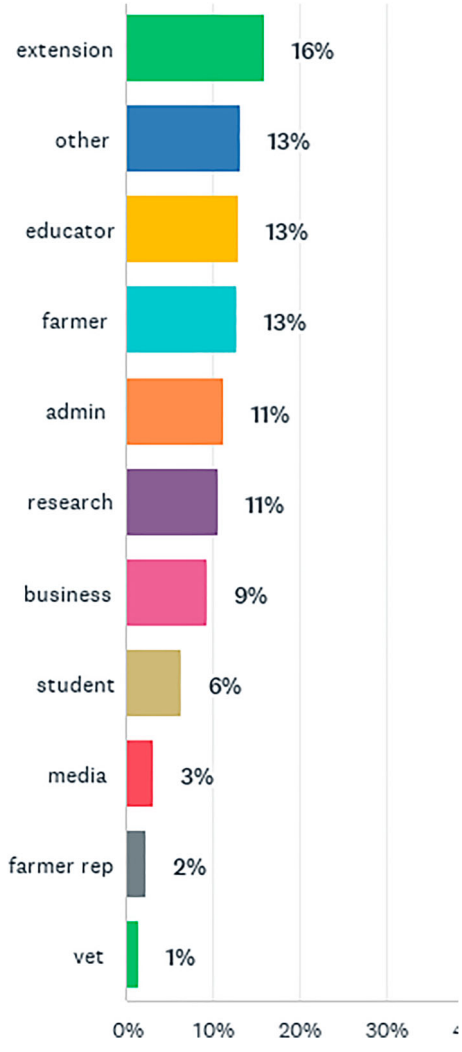

Figure 1. Occupations ($n = 2335$).

young women to have access to mobile phones (86% vs 77%) and Internet (44% vs 30%). Women may also have less money for airtime, and less time to search for information.

Between them, the respondents use all of the language versions offered on Access Agriculture videos. Fifty-five percent of the respondents knew that the platform had videos in other languages besides English, Spanish and French. This could be higher, so Access Agriculture is now improving the website to make the multiple language versions easier to find.

3.2. Using the videos

Sharing videos is a measure of their quality; people would not show useless videos to their friends or students, nor would they send the links to colleagues. Most respondents who used the videos had shared them with farmers (64%), with youth (46%), with extension (44%), students (39%), and in women's programmes (30%). Nineteen percent shared the videos with broadcasters, or broadcast them themselves.

Extensionists are not the only ones sharing videos. Three-quarters (72%) of the farmers themselves manage to share videos with their peers. For example, Tshibangu Mputu Derrick, a farmer in the Democratic Republic of the Congo (DRC) who is affiliated with the Associations des Agriculteurs Sans Frontières (A.A.S.F)/RDC wrote that the videos teach him different techniques of animal husbandry and agriculture, which he shares 'with all people of all ages in the village where my activities are located – And I put the links in our farmers' WhatsApp group'.

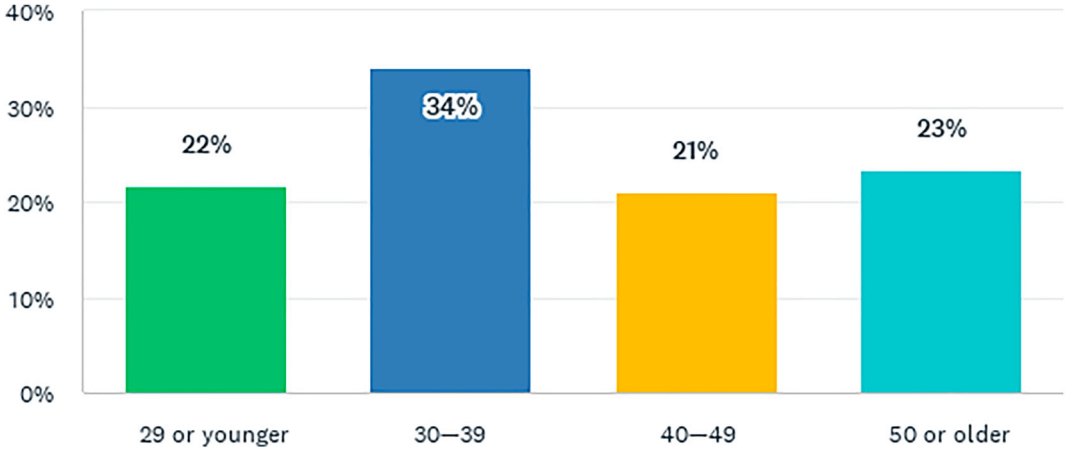

Figure 2. Age of respondents ($n = 2335$).

