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Spreading
know-how

Photo: P. Luttini / Biovision

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Dear Reader,

Whether “Changing markets” or “Food losses”, “Responsible investments” or “Organic farming”, no matter which aspect we devoted previous editions to, preparing the contents would always involve a debate on how much the success of the respective measures also depended on the crucial aspect of agricultural extension. There was a general feeling that at least one article ought to take up this topic. We usually dropped the notion, realising that “Rural advising” deserves an edition specially focusing on the topic. It is this edition that you now hold in your hands.

In the first part of the magazine, we address general questions. Why is rural advising important, and what objectives does it pursue? Why have extension services often been unsuccessful in the past? How should advising be conceived nowadays for it to be effective and sustainable? (p. 6). A question closely connected to this is which actors are involved in the pluralistic advisory systems operating nowadays, which respective roles they assume, and what problems emerge from their different tasks, values and mandates (p. 9). Focusing on the example of Malawi, our authors show what such a pluralistic extension landscape looks like in practice and examine whether it makes sense to speak of a “system” in this context (p. 12). And ultimately, there is always the question of whether and how rural advising can be sustainably financed. As could be expected, there is no “one size fits all” answer to this (p. 16)

The second part of the Focus presents examples of various advising concepts, methods and tools, concentrating on their strengths and weaknesses. It starts with the “Management advice for family farms” (MAFF) concept that has been applied in Francophone Africa for almost 20 years. The participative approach goes way beyond pure knowledge transfer and disseminating new practices, centring on the family farm as an economic entity. Here, farmers are encouraged to reflect about their own managerial practices and to analyse their farms’ performance (p. 19).

Traditional media such as radio and television have always played an important role in extension communication. With increased access to Internet services and mobile technology, the architecture of information communication has become more and more decentralised and democratised. However, modern Information and Communication Technologies are not a silver bullet either. If the social and political contexts are not well understood, even the most sophisticated ICT application will be useless, as experience from various countries shows (p. 22).

The Farmer Communication Programme run by the Swiss Biovision Foundation is based on close co-operation with research institutions aimed at providing farmers in East Africa with state-of-the-art insights in organic farming. Much of the content of the

monthly magazine published by the foundation is determined by the farmers’ feedback. In addition to SMS and an Internet platform, knowledge dissemination is supported by a radio programme broadcast twice a week in which farmers report on their experiences (p. 25).

Farmer-to-farmer knowledge exchange is also at the centre of the “Best Farmer 2012” project. The objective of the “Innovation Competition and Agricultural Show” run by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) in Cambodia was to create a public platform where small-scale farmers could present their innovations and achievements and learn from each other. In addition, direct contact between the farmers and their organisations with private companies and retailers was promoted (p. 28)

For Africa Harvest, the biggest obstacle that technology adoption faces in Africa is that the respective projects are too one-sided. Activities in the organisation’s “Whole value chain approach”, at the centre of which is supplying farmers with clean banana plantlets, range from awareness raising with the aid of demonstration plots and co-operation with banks and enterprises in order to make the innovation accessible to the potential beneficiaries via permanent training measures on growing cultures to supporting market activities (p. 30).

What all of the “modern” concepts presented here have in common is that they attempt to break with the old top-down extension practices and promote more participative ones. This also includes integrating the traditional knowledge of farmers and taking women’s needs into consideration. It is not an easy venture, but is clearly feasible, as our example from Papua New Guinea shows (p. 33).

Often enough, charcoal production contributes to the destruction of vulnerable ecosystems. However, sustainable charcoal production can be achieved with a clever management system that is equally beneficial to the natural resources and the population (p. 36). The same is true of our Indian example. Not quite three years ago, the First Agro company was founded. It provides hotels, restaurants and retailers with guaranteed zero pesticide vegetables (p. 39).

Have an interesting read!

Silvia Richter



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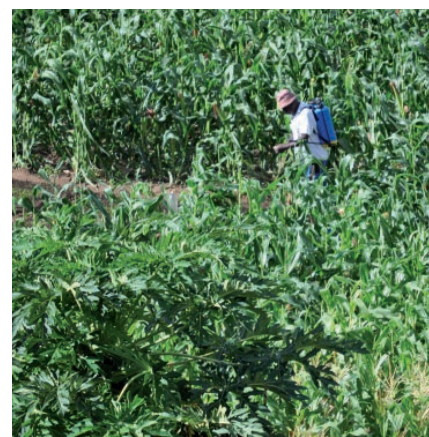


Photo: S. Richter



Photo: F. Kraemer/GIZ



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Photo: GIZ/ECO

Family farming: let's forget ideology

Against the backdrop of the International Year of Family Farming (IYFF) declared by the United Nations, the World Farmers' Organisation (WFO) and the European Union Farmers' umbrella organisation Copa-Cogeca ran a joint event in Brussels, Belgium, in mid February 2014. "North-South family farming – how to respond to the same challenges?" was the topic addressed by participants coming from a wide range of European and African countries.

Participants insisted that family farming was neither a question of "large" or "small" nor of "intensive" or "extensive", or "diversification" or "mono-culture", but that the real issue was the way of life the characteristics of which depended on the socio-economic context the farmers lived in. There was also agreement that strengthening family farms, of which there are around 525 million world-wide, was a key to combating hunger and poverty.

■ Learning from experience gained in the North

Around 85 per cent of the family farms manage less than two hectares of land, especially in Africa and Asia. However, Gerd Sonnleitner, Special IYFF Ambassador of the United Nations, believes that focusing on protecting smallholders is the wrong approach, since this would only perpetuate poverty. "We have to bring the extremes, modern and traditional farming, together in order to achieve a win-win situation in overall development," said Sonnleitner, who used to be Copa President, in Brussels. He also reminded the meeting that in the 1950s, agriculture in Europe had been facing the same

Just like soccer stars, top farmers ought to be in the media to make the sector attractive for young people.

problems as the farms in countries of the South are confronted with today. Three factors had been crucial to recovering from a situation of shortage: a reliable political framework (e.g. ensuring ownership, since farmers have to plan over a long period), consistent, continuous further training and education (farming was a sophisticated profession, and challenges like climate change and price volatility required dynamic adaptation) as well as the promotion of independent farmers' self-help organisations. Governments in the countries of the South ought to above all support the establishment of machinery co-operatives, which were both economical and environment-friendly, Sonnleitner maintained.

■ Co-operation and market access key

Charles Ogang, President of the National Farmers Federation of Uganda, UNEFE, agreed that strengthening of farmer organisations was an important measure in addressing the wide range of challenges that family farms are facing. The Federation supports the setting up of village savings groups, organises agricultural shows and provides extension services. "This

is especially important for those farmers who cannot profit from government extension services," Ogang said. In addition to investments in infrastructure, research, extension, education and health, promoting access to productivity-enhancing technologies was a key factor. The Federation President also called for the documentation of indigenous knowledge. The contribution that smallholders were making towards sustainable production, such as on-farm research by selecting high yielding crop varieties and good livestock breeds, was often forgotten.

Tackling the hurdle of market access was key to the successful management of family farms, Daniel Gad, Managing Director of Omega Farms Plc, Ethiopia, maintained. Gad, himself an entrepreneur, was convinced that only simple means were needed to improve regional market accessibility. For instance, farmers could join forces to process food and thus generate value added. He referred to the manufacture of peanut butter from groundnuts, which up to more than a decade previously had been performed by a single small company in the country. Nowadays, less than two per cent of peanut butter on sale in the supermarkets in Addis Ababa was imported.



Photo: J. Boethling

“Agriculture contributes significantly to economic growth in Africa; the big missing gap is investment in the value chain,” Gad said.

■ Bringing financial literacy to farmers

In Uganda, the development of milk collection centres has proved to be a success. Here, dairy farmers come together to bulk their produce. “This makes processing and transport easier and enables the farmers to maintain the cool chain, which is difficult to accomplish at family level,” Evelyn Nguleka, President of Zambia National Farmers’ Union (ZNFU), told the meeting. One of the biggest problems for the producers was setting the price, which was why the Union had introduced a national telephone number for price information. “It is important for farmers to be able to calculate what they need. We are trying to bring financial literacy to the farmers,” Nguleka said. All information available on the ZNFU Internet page should also be made accessible to

mobile phones. “Everyone has them in Africa,” she pointed out.

■ Young people need role models

Getting enough young people into farming is a problem that equally affects family farms in the North and in the South. The situation is particularly dramatic in countries such as Uganda, which has a youth unemployment rate of more than 80 per cent. But the sector has a poor image. “Most are farmers by default; agriculture is for the less educated – with low income and high risks,” said Denis Kabiito of Caritas Kasanaensis, referring to public perception. Moreover, farmers tended to dress in rags, which young people found repugnant. Furthermore, agriculture was used in schools or prisons to punish undisciplined individuals.

So what can be done to revamp the image of agriculture? For one thing, young people would have to see their parents enjoying a good quality of life with their farms. Second, there would

be a need for role models, similar to the soccer stars on TV. “Let us copy the best and publish,” said Kabiita, who also called for bringing innovations and mechanisation to farmers in order to make the sector more attractive for the youth. Offering them capacity building was a further important step. To this end, however, curricula some of which still went back to the days of the British Empire had to be revised.

Even though it was stressed again and again that the size of a farm did not matter in the family farming concept, this issue remained centre-stage in the event. “In Europe, you often say that small is beautiful, although that isn’t necessarily true; to be small often means having to face a lot of hardship,” said Denis Kabiito towards the end of the meeting. To Roberto Poggioni of the Italian farmers association Confagricoltura, ideological professions were of only secondary importance. “Our aim is to be able to hold our own in the big markets despite being small,” Poggioni explained.

Silvia Richter

UNEP calls for reassessment of global land use

Up to 849 million hectares of natural land – nearly the size of Brazil – may be degraded by 2050 should current trends of unsustainable land use continue, warns a report by the United Nations Environment Programme (UNEP). The UN authority therefore demands more resource-efficient land management.

The need to feed a growing number of people globally has led to more land being converted to cropland at the expense of the world’s savannah, grassland and forests. This has resulted in widespread environmental degradation and loss of biodiversity, affecting an estimated 23 per cent of global soil. Between 1961 and 2007, cropland expanded by 11 per cent, a trend that

continues to grow. The report entitled *Assessing Global Land Use: Balancing Consumption with Sustainable Supply* uses the ‘safe operating space’ (SOS) concept as a starting point to understand how much more land use can occur before the risk of irreversible damage – in particular through biodiversity loss, release of carbon dioxide, disruption of water and nutrient cycles and loss of fertile soil – becomes unacceptable. The scientists calculate that the global cropland area available for supplying demand could safely increase by up to 1,640 million hectares. As an interim target, they propose 0.20 hectares of cropland per person by 2030.

The experts believe that while the world’s average agricultural yield

growth is slowing, the opportunity to increase productivity in regions with lagging yields, like sub-Saharan Africa, is promising. Capacity building on best management practices, integrating scientific and local know-how and investing in the remediation of degraded soils offer strong potential for maximising yield. In high-consumption regions, more efficient and equitable use of land-based products is required. Up to 319 million hectares of land can be saved by 2050, if the world follows a combination of measures designed to keep cropland expansion within the ‘safe operating space’. (UNEP/wi)

More information:

➤ www.rural21.com → News

Rural advisory services – back on the development agenda!

Over the last few decades, the range of agricultural extension and advisory services as well as the notions of which tools and methods are most suitable have seen fundamental changes. Our authors give an overview of old and new approaches, showing what we already know and where there is a need for more information.

We live in a complex and ever-changing world, with a growing population faced with increasing needs for food, fibre, and fuel, coupled with the challenge of maintaining natural resources. When we throw in issues such as climate change and uncertain markets, this means that innovation in agriculture – with the requisite sharing of information and access to input and output markets – is essential to meet these challenges.

Agricultural extension and advisory services are increasingly seen as a key means to promote innovation. These services help farmers deal with risk and change, by improving their livelihoods and strengthening their capacities. They assist in spreading new ideas and sharing existing technologies and practices, as well as in supporting the organisation of farmers and linking them to markets. In addition to agriculture and production, advisory services are also hoped to address challenges such as nutrition education and rebuilding after crises.

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■ From a “green revolution approach” to a global forum

This interest has not always been a given. The first wide application of agricultural advisory services in developing countries took place in the middle of the last century. During that time there was concern about the growing hunger and potential starvation of millions of smallholders in Asia and beyond. Research and extension were deployed to address this challenge (mainly with high-yielding maize and wheat varieties) as part of the “Green Revolution”. Transfer of technology (TOT) was seen as an important way to assist farmers through the provision of improved seeds, fertilisers, and pesticides, along with training them in how to use them. Regarding the introduction of modern rice varieties, the transfer of technology was a success in broad terms (although

it did lead to ecological and biodiversity concerns). However, subsequent attempts to apply the TOT approach in other contexts – such as Africa – mainly failed.

Due partly to the perceived failure of extension services in terms of effecting the Green Revolution in Africa, and combined with forced public services budget reductions by lending institutions, support to advisory services (and to education and research) declined starting in the 1990s. This has led to an erosion of capacities in providers of advisory services, who find it difficult to perform traditional roles, let

Extension services are to become more demand-driven nowadays, with farmers being actively involved in the process of prioritising and generating extension content.



Photo: © J. Binder/GIZ

Farmers' own knowledge is seen as an important resource to draw upon.

alone take on new ones. Despite a lack of funding and attention by the international community, non-governmental organisations and others sought alternatives to TOT and experimented with participatory research and extension approaches. At the same time, there was a growing interest in indigenous knowledge as a source of best practices and innovation.



Photo: © M. van Eckert/GIZ

It was then that a group of donors and other development agencies came together to discuss the role of extension in agricultural development. Called the "Neuchâtel Initiative," the group met yearly between 1995 and 2010 to discuss alternative approaches and set common frameworks on extension and advisory services. This led in 2010 to the establishment of the Global Forum for Rural Advisory Services as a proactive functional body to provide advocacy and leadership for extension world-wide. It does so through providing voice vis-à-vis the international development community, providing a platform for exchange and strengthening of extension networks, and the development and synthesis of evidence-based approaches and policies.

■ Rethinking extension – the new pluralism

This renewed interest in extension runs in parallel with efforts in rethinking its role (see Box on page

8). From a linear view of extension through TOT, the understanding has now shifted towards networks and innovation systems. In practice, this means that the role of extensionists is not merely to train farmers, but to facilitate between and link the different stakeholders in agriculture (e.g. farmers, research, traders, etc.) as well as maintain platforms for mutual learning and exchange. In addition, as any actor in the innovation system is now seen as holding and potentially contributing to the development of improved technologies and practices, the farmer's own knowledge is viewed as an important resource to draw upon. This is also apparent in the attempts to make extension more demand-driven, with new approaches and methods striving to identify farmers' needs by actively involving them in the process of prioritising and generating extension content as well as monitoring and evaluating the services. The important role of farmers' organisations in providing extension services is also recognised.

These new roles and functions have led to a growing pluralism in agricultural extension providers and methods. In addition to the usual government-funded extension services, advice and facilitation are now also increasingly provided by private companies, farmer organisations, and NGOs. Information and Communication Technologies (ICTs), too, are increasingly used for the sharing of knowledge and information, especially given the rising ubiquity of mobile phones in rural areas.

This pluralism arose partly as a response to the difficulties many government-funded extension services have in maintaining their effectiveness with often limited funds, and in adequately responding to the needs of their client base. And while it does broaden the reach of extension and advice, it also entails the risk of technological biases and path dependencies. Thus there is a danger of companies giving preference to their own products when offering advice. Neither is there any guarantee that the technology trajectories opted

Towards networks and innovation systems

Extension as viewed from the innovation systems perspective is a much different function than the linear model. The innovation system recognises the many different sources of knowledge and focuses on interactions between actors rather than just the actors themselves. It also notes the important role of the institutional environment. When seen in this light, extensionists have a critical brokering role between farmers and other sources of knowledge.

These new roles of extension are reflected in approaches to extension and development such as farmer field schools, study circles, innovation platforms, and farmer research groups.