As in previous studies, videos were the first choice of files to download (Figure 3), but in 2021 there was an increase in 3gp files accessed, from 29% to 43%. The 3gp format is specially made for viewing videos on cell phones. As more people get mobile phones, 3gp becomes more popular.

People are using the videos more often. The survey asked, 'How often do you use Access Agriculture videos or audio tracks to train others?' The modal response was two to five times a year (591 respondents, i.e. 25%), followed closely by the 504 (21%) who use the videos to train others over 12 times a year (Figure 4). This is an increase since 2018, when only 15% shared videos 12 times per year or more, and much more than in 2015, when the modal response (41%) was 'never' and only 11% shared the videos more than 12 times a year.

One of the most popular ways to spread information was to learn from the videos, and share the new ideas with others (62%). Respondents were also screening videos in rural communities (59%), and sharing with organisations (40%). Respondents were also using information and communication technologies (ICTs) that had not been common when Access Agriculture started in 2012 (Figure 5). For example, a third shared on social media and 16% transferred videos onto memory cards for cell phones. For the question 'How have you used Access Agriculture videos to reach out to farmers?' there was an option to write in an answer. Many of

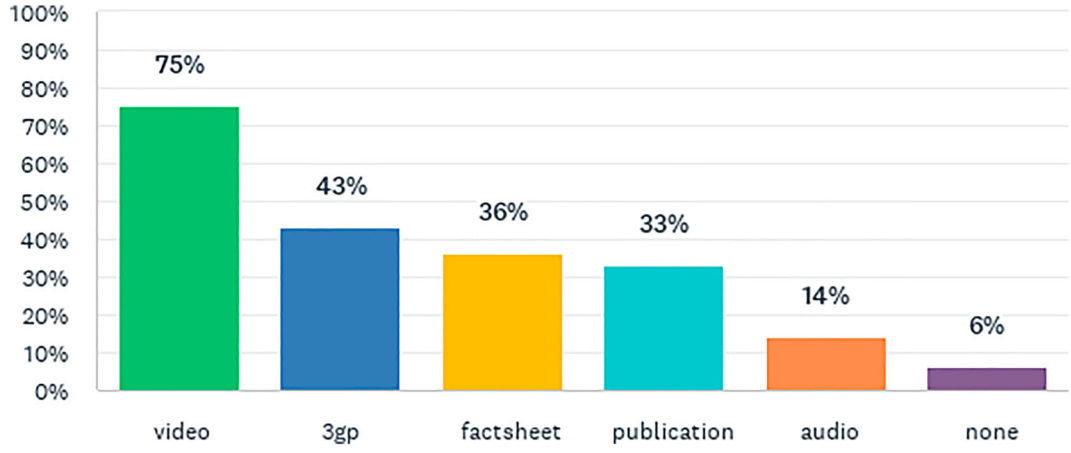

Figure 3. The type of file users download ($n = 2382$).

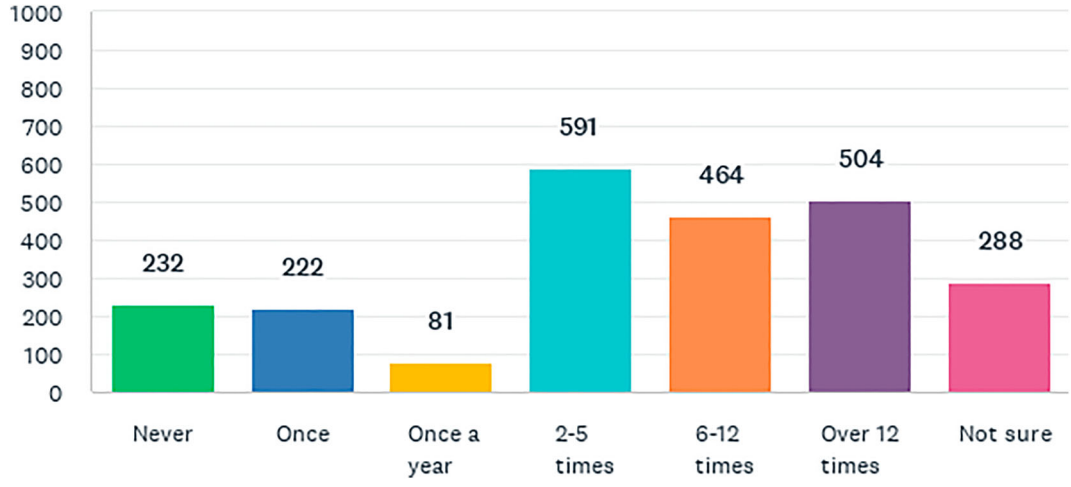

Figure 4. Frequency of training others ($n = 2382$).