More information:

GFRAS activities, documents, the 'New Extensionist' etc.: ► www.g-fras.org/en

Farmer field schools: ► www.farmerfieldschool.info

Rural Finance Learning Center: ► www.ruralfinance.org

International extension conference: ► <http://extensionconference2011.cta.int>

References and further links: ► www.rural21.com

for, be it in good faith, from outside will really meet farmers' needs.

Pluralism is seen to contribute to the sustainability of advisory services, which is always an issue given limited government and project funds. However, political frameworks are needed to provide the setting for pluralistic and sustainable rural advisory services. Policies on rural advisory services also help to co-ordinate the different types of providers and to provide certification mechanisms and quality assurance.

Last but not least, there is also a growing recognition of the different roles and needs of men and women, as well as of youth and of the disabled in agriculture. In most countries, women and youth – and in some cases (e.g. after a civil war) even the disabled – are important contributors of the agricultural workforce, but have only limited access to information and other assets. It is therefore the task of extension to develop content adapted to their needs, and find means and mechanisms to have them participate.

In response to this changing understanding of agricultural extension, GFRAS developed a position paper called the 'New Extensionist' (see box). It offers a synthesis of extension's

expanding role in agricultural development, going beyond attempts at strengthening the knowledge and skills of the individual extensionists towards a look at the whole agricultural system and its mechanisms for knowledge creation and exchange.

More information, please: the need for sharing

The foundation of GFRAS and the 'New Extensionist' publication reflect how actors in development look to extension to address many of today's agricultural problems. In doing so, they are searching for information about advisory services, different models and approaches, with evidence of their effectiveness. Gaining this type of information is often difficult, however. Advisory services today are much more pluralistic and decentralised, making it hard to know how many personnel are out there working with farmers, and what types of programme and approach are being used. The only comprehensive study of extension services world-wide was conducted in the late 1980s (Bahal and Swanson 1988). This study and GFRAS' Directory of Extension Providers are the latest global attempts to quantify extension and to take a look at topics and finances of extension in

different countries. However, given the diversity of advisory services today, they are not comprehensive.

In addition to data around extension players, personnel, and programmes, evaluations and other assessments of existing extension approaches are scarce. This is due in part to the fact that extension impacts per se are very difficult to show, especially in terms of dealing with attribution issues and linking cause and effect quantitatively (Purcell and Anderson, 1997; for further details see Davis, 2008). However, in order to convince policy-makers and to guide investment in extension approaches and funding mechanisms, more information and evidence are needed. A systematised collection of good practices in extension and more rigorous assessments and other evaluations are therefore being spearheaded by GFRAS and partner organisations, including GIZ.

From vision to reality

Extension and advisory services have come a long way since the Green Revolution days. Today they are envisioned having a much broader, deeper, and more holistic role, which we hope will contribute to rural development goals worldwide. However, to ensure that advisory services effectively play their role in rural development, information about approaches and policies is needed. The capacity of extension organisations and individuals must be strengthened. Platforms have to be in place to share information at local, regional and global level. We need to advocate about the importance of rural advisory services to policy makers. These are all areas in which development actors, regional extension networks and a global network such as GFRAS work together to ensure that vision becomes reality. This issue of Rural 21 – for which several authors were found by using these networks – is a step in this direction.

Clarifying roles in extension processes

Rural extension services are an extremely complex affair. This is due to the wide range of constellations in which farmers operate nowadays, and also to the large number of players who are active in advisory services, with their different tasks, values and mandates. With reference to Germany's rural extension services, our author shows who is taking on which role and where conflicts might potentially arise.

"Don't solve other people's problems", is the author's advice for advisers. That, of course, immediately begs the question: what do advisers do, then, if they don't solve problems? Doesn't the phrase "advisory work" imply a duty to give advice? Who gives advice during advisory work is the central question about the players in extension processes. Who is involved in extension processes, and what are the roles that might be taken by advisers and their clients? What is the relationship between clients and advisers, and how does the relationship change when clients are not just individuals but groups, or, to go wider still, networks?

■ Our understanding of advisory work

Paradoxically, right at the beginning of this article, I offer a piece of advice to make it clear straight away that advisers should refrain from giving advice. This ties in with my understanding of advisory work, which I would like to put forward. When I talk about advi-

sory work, I have in mind situations of the utmost complexity. I see situations in which advisers value the capabilities, experiences and personality of those seeking advice and are able to establish a relationship as equal partners. Essentially it is about advisory processes and in particular about discussions that help to clarify the situation and raise awareness. Here I am assuming – in line with the client-centred discussion technique advocated by Carl Rogers – that the clients have the ability to manage their situation. Extension is the process by which the adviser uses intellectual assistance to endeavour to motivate and enable his partners to act in the right way to solve their acute problems. They "acquire greater insight into the network of problems affect-

ing them and recognise the alternative solutions available. They gain from this both the incentive to embark on problem solving and the direction to take. ... The relationship between advisers and their partners that is necessary to achieve this should be reciprocal, but the adviser being only committed to the welfare of his client. In this relationship, the partner's freedom to make decisions and to assume personal responsibility for his or her actions must be preserved in full, because she or he alone must ultimately bear the responsibility for the consequences of these actions." I quote Hoffmann et

Advisory services for networks as part of the EU's SOLINSA (Support of Learning and Innovation Networks for Sustainable Agriculture) research project.

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Photo: S. Helmle

al. (2009, p. 25). Taking this definition as a basis, the players are described as advisers, partners and people affected.

■ Actors in their respective environments

What all these actors have in common is that they form part of organisational and business relationships, networks, families and social groups. Where farms are concerned, family models are generally assumed. This is often only partially accurate, as it presupposes firstly that there is a family, and secondly that family members are actively involved in farm work. However, in small-scale and part-time farming there are often arrangements where farming has to be coordinated with other forms of employment. This is important for extension services, since nowadays farmers work in settings strongly characterised by non-agricultural activities, since the farm – and the matters requiring advice related to it – is not necessarily the priority, and since farm goals and associated projects are now often only expressed for the managing generation. The clients articulate their desire for specialist advice, or for advisers who are seen as all-rounders, in all sorts of different ways, depending on the matter requiring advice and the type of farm. For the adviser this means constantly reviewing the contexts in which advisory work takes place and also reflecting on the implications for the clients' possible courses of action.

■ Groups and networks

Group advice and advisory syndicates or advice circles adopt the idea of learning from each other and of a shared

Training session in non-directive conversation skills. It is important that especially young and inexperienced extension officers learn these basic skills so they can understand issues from their clients' perspective.

search for better potential solutions. In these approaches particular importance is attached to the advantages of groups – a range of perspectives, a large pool of knowledge and experience, an opportunity to reflect on experiences, a reduced risk if something new is tried out on a farm for the first time. In addition groups benefit from the social support. Frequently individual and group counselling are combined, and there is a transition to educational work and training courses if special learning requirements are a priority.

Currently multi-actor networks far wider than groups of farmers are under discussion. Moving beyond (outdated) conceptions that assume linear knowledge transfer of research to practitioners via extension, now farmers, advisers, researchers, journalists, technicians, administrators etc. are coming together in networks of this kind to develop innovative projects. It is useful for farmers if development and practical trials are in close proximity. In general it is a learning process for all participants, as often it is a new experience for everyone to have to express themselves clearly in a network like this, and to acknowledge totally different target structures, totally different working methods and time budgets. In these networks extension is one player

amongst a wide variety of others. It is a real challenge for extension to see itself as an independent actor in these constellations and not as a mediator between the other players.

■ Organisational settings of advisers

In general advisers are integrated into organisational structures. For example, Germany has a particularly pluralistic extension system. In terms of types of provision, advisory syndicates, farm managers' working groups and individual counselling are especially important. There is a wide range of providers: the government, churches, businesses, associations, chambers of commerce, producer groups, banks, housing associations, energy companies, businesses upstream and downstream – the list goes on and on.

Just as farmers do not only farm, advisers do not only give advice. It is quite normal for advisers to offer services – especially if companies are the extension providers. It is also normal for advisory work to be closely linked to product or farm certification. Combinations like this are found in contract farming and in associations. In the case of official extension services, the over-



Photo: S. Hoy

Extension is still perceived as a potential instrument to drive farm modernisation.

lap between roles might be greatest if, as well as providing advice, the government departments offer training and further education, funding programmes, and support with applications, and also exercise control. From an organisational point of view this can be solved by one person fulfilling all these roles at once. It is especially important for clients that, for example, sensitive information and data from advisory processes are not used for other tasks, particularly control and funding tasks. The churches are among the providers who offer social counselling especially for farmers. This includes family counselling, farm transfer and debt counselling. It covers the whole range from telephone helplines for real crises to intensive individual counselling work that frequently goes on for years. This sort of counselling is accepted because it is often provided by “amateurs”, that is, farmers trained in psychology.

■ When roles overlap

Clients know exactly what to expect from advisers. However, particularly in the context of governmental extension services the players face further challenges. This can be the squeeze on public finances and thus the question of how advisory work is funded. It can also be pressure caused by matters of public concern, such as mitigating climate change or protecting waters and biodiversity, which have a habit of sneaking into extension targets as a way of legitimising the funding of advisory work. Extension is still perceived as a potential instrument to drive the modernisation of farms (see multi-actor networks). The spirit of partnership between clients and advisers is undermined by such instrumental perceptions. Advisers are assigned



Photo: J. Boethling

the tasks of transmitting knowledge for practical use and disseminating knowledge. In doing so, they slip into the role of experts or, to put it bluntly, know-alls. This can be seen in the jargon, with which advisers and farmers are doubtless familiar: suddenly the clients are “resistant to advice”, “not open”, they seem hostile. The type of relationship formed between the players sets the pattern for the communication process. Clarity of roles and consistency of behaviour are fundamental to this process.

■ Discussed together, decided alone

Advisory work is relationship work. If we expand the intellectual framework in which extension takes place beyond the adviser-client relationship, there are many different actors involved in extension processes. People who farmers know personally provide them with substantial help in solving their problems. In addition to them there are a number of other actors: banks, teachers and trainers, experts, and companies. Many business decisions are made outside professional extension contexts. Discussions take place

with people who are directly affected by decisions. In practice, researching information, setting development goals, defining problems, and weighing up possible alternative solutions include some planned elements, but often some entirely spontaneous ones as well. Particularly when decisions are very complex, a lot of actors, all with different perspectives, are called on for “advice”. If extension workers are actually brought in, all-rounders come together with professional advisers, and supposedly neutral advisers with company advisers whose products may later be taken into use. Government bodies are of major importance, especially when making applications, and fellow professionals and counselling syndicates are also essential. These groups work with or without professional advisers, in the original sense of the word counselling, which derives from the Latin “consilium”. This means discussing things together, exploring situations together, but eventually leading, after individual reflection, to a conscious decision by the farmer himself, who has personal responsibility for this decision, about what is important for him.

References: ► www.rural21.com

Many actors, little coordination

As with other countries, agricultural extension and advisory services (EAS) in Malawi are provided by public, private, and non-profit organisations. While it has become commonplace to refer to this collection of actors as a system, this claim is only valid in the loosest of terms, as many of the component parts do not functionally interact with others in an operational sense, tending rather to function as independent sub-networks within larger national, and international spheres of exchange. The potential for interaction and exchange between these component parts defines the potential for positive synergism, whereas the disconnect defines sources of inefficiencies, redundancies and conflict.

The Malawian Ministry of Agriculture, Irrigation and Water Development revised its extension policy in 2000, launching a number of highly progressive reforms, including the introduction of decentralised co-ordination and the principles of stakeholder accountability, gender equality, and demand-driven and pluralistic service delivery, among others (MAI, 2000). Since the introduction of these reforms, the importance of greater market integration, currently articulated through the value chain development concept, and the key challenges of climate change mitigation and adaptation have moved to the fore and are being built into the revised Department of Agricultural Extension Services strategy under preparation.

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■ Governmental extension system

The Ministry of Agriculture, Irrigation and Water Development (MAIWD) Department of Agricultural Extension Services (DAES) is by far the largest extension provider in the country. DAES technical branch heads reported a total of 2,415 field and office staff members. However, staffing levels within DAES, across all levels, were reported to be approximately 70 per cent of the established positions, or a 30 per cent vacancy rate. DAES is the only nationwide extension provider and the only organisation working across all agricultural value chains and other services areas (e.g. health and nutrition).

Structurally, the governmental extension system is around a four-tier administrative hierarchy:

1. DAES at the national level: led by a director, and assisted by the heads of the five technical branches: Extension methodology and training services (EMS); Agricultural gender roles extension support services (AGRESS); Food and nutrition (FN); Agricultural communications; Agribusiness.



tion methodology and training services (EMS); Agricultural gender roles extension support services (AGRESS); Food and nutrition (FN); Agricultural communications; Agribusiness.

2. Agricultural development divisions (ADDs, 8): led by programme managers, chief and assistant chief agricultural extension officers, and principal subject matter specialists (SMS) representing each of the DAES technical branches, in addition to SMS from other MAIWD departments (Animal Health, Crop Development, Fisheries, Irrigation and Water Development, Land Resource Conservation and Management, Planning).

3. District levels (28): led by district agricultural development officers, their assistants, and SMS for each of the DAES branches and other MAIWD departments.

4. Extension planning areas (EPAs, 187): agricultural extension development co-ordinators (AEDCs) supervise and coordinate the activities of



Photo: G. Heinrich

Members of the area stakeholder panel getting ready to meet. These area stakeholder panels are evidence of the move towards demand-driven extension programming in Malawi.

ing for the same contracts lead to an operational context by a large number of actors employing variations of the same approaches and technical themes. Most NGOs depend on engaging the Ministry's extension officers to implement the work at the local level and achieve scale. Some NGO programmes provide both technical training and financial and/or logistical support, which enables the AEDOs and lead farmers to work more effectively and efficiently. When the objectives of the NGO and Department of Agricultural Extension Services (DAES) are not well-aligned, however, this approach to project implementation may distract the AEDOs and lead farmers from implementing their locally established priorities and, in the worse cases, lead to confusion and conflict.

To staff their initiatives, NGOs tend to recruit the best DAES staff members into their agricultural programmes by offering better terms of service than the government. For example, whereas the DAES agricultural extension development officers (AEDOs) have push-bikes for transport and some cell phone airtime for communication (for use with their personal cell phones), the average front line worker for a large NGO has a motorcycle for transport, a full set of extension materials, a cell phone, a laptop computer and connection to e-mail via a "dongle" that connects to the Internet through the cell phone network. Such additional benefits, in addition to generally higher salaries, make it relatively easy for NGOs to fill their programmes with the best and brightest from the DAES ranks, even if they are often not able to offer long-term contracts. The same is true for the field operations of the many donor-funded, contractor-implemented projects.

the agricultural extension development officers (AEDOs), the frontline extension staff members who operate at sectional levels comprising five to 15 villages each.

■ NGOs and project extension efforts

A large number of NGOs, including more than 10 international NGOs, are providing agricultural extension and advisory services (EAS) to smallholder farmers in Malawi. Working independently or under subcontracts with these international NGOs are a larger number of domestic NGOs, some of which also provide limited extension type services.

Most NGO activities are funded by external donors through implementation contracts with predetermined targets and centralised control. The relatively small size of NGO efforts and the drive to differentiate themselves technically and operationally from other EAS service providers compet-

■ For-profit companies

Malawi has a wide range of for-profit companies operating in the agriculture sector. Some of these companies provide extension and/or advisory services to farmers, although the services provided vary widely in breadth, depth and quality. The key for-profit companies that provide EAS include tobacco production and purchasing companies, cotton companies (organised around ginning facilities), milk, tea, coffee, sugar and grain buyers/processors, input supply companies such as the seed and fertiliser supply companies, and large and small agricultural input retailers

The various types of companies can be grouped according to their underlying characteristics as *pull* or *push* business models, which influence the types of advisory services that each provides its clients. The relationships that evolve under the *pull* of commodity production, exhibited through outgrower schemes and contract farming (e.g. tobacco, cotton, chilies) where advisory services are offered to farmers to ensure the maintenance of a constant supply of a primary commodity, are significantly different from those that evolve under client-product sales contacts. *Pull*-based business models often include some concern for producer welfare and economic viability because they recognise the need to maintain farmer productivity and sustainability to ensure returns from significant fixed-asset investments (e.g. ginning and other processing facilities). In practice, this can include offering advisory and material services beyond the target commodity, such as tobacco companies offering inputs for maize as well as tobacco to ensure that those inputs provided for tobacco production are used for that crop and not diverted to maize. The advisory services offered to farmers tend to include the full range of techniques related to production of the target crop, not just those related to the use of a single input (e.g. ferti-



Photo: B. Simpson

An example of collaboration between state and non-state actors.

and how to apply them. The support they provide to farmers, however, is generally limited to guidance on what to purchase and how to use various products.