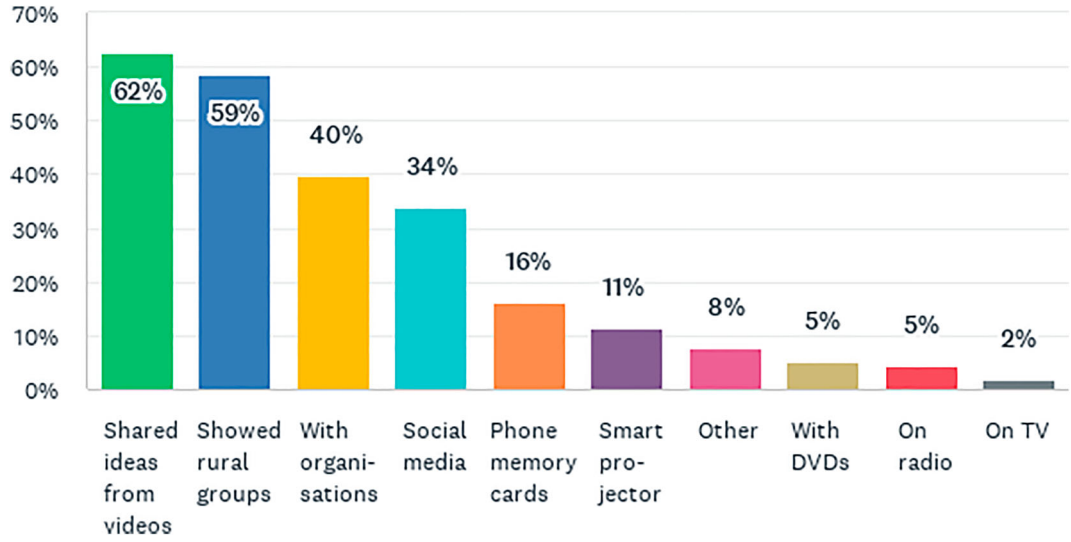

Figure 5. Responses to 'How have you used Access Agriculture videos to reach out to farmers?' ($n = 2302$).

them wrote in with innovative ways of sharing information, for example:

3.2.1. Burning DVDs

Uma Apollo of Kilimo Trust (an agricultural not-for-profit in East Africa) has reached 20,000 Ugandan farmers with videos in the Luganda, Kiswahili, Runyakitara, and Luo languages.

> After downloading videos, I burn them on a DVD and besides sharing with (rice) millers and companies dealing with farmers, I share with village (extension) agents both hard and soft copies for them to burn more in case they run out of the hard copies.

3.2.2. Buying equipment to show videos

Josephine Ng'ang'a of the NGO Research, Community and Organisation Development Associates (RECODA) in Tanzania writes, 'I use a projector to share with farmers. We have bought phones, soon we will use memory cards to share them'. In a follow-up email in 2022, she added that RECODA has loaded videos (from Access Agriculture and from other sources) onto flash cards for farmers who also use their phones to search the Internet for more information.

3.2.3. Beating COVID

An extensionist with an international NGO in Uganda reached over 1000 farmers with videos in the Runyakitara language. He said, 'I share videos to community-based trainers working with our farmer groups on WhatsApp. This has been extremely useful in helping us train farmers over the COVID lockdown period'.

3.3. Number of farmers reached

The hosts of an online video platform know how many people have visited the site, watched and downloaded the videos, but that still leaves the question of how many other people actually viewed them. This is especially important with agricultural videos, which extensionists share with farmers, which teachers screen for students, and it only takes a click or two to share videos with organisations via social media. One purpose of this survey was to estimate this larger audience, hidden from normal monitoring-&-evaluation. Between 2018 and 2021, Access Agriculture reached over 30 million farmers (Table 2).

Most farmers were reached by people who share videos using mass media. Still, a million people were reached by smaller programmes, even though (after 2018) Access Agriculture did not have the kind of large support programmes from CGIAR (international research) centres that reached large audiences in previous surveys. Combining data from the 2015, 2018 and 2021 surveys, at least 90 million farmers were reached through Access Agriculture videos, including small media and mass media.

The easiest way to reach over 10,000 people with a video is by broadcasting it on television or playing the soundtrack on the radio. The following two case studies suggest that conventional mass media can

Table 2. Total number of farmers reached with Access Agriculture videos or audios.

People trained	Median value	Responses	Farmers reached
None	0	244	0
1–10	5	539	2695
11–50	30	415	12,450
51–100	75	300	22,500
101–500	300	318	95,400
501–1,000	750	173	129,750
1001–5,000	3,000	110	330,000
5,001–10,000	7,500	61	457,500
Sub-total			1,050,295
10,000 +		50	29,459,340
Total			30,509,635

offer farmers a high-quality information experience, combined with commentary and interaction with the audience.

3.3.1. Staying grounded while on the air in Ghana

Since 2010 Gideon Kwame Sarkodie Osei at ADARS FM, a commercial station in Kintampo, in central Ghana, has had support from Farm Radio International (FRI). With their encouragement, Gideon started a weekly radio magazine show for farmers, where he plays Access Agriculture audio tracks.

The show starts with recorded interviews, where farmers explain their own knowledge of a certain topic, like aflatoxin (poisons produced by fungi in improperly stored food products). After the interviews, Gideon plays an audio track, to share fresh ideas with his audience. Gideon has played many more than 50 audios. Every week there is a guest on the show, usually an extensionist who can discuss the topic and take questions from listeners who call in.

Gideon's experience with the magazine inspired him to start listener groups, in coordination with FRI. Gideon is also a trainer for FRI. Before Covid, he would travel to other towns and cities in Ghana, meet other broadcasters, and go to the field with them to show them how to improve their interview skills and to craft their own magazine show. Now he continues to train broadcasters, but online. Gideon says that 60,000 people tune in to his radio magazine. (Adapted from a blog 'Staying grounded while on the air' on www.agroinsight.com).

3.3.2. A greener revolution in Africa

After settling in the USA in the 1990s, Isaac Zama would visit his native Cameroon almost every year, until war broke out in late 2016. About that time a new satellite TV company, the Southern Cameroons Broadcasting Corporation (SCBC), was formed to broadcast news and information in English.

In 2018, Isaac approached SCBC to start a TV programme to help Cameroonians impacted by the war to grow more of their own food. With his PhD in agriculture and rural development from the University of Wisconsin–Madison, Isaac was well placed to find content that farmers back home would appreciate.

Isaac's TV programme, Amba Farmers' Voice, is broadcast live from his studio in Virginia, every Sunday. He introduces each video in West African Pidgin, then plays it in English, and adds comments in Pidgin. Two to three million people watch Amba Farmers' Voice in Cameroon every week, besides many others in Nigeria, Ghana, Sierra Leone and even in some Francophone countries, like Benin and Gabon. 'People think that Africans don't have cell phones', Dr Isaac Zama says, 'but 30% of the older farmers in villages have android phones, which they use to watch the broadcast on Facebook'. (Adapted from a blog 'A greener revolution in Africa' on www.agroinsight.com).

Leveraging his experience from the programme, Isaac has been recruited as a volunteer expert by Winrock International through its Farmer-to-Farmer programme to train fish farmers in the north of Ghana (via virtual meetings), to make organic fertiliser with pond residue. He illustrates his meetings with videos. To create more impact, Isaac plans to introduce an android app that would enable many more farmers to watch the programme via WhatsApp (Isaac Zama, personal communication 2022).

3.4 Impact on communities, women and youth

The survey asked how the videos had made a difference in farm families' lives. Answers were multiple choice, and more than one was allowed. Choices were randomised so that each respondent saw them in a different order, to avoid biasing the first few possible responses. The top response, 'better yield' garnered almost 50% of the responses (Figure 6). This suggests that strengthening farmers' knowledge on agroecology (as Access Agriculture videos do) can improve farmers' yields, an idea that is currently debated (Anderson et al., 2021, p. 18).

The next most frequent answers support the notion that the videos promote productive, sustainable agriculture. 'Improved pests, disease and weed management', 'better soil health and soil fertility',