■ Farmers' organisations

The main umbrella body representing the interests of farmer organisations in Malawi is the **Farmers Union of Malawi (FUM)**. The **FUM** was established in 2003 through the assistance of the Department of Agricultural Extension (DAES) in an effort to consolidate and establish a representative voice for independent smallholder farmer associations and co-operatives. The union currently has 93 member organisations representing a reported 350,000 smallholder farmers (the largest is TOBACCO with 87,000 members; the average union member size is 1,000 to 4,000). The FUM is recognised by the Government as the official representative of smallholder farmers' organisations in the country. As primarily an umbrella advocacy organisation, the FUM serves to convene its members to address national policy issues. It also provides some services to member organisations to strengthen their internal management and advocacy capacities, and develop increased market access. The FUM, however, does not appear to provide any direct technical extension or advisory services to farmers. Furthermore, it is largely donor-funded.

By far the largest farmer association in Malawi is the **National Smallholder Farmers' Association of Malawi (NASFAM)**, a self-described "independent smallholder-owned membership organisation". The **NASFAM** evolved out of a USAID-funded tobacco project in 1994 and reportedly includes about 108,000 smallholder members organised into 43 membership associations.

liser). Data provided to the assessment team indicated that, in the previous season, independent tobacco producers did not profit from their tobacco crop, but those who received advisory service assistance from at least one tobacco company did profit, presumably because of the higher quality extension service that the farmers received.

Product *push* businesses are typified by over-the-counter sales (e.g. seeds, fertiliser). The success or failure of the individual farmer/client has less bearing on the success of the supply business because the nature of the products on offer (and the profit margin) and the associated advice are much more limited and there are fewer fixed-asset investments at stake. In cases where the *push*-based business is a retail outlet of a larger chain or carries products of a single supplier, there is greater concern over brand loyalty and customer satisfaction, and potentially greater prospects exist for the provision of additional value-added advisory services as a means of attracting and retaining clients. Because of the nature of the *push*-based business model, which links retail profits with product sales and the influential role that information may play in purchasing decisions, the source and veracity of the information supplied are critical.

The major commodity purchasing companies operate what are effectively outgrower schemes. For example, one

tobacco company provides the growers in its farmer clubs with all of the necessary inputs for both tobacco and for maize. All inputs are provided on either a cash or credit basis and are physically delivered to the farms. Credit is arranged through a partnering bank, and payment is deducted from the value of the crop once it has been harvested and sold to the tobacco company. The company provides five field trainings for its supervisors during the year, and these are disseminated in cascade fashion down through the field technicians to the farmers' clubs. The trainings include technical advice on both maize and tobacco production, as well as planting of trees for fuel and establishment of "live barns" for the tobacco curing. They also include advice on the production of legumes.

The operating model for input suppliers and agro-dealers is significantly different. For example, although seed companies may conduct demonstrations of their varieties, the companies do not employ extension agents or provide advisory services on production issues. Rather, they tend to engage local agricultural extension development officers (AEDOs) to help organise field days and mobilise farmer participation. Some agro-dealers have received training through past projects in subjects such as seed selection and storage, safe handling and storage of herbicides and pesticides, and various types of fertiliser

The NASFAM works nationwide, essentially operating as a *pull*-based business, to assist development of diversified crop marketing opportunities for its members.

The core of the NASFAM operations is its association membership structure, starting with clubs made up of 10 to 20 farmers. The clubs are grouped into group action committees and further aggregated into associations (currently 42) that are managed collectively under 14 geographically based association management centres. The division of tasks and services between the commercial and development branches is unclear, especially the extent to which the provision of development services serves as the inducement for farmer participation in the commercial activities.

The NASFAM employs 135 staff (18 per cent women), including five subject matter specialists (SMS). The latter are responsible for technical programming and providing training and technical backstopping for field officers. NASFAM employs more than 70 field officers, all of whom are attached to one of the 42 associations. The field officers in turn work with 1,458 volunteer farmer trainers, who provide the actual farmer training on best practices to the NASFAM club members. The regional SMS train the field officers, who in turn train the farmer trainers, each of whom works with up to 100 farmers at the club level. The farmer trainers manage demonstration plots on their land or another member's land, and make individual farm visits. They are equipped with push-bikes, rain gear, and NASFAM-produced extension crop bulletins, crop calendars and other materials. In addition, NASFAM produces a twice-weekly 30-minute radio programme and a quarterly newsletter, and has produced one documentary on conserva-

tion agriculture. At the Department of Agricultural Extension Services (DAES) EPA level, NASFAM field officers reportedly participate in the area stakeholder panels and work with the DAES district staff to co-ordinate placement of demonstration plots so as to avoid duplication of efforts. Nationally, NASFAM receives financing through at least eight donor-financed projects.

■ Other stakeholders

There are several other key actors in Malawi's pluralistic EAS system. The most notable of these are the **University of Malawi, Bunda College** and **Natural Resources College**, which provide basic training for EAS frontline extension workers and advanced degrees for subject matter specialists (SMS) and EAS managers.

Radio also plays an important role in extension – it is estimated that 60 per cent of Malawi's smallholder farmers have access to radios. **Farm Radio Trust (FRT)** uses what it terms a participatory radio approach to working with rural listener groups. Programming is developed on the basis of the results of focus group interviews (organised around gender, age and enterprise) that are conducted by the home office staff working with the DAES agricultural extension development officers (AEDOs) at the extension planning areas (EPA) level. On the basis of identified infor-

mation gaps, Farm Radio Trust locates technical experts from Bunda College, Department of Agricultural Extension Services (DAES), Department of Agricultural Research Services (DARS) and the NEPAD regional office to develop its content. The programmes, which are aired weekly, with at least one repeated broadcast, include live responses to calls and SMS messages from listeners. FRT has a five-year agreement with DAES on technical cooperation and joint programming. Currently most of its finances come through donor projects.

■ Conclusion

This short case study describes a somewhat typical pluralistic EAS landscape. One is reluctant to call it a system, as the various players are actually not well co-ordinated, nor are potential synergies being exploited. The plurality of actors masks the strong dependency on donor funding. The value of services provided by the public sector to projects is generally underestimated and under-acknowledged.

The article is a summary of a report prepared by Brent Simpson (Michigan State University), Geoff Heinrich (Catholic Relief Services), and Grace Malindi (consultant). For the full report – including a set of recommendations – see:

➤ www.meas-extension.org → country studies → Malawi.

At the main DAES office in Lilongwe: Several hundred bicycles had recently been received from China. They are intended to improve mobility of frontline extension agents.

Photo: B. Simpson



Sustainably financing extension services

Providing extension and advisory services is expensive. There are salaries to be paid, transportation and operational funds to be provided, buildings to be rented or built, demonstration plots to maintain, and continued education to be offered to the extension staff. And then there is the need to continually invest in an overall functioning agricultural innovation system with strong research and teaching institutions, enabling policies, as well as to make capital investments in rural infrastructure that will not only benefit the farming population. Where are these funds to come from, and will these expenditures pay off?

“The quality of spending to agriculture is more important than the overall level of spending.” (Akroyd and Smith, 2007)

Delivery of extension and advisory services takes place from a plurality of actors including the public sector (especially via a national extension service, but also through public universities and agricultural colleges), the private sector (seed dealers and agro-vet suppliers, fee for service extension providers, or extension agents employed by out-grower programmes and contract farming operations), as well as through local NGO and international NGO providers. Even within the public systems around the world, there is variation along the lines of decentralised control of finance, use of bonuses or performance-linked payments to agents, contracting in of donor-funded extension projects, and other practices.

Public sector financed and delivered.

World-wide, the public sector remains the primary source of funds for extension services, and the public sector extension services deliver the bulk of

extension messages and activities. The most common approach appears to be a large, widely distributed extension bureaucracy with national geographic coverage that includes positioning extension agents at the local level.

The centralised approach to the public sector system has been modified in a number of countries (India, the Philippines, Nepal, Uganda, and others) to have funds flow to district and other local government levels and then put into agricultural extension services. The promise of decentralisation is for improved accountability and a means of heightening the responsiveness of the extension system to farmers and their local representatives.

Public sector financed and contractor delivered.

Another commonly observed structure has a ministry of agriculture financing extension efforts while a contractor (a for-profit organisation or an NGO) delivers the service. In this case, the ministry provides contract oversight and, oftentimes, overall project coordination and performance against objectives is measured. In Chile, the government moved to a contracting approach for extension, where better-off farmers paid a fee for extension services and where government paid the contractor for services to the poorest group of farmers. A government that is able to manage this process demonstrates a

significant administrative and managerial capacity.

User charges financed and private provider delivered.

Another model is the private sector provider who offers farm visits and advisory services for a fee. This entirely private sector model has the benefits of a very responsive extensionist who is focused on ensuring repeat business from his/her clients. It is sustainable financially as long as the producers can afford to pay the fees and they see the value for the services. A drawback of this approach is that many of the poorest farmers will forgo utilising extension services because of lack of ability to pay.

Marketing margins financed and private provider delivered.

For higher value crops such as cocoa, oil palm, cotton, rubber and others, private sector companies operating agricultural marketing businesses or processing plants often work with contract farmers, or with outgrowers on a less formal basis than a written contract, to provide technical advice on seeds, fertiliser and chemicals and their use and application, planting times, harvesting techniques and equipment. An especially valuable aspect of these contracts and services is the business knowledge and abilities to connect with markets and intermediate with growers regarding quality of produce. While everyone understands the private

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sector firm providing these services has business incentives to control the costs of extension services and keep those services narrowly focused in the business' interest rather than the producers' broader needs, real benefits to producers occur. The benefits include information about new technologies, access to market opportunities and marketing channels, and often credit for inputs such as fertiliser, seeds, and chemicals. A drawback is that other information and educational interests of the farmers to meet subsistence needs or successfully integrate with other value chains may not be met.

Private sector providers of crop advisory services or vet services receive their payment through product sales or marketing margins. Thus they have a distinct commercial interest tied in with their service provision. Advice and training provided by private sector input dealers will be tailored to the sales of their product. If there is little or no prospect of sales, most private sector input dealers will curtail visits, leaving only a subset of farmers served and entire regions of a country underserved.

■ Sustained funding – sustainable financing

Sustainably financing extension services means that, in terms of public or donor funding, there is a long-term

commitment to do so because it is in the national development interest, and in terms of private funding, that the business models employed lead to increased profits that reliably cover expenses. The benefits, to the consumers of the services but also to society and the economy at large, must outweigh the costs, and the returns must be higher than alternative uses of the funds.

The financing question often receives attention for the wrong reasons and in the wrong way. Some within the agricultural development policy community have noted the weaknesses and failures of public extension and have thereby advocated the private sector provision of extension services. Similarly, some development advocates have advanced community-based extension services as being the most appropriate way forward (farmer-led, farmer control through vouchers or other mechanisms of extension services delivered to their farmer organisations, etc.). However, a broad consensus appears to exist among agricultural development researchers and analysts that no "one-size fits all" approach exists for extension structures (Birner et al., IFPRI report on best fit), and by corollary, extension financing.

The question of how to sustainably finance extension is much more than simply how much funds should be channelled into the public sector sys-

tem, through NGOs, and through the private sector input dealers. The financing question also concerns how funds ought to be allocated within the public sector, what the design of the flow of funds is, how funds are controlled, and how they are linked to extension programmes and activities. Although staffing costs and major capital expenditures (office, demonstration plot development, and vehicles) receive much of the attention in projects, the question of budgeting and access to funds for recurring expenditures within public extension systems (expenditures on items such as fuel, telephone and internet access, electricity, water, supplies for demonstration plots, farm labourers, vehicle repairs, and extension teaching supplies and materials) also impacts the sustainability of the financing of an extension system.

Related to the "who pays" question is the question of who actually delivers the service. For training and education on the use of fertiliser, an input supply dealer might provide the training to farmers who are likely to be able to pay to purchase fertiliser. For organising a farmer group, there are a number of extension service providers that might deliver the service, namely the government extension service, or a local NGO or international NGO or a private company or consultancy.

■ Demand for information – willingness to pay for extension services

Another aspect of the framework for analysing the sustainability of finance for extension services concerns the demand expressed by farmers for extension services. Economists generally discuss this demand as the farmer's willingness to pay for extension infor-

For higher value crops such as cotton, private sector companies often work with contract farmers or with outgrowers and provide technical advice.



Photo: J. Boethling



Photo: J. Boethling

Sustainably financing extension services means that the benefits – to the consumers of the services but also to society and the economy at large – outweigh the costs.

significant fraction of the producers do not have a willingness to pay sufficient to cover the cost of the service. In a high poverty context, does extension have as a goal poverty reduction along

mation or extension services. Holloway and Ehui offer an estimate of the willingness to pay for a one visit increase in the number of extension visits from milk co-operative marketing data from Ethiopia (2001). With milk production and marketing data on 168 milk marketing households, and using an inference off of the relationship of extension visits to market participation, they estimate the willingness to pay using an econometric regression model. While they find a wide dispersion in the values of willingness to pay for a one-unit increase in extension visitation, they put the cost of providing a unit of extension service at 2.14 Ethiopian Birr, and 65 of the 168 households were estimated to be willing to pay that amount. Thus, they conclude that at least partial privatisation may be possible if a significant fraction of the milk producers are willing to be up to the cost of receiving the extension services. However, they do not report the description of the producers who had an estimated willingness to pay beneath the cost level, and we might conclude that these farmers were more likely to be smaller and less productive farmers and poorer farmers. The willingness to pay highlights a critical point – willingness to pay, a key aspect of any private sector financing based on user fees or producer contributions, is also a function of ability to pay. While a privatised system may be sustainable and self-financing, as the Holloway and Ehui research shows, a

with increasing agricultural productivity? If so, then a purely privatised system is likely to leave many producers behind, and the poverty reduction goal may not be met.

Dinar and Keynan (2001) and Keynan, Olin, and Dinar (1997) analyse a pilot programme for payment for extension services in Nicaragua that was implemented in 1996. The programme was not designed to precisely measure farmer willingness to pay for extension services, but instead was designed to increase quality and responsiveness (demand-driven) in the extension services delivered as well as to measure farmer willingness to pay some charges for extension services. Farmers committed to paying to the extension agent a bonus, thereby creating a linkage between quality of the service and the direct relationship between the agent and the farmer. In the first year of the programme, Keynan, Olin, and Dinar report that “farmers paid more than 60 per cent of their fees within a reasonable time ... indicating that they were willing and able to pay”. They also report that overtime remaining balances were paid and that all 17 farmer groups continued the programme the following year. They further conclude that the programme generated the desired impact on extensionists, and the agents sought out additional clients and were more responsive to client needs. Further, extension agents switched in their desire to obtain

additional trainings to a desire to be in the field. Management encouraged this by introducing a rule that no more than two days per month of training would be permitted.

To sum up, while the quantitative research base is quite limited regarding farmer willingness and ability to pay for extension services (of different kinds), some evidence exists that farmers are willing to pay and able to pay limited amounts, perhaps not the full cost. However, some farmers, especially poorer farmers and smaller-scale farmers may not have the ability to afford payments unless they are structured so that the farmer does not have to pay upfront and does not substantially increase risk through the payment. Furthermore, some farmers, including many of the most vulnerable farmers, may not be able to perceive *ex ante* the benefits and value of the services they might receive, thereby creating an informational market failure in the provision of extension services.