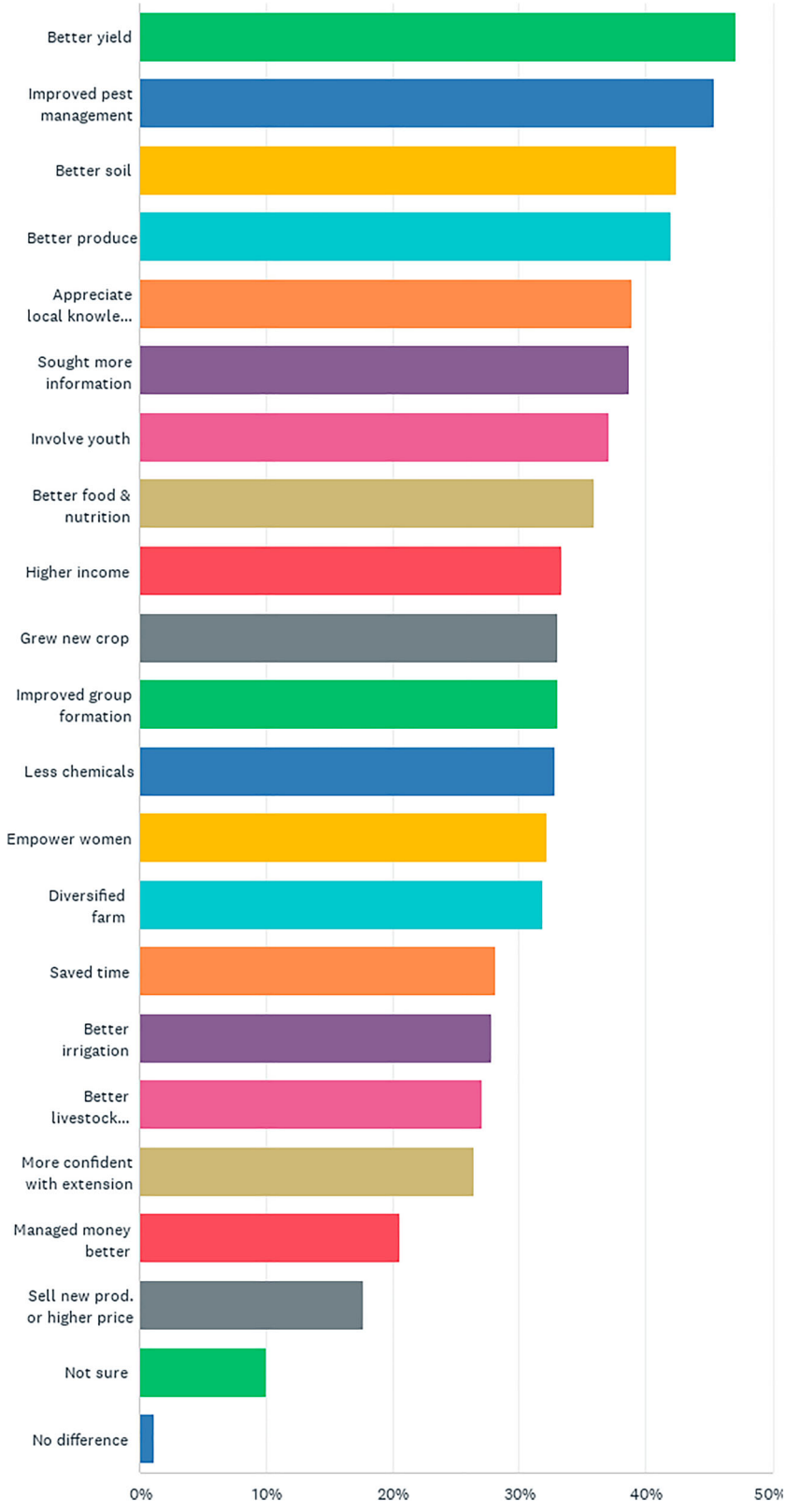

Figure 6. Responses to 'How have Access Agriculture videos impacted farmers?' ($n = 2210$).

and 'better produce' were all noted by over 40% of respondents. Many (39%) felt that the videos helped farmers to appreciate local knowledge, and to improve their self-esteem. Only 1% thought that the videos had made no impact on farmers' lives.

Respondents who share videos with women tend to be young (57% are under 40, including 17% under 30), but most of them are men (83%), suggesting that videos are reaching women farmers through male extensionists. The people who share videos with women's group are also more active than many users; 34% share videos over 12 times per year.

3.4.1. Generating employment for female youth

Subash Biswas with ASD-Bangladesh (Association for Sustainable Development in Bangladesh) shares videos with adolescent girls who dropped out of school, and with women from poor families to motivate them to try vermicomposting and other income-generating activities. In a follow-up phone call with Ahmad Salahuddin (of Access Agriculture) Mr. Biswas, who has a diploma in agriculture, explained that he reaches about 500 farm families, mainly by providing training and entrepreneurial support on vermiculture and vegetable growing in Sadar Upazila, Magura, Bangladesh. The NGO has seven employees and a dozen volunteers. Subash started using Access Agriculture videos in March 2020 at the start of Covid. He found the video summaries on YouTube, but then taught himself to download the full-length videos from the Access Agriculture platform. Mr. Biswas is not unusual in that regard. Most users find Access Agriculture by surfing online, rather than from a personal contact. In a recent email in 2022, Subash Biswas writes that during the Covid pandemic, most users find it safer to receive information by phone or online, rather than from a personal contact. Chivers et al. (2021) also note that Covid has given online videos a greater role in extension.