■ Conclusion

A variety of models and approaches to financing extension services exist, from viable and strong publicly funded extension to private sector financed and delivered extension services. Often, extension policy-makers and advocates must make trade-offs between considerations such as system performance, sustainability, political feasibility, efficiency, equity, and access in the choice between publicly-funded and privately-financed extension services and the variants along that continuum. Going forward, researchers interested in the financing of agricultural extension services should document case studies of sustainably financed extension services and systems as well as conduct research on the impact of various financing approaches on farmer productivity and system performance.

References: ► www.rural21.com

Setting out from farmer realities

The aim of the “Management advice for family farms” (MAFF) approach is to strengthen the abilities of farmers to manage their farms and improve their economic and social autonomy. In Francophone Africa, this holistic concept has been applied successfully for almost two decades.

In West Africa, the partial withdrawal of the state from agricultural extension functions has led to the rise of a pluralistic form of advisory services being provided by various actors. However, these new actors (non-governmental organisations – NGOs, producer organisations – POs, agro-industrial companies, etc.) have assumed the advisory role only partially. Moreover, their advisory approaches are geared to meet their own specific objectives. Breaking with the old top-down extension practices to promote more participatory approaches is not easy. In addition, governments are struggling to finance advisory actors in a context of limited budgetary resources. They are also having difficulties promoting the development of innovative advisory mechanisms to help meet the plurality of producer needs or to extend support for new approaches outside of project-based schemes. It is in this context that MAFF (Management Advice for Family Farms) approaches have been promoted in Francophone Africa for nearly two decades, first with the support of French co-operation entities. Support from elsewhere

in Europe (Belgian, Dutch, Swiss co-operation entities) and involvement of some governments have made it possible to adapt the MAFF approach to different contexts. Today, MAFF programmes exist in more than ten countries in Francophone Africa, integrated into advisory services provided by NGOs, POs, cotton companies, or government-dependent agencies. They impact approximately 100,000 producers.

The MAFF approach aims to strengthen the ability of farmers to manage their farms and improve their

autonomy with regard to their economic and social environment. It is based on participatory methods providing (i) self-analyses to modify farmers’ and advisers’ representations of the problems addressed, and (ii) decision-support tools based on technical and economic records (book-keeping) to produce new knowledge and generate learning processes. In this regard, management is perceived as a cycle consisting of different phases: analysis, forecasting, action, monitoring, adjustment, and evaluation. The advisor carries out a joint analysis of results obtained by each farmer. Exchanges between farmers about their results are always encouraged through regular meetings (training, field visits, on-farm experiments, etc.) since they stimulate strong dynamics. MAFF distinguishes itself from extension services which aim primarily at transferring knowledge and new practices to farmers, notably in the field of agricultural production. The MAFF approach is similar to that of ‘Farmer Field Schools’ in that it promotes farmer learning. It does so, however, by focusing on the farmer and his family farm (and not mainly on crop production) through technical and economic analyses.

A MAFF participant in Benin taking notes.



Photo: Marine Rouchousse

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Photos: Marine Rouchouse

The MAFF approach extends far beyond just knowledge transfer on agricultural production. It is focusing on the farmers and their family farms and addresses both the economic and social contexts. Exchange between farmers about their results is supported in regular meetings.

■ MAFF in action: the example of Benin

One of the first countries in West Africa to implement MAFF was Benin, starting in 1995, in the framework of pilot projects. MAFF is currently being implemented there with the support of bilaterally funded programmes, such as PADYP (Project to Support Development of Production Dynamics), funded by the AFD (*Agence Française de Développement*). Advice is provided by nearly a dozen NGOs who have acquired extensive experience in MAFF, by POs such as FUPRO (Federation of Producer Unions of Benin) or by the Ministry of Agriculture, which has recruited more than 250 advisers for MAFF. Nearly 20,000 farmers are involved in MAFF in Benin. Based on the experience gained in the field of MAFF, the Ministry of Agriculture drafted a document in 2007 entitled 'White Paper on agricultural advisory services in Benin' in an attempt to extend the approach to the entire country and to identify complementarities with other forms of advisory services. A 'National Strategy for Implementation of Agricultural Advisory Services' (SNCA), also released

in 2007, divides advisory services into five categories: 1) specialised technical advice (already in existence), 2) advice on market access, 3) advice to farmer organisations and local planning, which includes advising producer organisations, 4) farm-management advice and 5) food and applied nutrition advice. MAFF is therefore part of the wider advisory system to provide "farm management advice". At national level, a formal co-ordination mechanism among actors providing advice is still missing. However, some initiatives do exist. For example, projects or international organisations such as AFAAS (African Forum for Agricultural Advisory Services) organise national workshops to share knowledge. NGOs involved in MAFF provision have built a network to assess methodologies. National farmers' organisations such as FUPRO represent the voice of farmers in national fora.

The adviser conducts group advisory sessions but also advises farmers individually. MAFF is implemented in a flexible and gradual manner. The adviser uses a farm-diagnosis phase to identify the farmers' requirements and orient activities together with them.

He then organises collective training on farming techniques (fertilisation of maize, cotton pest control, regulation of blooming of pineapple, etc.). He also teaches them management concepts and the use of corresponding tools (crop-season planning, grain stores management, cash flow planning, revenue-expenditure accounts, etc.). In this way, MAFF encourages farmers to reflect about their own managerial practices, helps them incorporate measurements and forecasting in their practices and teaches them to use technical and economic indicators (gross margin, costs/income ratio, etc.). This supports the farmer in analysing his farm's performance.

During the crop season, the adviser ensures individual monitoring of farmers in their fields to provide additional targeted advice. At the end of the season, a first analysis of the technical and economic results, both at crop production level and entire farm level, is undertaken with farmers in group meetings. Some advisers use computers to perform additional processing on the data of the farmers. These more accurate results are then presented and

discussed with each farmer. Based on the results of the previous crop season, the advisers and farmers plan the following crop season together with the farmers. Under the MAFF approach, exchanges between producers are encouraged through various collective activities (training, group meetings to discuss results, field visits to share experiences, trials in farmers' plots to test innovations, etc.).

To improve access to MAFF for other farmers, NGOs encouraged the initial MAFF participants, often literate in their own language, to form new groups in their villages. This is how farmer extension workers were trained and supported by NGO advisers to be able to deal with the most basic themes with new producers (planning rotations, calculations of gross margins, etc.). Farmer extension workers in Benin now number almost 500, with some of them even being remunerated for their work. At present, the main focus of advisory actors is to adapt the method for non-literate farmers, either through conducting literacy programmes while teaching the use of management tools or by developing management tools that do not rely on written matter.

■ The chief benefits for farmers

MAFF helps farmers acquire new knowledge and new skills. Farmers make use of this knowledge and these skills to change their agricultural and managerial practices (early sowing, separation of cereal stock for self-consumption and for selling, better planning of cropping seasons, etc.). "This advice helps us develop our ideas", they say, commenting on MAFF. "Now we know we are able to change." "In the past, we used to draw from the grain store, and when it became empty, we had to manage",

some farmers report with regard to prediction and management. "This year, after harvest, we calculated the quantity for family consumption. We separate the bags for family needs and sell the extra ones." The changes made by farmers participating in MAFF have a significant impact not only on their own farms and families but also on those of non-participants whom the participants exchange ideas with. These impacts are, however, difficult to measure and quantify. In 2010, a study in Benin by an independent institute, IREEP (*Institut de Recherche Empirique et d'Economie Politique*) involving 254 farmers who had participated in MAFF for at least three years between 2000 and 2007 provided significant results (see Table).

■ Strong involvement of producer organisations

MAFF is also particularly useful for Producer Organisations. PO members who participate in MAFF improve the performance of their farms which in return can make the POs stronger. Some MAFF participants then become leaders in their PO and can therefore use the management skills acquired via MAFF for its benefit. Moreover, in many countries, the POs play a special role in the direct implementation of MAFF. Examples include several POs of the management network in Burkina Faso, the Federation of Producers of Fouta Djallon (FPFD) in Guinea, FUPRO, or the National Union of Cotton Producers of Burkina Faso (UNPCB).