3.4.2. For women's cooperatives

Abdullateef Olaosebikan, an entrepreneur with NaFarm Foods in Nigeria says 'I download the videos and share with women cooperatives society in food processing, on their phones so that they view them to learn'. He has shared over 50 videos, reached over 1000 farmers and has also shared the videos with 11 organisations.

3.4.3. Groups for young mothers

Kodjo Hilaire in Benin has shared over 50 videos with over 1000 people, to train young mothers who are beneficiaries of the JARDALIM project 'integrated home gardens' of the NGO Benin Centre for Environment and Economic and Social Development (CEBEDES-XUDODO).

Respondents who share videos with youth tend to be young themselves (61% are under 40, including 24% under 30). They are extensionists (19%), farmers (14%), others (12%) and business people (11%). Only 11% are educators, suggesting that the youth being reached are young farmers, and not just students. One educator who took the 2021 survey was the distinguished Bolivian university professor, Dr Alejandro Bonifacio.

3.4.4. The farmers of tomorrow

Professor Alejandro Bonifacio is from the Altiplano, the semi-arid plains at 4000 m above sea level. He teaches plant breeding at the public university in La Paz (Universidad Mayor de San Andrés). Many of his agronomy students confide that they would like to take over their parents' farm, if only they didn't have to farm like their parents did. The youngsters want to use small machinery, and do less pick and shovel work. Young farmers also want to exploit emerging markets for differentiated produce, such as organic food.

Professor Bonifacio shares Access Agriculture videos with his students. Every year, Bonifacio organises a forum for students on plant breeding and crop disease. He assigns them three videos to watch, to discuss later in the forum. One of his favourites is *Growing lupine without disease*, which shows some organic methods for keeping the crop healthy. (Adapted from a blog, 'Teaching the farmers of tomorrow with videos', on www.agroinsight.com).

3.5 Sharing with organisations

Many people (1538) shared videos with other organisations, including 182 (7%) who reached out to 11 agencies or more. For the question 'Could you please list the organisations you have shared Access Agriculture videos with?' over a thousand people (1250) took the trouble to write in an answer (Figure 7). A few organisations were mentioned twice or more, but the vast majority were mentioned only once. We counted almost 5000 organisations reached (4927). This includes respondent's own organisation, and the others they shared with. This is probably an undercount, because

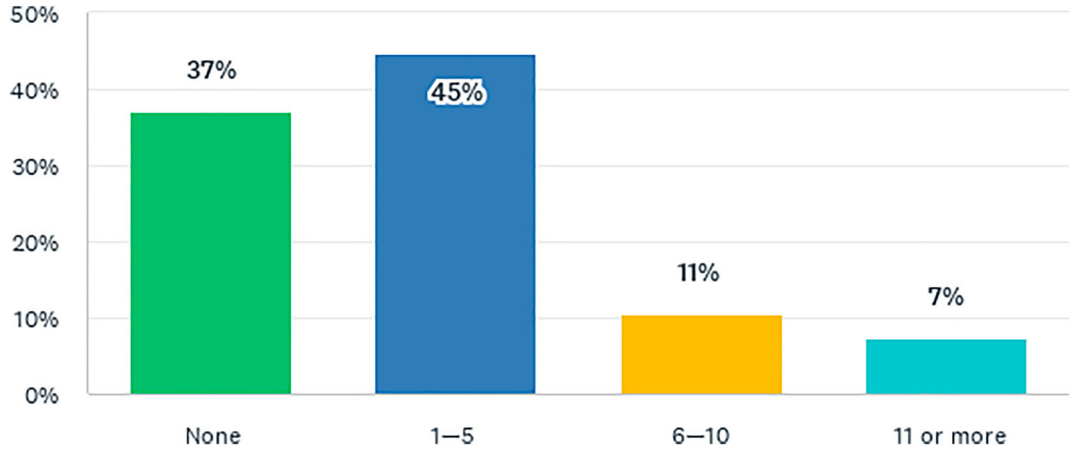

Figure 7. Number of organisations who received Access Agriculture videos from the platform's users ($n = 2450$).

several respondents said they shared with many other organisations, too many to write down. For example, an ICT person with the Agence Nationale d'Appui au Développement Rural (DFD-ANADER) in Côte d'Ivoire shared the videos within his agency which works with universities and more than 2500 cooperatives.

4. Discussion

This paper asks if there is an appropriate role for online videos to share information with the world's farmers about sustainable agriculture. This online survey shows that in only 3 years a medium-sized organisation like Access Agriculture (much smaller than a national extension agency) can reach over 30 million farmers in at least 106 countries with quality information. Few of the respondents had any direct contact with Access Agriculture, suggesting that users will find relevant videos by using search engines and through their social networks. Most of the users are in Africa, suggesting that online videos can appeal to parts of the world that do not have the greatest access to electricity and Internet.

The videos were accessed by a relatively young audience, implying that digital media may help to engage the next generation of farmers. Young people in Ethiopia, Uganda and Tanzania, for example, are willing to stay in farming (counter to the prevailing stereotype) if agriculture can be made profitable for them (Njuguna-Mungai et al., 2021). Using a digital platform is easier for youth than for elders, and young farmers are often entering niche markets that may include organic produce (see Bentley et al., 2019; Van Mele, 2021). Many educators who responded to this survey are showing agricultural videos in classrooms: a further avenue for reaching young farmers and future extensionists.

Access Agriculture makes concerted efforts to reach women. For example, many of the videos are filmed by women. Almost all of the videos feature women farmers (often filming more women than men). As in previous Access Agriculture surveys, only 16% of the respondents in 2021 were women, which may reflect the gender gap in access to the Internet. Actually, it is possible that more women use the service. First, in the most recent analysis of the Access Agriculture website statistics, 43% of visitors were female (Josephine Rogers, personal communication). Perhaps women had less time to take this survey, or maybe men had greater access to computers (as opposed to mobile phones), which can make it easier to fill in the survey. Second, as this survey shows, extension agents (mostly male) do screen the videos for women, often in organised groups. Female farmers in various African countries regarded video screenings in communities as one of their favourite ways of learning (Kansiime et al., 2021). In the future, reaching more rural women may depend on encouraging people to share videos with organised groups of female farmers.

Mobile phones are emerging as a key vehicle for sharing videos, as evidenced by the growing number of people who download the 3gp (phone-friendly) versions of Access Agriculture's titles. This indicates that outreach will be increased with

applications (apps) that will make it easier to share videos on cell phones. The online videos are so highly appreciated that the audience shares them with others. Some 5000 organisations received physical copies or links to the videos from the respondents to this survey, with no direct contact from Access Agriculture.

Although an estimated 30 million farmers watched these agroecological videos between 2018 and 2021, most of these viewers watched on TV or heard a soundtrack on the radio. Videos will only be shared this way if the cinematic quality is good. Broadcasters reject inaudible videos with blurry images, suggesting that amateur 'participatory' videos will only ever find small audiences.

The 30 million viewers include one million who were reached in small groups, facilitated by extensionists or neighbouring farmers who showed videos on their TV sets or on screens set up at twilight on the village green. This indicates that videos can be used in facilitated programmes, by extensionists who can answer questions and lead discussions. Respondents said that the main impact of the videos was to boost yields. This is crucial when critics accuse ecological agriculture of leading to diminishing yields (see Anderson et al., 2021).

Most respondents share the videos with farmers and with organisations. They would only do this if they found the videos of solid quality, lending support to the approach used by Access Agriculture, including: (1) The videos are professionally filmed (farmers speak on camera, but do not make the videos). (2) The videos are filmed locally, but on topics of broad interest (the zooming-in zooming-out, or ZIZO method – Van Mele, 2006). (3) The videos explain underlying scientific principles in a way that triggers farmers to adapt ideas to their own context. (4) Each video is published in multiple languages, often local ones. (5) The videos, audios and factsheets are easily downloadable for free.

5. Conclusion

As extension services struggle to reach the world's farmers with appropriate information on agroecology, new ICTs are rapidly becoming more available across the Global South. Most farmers now have a cell phone and can access educational videos. Currently, Access Agriculture is the only organisation specialising in providing agroecology videos on demand, for free, online. Making a living by producing healthy, environmentally-sound food demands that millions of farmers speaking many languages be reached with proper ideas that they can experiment with. Online videos can join quality and quantity, reaching many farmers with information and ideas they can test on their own farms.

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Appendix

Annex 1: questionnaire for Access Agriculture 2021 on-line survey

Access Agriculture hosts over 220 learning videos in over 85 languages on its video platform (www.accessagriculture.org). All the videos are free to watch or download.

The first 1000 people who complete this survey will be entered into a draw. One winner will receive a free smart projector.

Access Agriculture

1. How do you use the Access Agriculture videos? (Please select all that apply).

I share them with farmers.
I share them with extension agents.
I share them with broadcasters, or I broadcast them myself.
I share them with students
I share them with youth (people under 30 in rural and urban areas).
I use them in programs for women.
I watch the videos by myself.
I haven't used them yet.
Other (please tell us about it). _____

Use of platform and videos.

2. Which files do you download from the Access Agriculture platform? (Please check all that apply).

video (mp4 - to watch on computers)
mobile video (3gp - to watch on cell phones)
audio
factsheet
publication
I haven't downloaded any files

3. How many videos hosted on the Access Agriculture platform have you watched?

1—5
6—10
11—20
21—50
Over 50
I have watched some, but I can't remember how many.

4. How many Access Agriculture videos or audio tracks have you shared with others?

None
1—5
6—10
11—20
21—50
Over 50
I have shared some, but I can't remember how many.

5. How often do you use Access Agriculture videos or audio tracks to train others?

Never
I only used videos or audio tracks once
Once a year
2–5 times a year
6–12 times a year
More than 12 times a year
I'm not sure

Sharing with farmers

6. How have you used Access Agriculture videos to reach out to farmers? (Select all that apply).

I showed them in rural communities or to small groups.
I shared them on social media.
I shared them with organisations that work closely with farmers.
I distributed DVDs to farmers.
I broadcast videos on TV, or shared them with TV stations.
I used audio tracks for radio broadcast or shared them with radio stations.
I learned ideas from the videos and shared the information with others.
I used a smart projector.
I distributed videos on memory cards for phones.
Other (briefly describe). _____

Impact

7. With how many farmers have you or your organisation shared Access Agriculture videos or audio tracks since 2018 (including radio and TV)?

None
1—10
11—50
51—100
101—500
501—1,000
1,001—5,000
5,001—10,000
More than 10,000. If more than 10,000 please write an estimate number here. _____

8. How have Access Agriculture videos impacted farmers? (Please select all that apply). (These answers were displayed randomly, so as not to prejudice the first ones on the list.)

Better yield
Improved pest, disease or weed management

Better quality produce
Were able to sell new products or get higher prices
Better soil health and soil fertility
Better use of irrigation water
Less use of pesticides or other agrochemicals
Saved time or labour
Higher income
Managed money better
More diversified farm, such as with more intercropping and more relay crops
Inspired to grow a new crop
Better livestock health
Better food and nutrition
Stronger appreciation of local knowledge and higher self-esteem
More youth involvement
Greater empowerment of women
Farmers have become more pro-active information seekers
More confidence to approach extension agents
Improved group formation
The videos did not make a difference
I'm not sure
Other (please tell us about it). _____

9. Besides English, French and Spanish, Access Agriculture hosts videos in many other languages as well. Which language versions have you used?

I wasn't aware that there were any videos in other languages.
I have used videos in the following languages (please list them) _____

Opinion about the Access Agriculture platform and videos

10. Do you have any suggestions for improving the Access Agriculture platform or the videos it hosts? (Optional). _____

Networking

11. How many organisations have you shared Access Agriculture videos with?

None
1—5
6—10
11 or more

12. Could you please list the organisations you have shared Access Agriculture videos with? (Optional). _____

13. Access Agriculture can translate its existing videos into more languages, but this takes funding. Would your organisation be interested in supporting the translation of more videos into local languages?

Yes
No
Other (please tell us about it). _____

14. Access Agriculture supports young, local people to become e-extension service providers with smart projectors to share videos with rural communities. Would your organisation be interested in supporting such youth entrepreneurs?

Yes
No
Other (please tell us about it). _____

Personal information

15. In which countries do you work?

16. What kind of work do you do? (Please check the one that most accurately describes your main occupation).

farmer
farmer representative
extensionist
educator (teachers and staff of university, or other types of school)
student
researcher
media (TV, radio, web page design and related fields)
business (including agricultural input retailers or wholesalers, processors and traders in farm produce)
veterinarians or other animal care givers
administration
Other (please specify).

17. What is your age?

29 or younger
30—39
40—49
50 or older

18. What is your gender?

Woman
Man
Prefer not to say

Let's stay in touch! Is it OK if we contact you for follow up questions?

First and last name
Name of your organisation
Email
Telephone