A producer organisation may efficiently implement advisory services when it has adequate human and financial resources. Advisory services implemented by POs can be expected to be oriented more in line with farmer requirements than those provided from outside. The PO itself is strengthened since it offers an additional service to its members and, in the process, gains a finer understanding of the constraints and opportunities of its members' farms.

However, the PO has to take care to properly integrate MAFF into its activities. If it does not, managing MAFF directly can weaken it through the dispersion of its activities, lack of adequate management of its salaried advisers or financial instability. For example, the National Union of Cotton Producers in Burkina Faso tried to implement MAFF in relationship with the cotton companies but without taking into account the advice already provided at grass root producer organisation level. This situation entailed tensions and unsustainable costs. In the end, the actors had to call off the venture.

All in all, experience with MAFF has shown that setting out from farmer realities provides better results than applying a top-down approach in advisory services. While the farmers themselves benefit from MAFF support, producer organisations can reckon with a stronger membership and gain from the additional skills that their members have acquired.

Impact of MAFF on production, income, food security and household expenses in Benin

Change in variables after MAFF	% of farmers concerned who believe the change is related to MAFF
Improvement in the yield of the main crops	94
Improvement in agricultural income	98
Improvement in the availability of food products during lean periods	85
Reduced spending on household goods and social activities	21
Increased spending on children's education	68

Modern ICTs and rural extension: Have we reached the tipping point?

Today, it would be difficult to imagine agricultural extension without modern information and communication technologies. What they can do, where they fit in, and where they reach their limits is shown in the following examples.

Extension and advisory services are relevant to agricultural and rural transformation processes, especially for millions of smallholder farmers, who remain the bedrock of the agricultural and food supply chains in developing countries. However, extension alone cannot lift millions out of poverty unless there is the right mix of policies, technologies, and market opportunities. This must be complimented by farmers who have the knowledge and skills, trust the system and the information and knowledge sources, and are willing and able to make the necessary investments. Extension agents also need to continuously develop new capacities and keep abreast of technological developments. The Nairobi Declaration, emanating from the 2011 international conference on *Innovations in Extension and Advisory Services*, states inter-alia that “the renewed national, continental and global interest and commitments for increasing investment in agriculture, provide an opportunity for delivering extension and advisory services that are farmer-centred, participatory, well-funded, demand-driven and performance oriented” (Nairobi Declaration, 2011). This article draws on examples from various case studies and published papers to demonstrate the diversity of Information and Com-



Smartphones let farmers access real-time agricultural information.

munication Technologies (ICT) applications used and derive some lessons for future intervention.

■ The changing policy context: Implications for extension delivery

Policy shifts and fiscal austerity programmes have impacted negatively on extension services, especially on public extension, in developing countries. This can be elaborated using the case of Kenya, where policy shifts over the period 1965–2007 led to changes in extension services from being a centrally managed, government controlled service to a partially privatised, demand-driven and diversified, pluralistic system with multiple actors. Public extension was expected to link farmers with other research and extension service provid-

ers and remain free of charge for smallholder subsistence farmers. Most of the budgetary allocation for extension was used for the salaries of the 5,000 plus extension staff employed by the ministry (Bolo & Makini, 2012). The implications are that under the updated system, smallholder farmers had to rely on multiple sources of information from a variety of extension service providers and, where applicable, pay for services.

■ ICTs in extension

While traditional media such as radio and television have played a major role in extension and development communication, growth in the Internet and increased access to and use of mobile technology are seen as game-changing. The architecture of information communication has moved from centralised to decentralised and has become increasingly democratised in the digital age. “Communication technologies” are converging, while multiple communication channels are still used for agricultural and rural development. Redesigning and upgrading the infrastructure and building capacity of stakeholders to take advantage of the new ICTs is critical.

■ Radio: Making mass media more participatory

The outreach of the traditional media, such as radio, in communicating with vast rural audiences has been enhanced with new ICTs. **Farm Radio International** (FRI) has been integrat-

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ing mobile technologies with radio to provide interactive, 2-way, and participatory radio programmes for rural communities. Through the **African Farm Radio Research Initiative** (AFRRI), farmers have been encouraged to make informed decisions about improved practices. Participatory Radio Campaigns (PRCs) have been piloted and evaluated in five countries – Ghana, Malawi, Mali, Tanzania and Uganda. It was found that *“in communities where broadcasters had interacted with the farmers through visits and phone calls and mentions on-air, on average, 80 per cent of local farmers listened to at least half of the PRC programming and about 40 per cent of farmers who listened adopted the improved agricultural practice”*, although passive listening also led to adoption by 20 per cent of farmers. However, farmers still needed reliable regular programmes giving them the opportunity to be heard (Ward, 2013). **Lessons:** Integrating traditional media and new ICTs can expand the reach of extension, but a high adoption rate requires farmers to be engaged in determining relevance and developing content and allowed to interact with information/service providers.

■ Videos: Democratising the use of ICTs

Access Agriculture offers an Internet-based platform for agricultural research and development (R&D) staff, service providers, extension agents, communication professionals and representatives of farmer organisations to support the production, translation and sharing of agricultural training videos in various languages. However, the Internet platform is not sufficient as the videos, either in VCD or DVD format, must be *“mass multiplied and made*

Using ICTs is only worthwhile when they are tailored to match the capabilities of both the extension agents and the farmers and the social and policy context is well understood.

widely available through a well-planned communication distribution strategy” (Van Mele, 2013).

The production and use of videos for sharing farmer-to-farmer extension videos and promoting a more inclusive approach to extension services in the **Katoloni Mission**, a community based organisation in Kenya, was researched. It was argued that low-cost, portable and rural-friendly videos provide opportunities to support farmer-led extension. A network of community based information and extension officers received basic ICT and video production training, XO laptops and portable, compact video cameras. The final products were popular with the farming communities, but there were challenges such as cultural differences, language barriers and infrastructural deficiencies, e.g. a lack of electricity, hardware and software incompatibility as well as inadequate IT support (Vallauri, 2013). **Digital Green** in India trained rural communities to produce videos by farmers, of farmers, and for farmers to exchange best agricultural practices to boost farm productivity and improve nutrition. This improved the efficiency of existing government and NGO extension systems by a factor of ten per dollar spent (Gandhi et al., 2009). **Lessons:** The context, choice and compatibility of tools and the communication platforms are important.

■ Mobile phones and using SMS to reach farmers

The **African Cashew Initiative** (ACi) was an innovation on an ICT-based price and weighing system used by about 400 registered farmers only during the marketing season. Interactive training sessions were introduced during the cropping season which were complemented by radio messages and short message service (SMS). About 20,000 cashew farmers in Ghana received key messages that were developed collaboratively by farmers, extension agents and other actors, adapted to farmers' needs and delivered as appropriate, during the year. Although there were delivery problems with the SMS and older farmers were challenged in using the cell phones, farmers were willing to pay between Euro 1.38 and 2.31 for the service because they found it valuable (Kachelriess-Mathess et al., 2013).

The **Grameen Foundation AppLab** has established a network of community knowledge workers (CKWs) who serve as “knowledge hubs” for smallholder farmers in Uganda. The farmers are trained to use a suite of ICT applications on a smartphone for addressing multiple challenges along the value chain. An SMS-based service, designed to reach the broadest possible audience, provides real-time agricultural information and extension services to farmers and also pulls data from the users for decision-making (Campen-



Photo: J. Boethling

hout, 2013). **Lessons:** Formulating the right messages for and with farmers, addressing illiteracy and empowering farmers to use mobile phones can lead to increased adoption of new technologies and improved practices.

■ Integrating ICTs in national extension systems

The **Rural Agricultural Development Authority** (RADA) of Jamaica has been proactive in using ICTs in its extension programmes. The ICT programme has been financed through its core budget and grant funding. Staff have access to computers with Internet access and multimedia projectors. Field agents have been provided with cell phones, GPS, digital cameras and soil testing kits. There is a dedicated website and an agricultural business information system with links to the Ministry of Agriculture and the Jamaican Agricultural Marketing Information System. RADA extension agents have been trained in the use of ICTs for enhancing service delivery. Social Media and Web 2.0 tools such as Skype and SMS text messaging are used to maintain close contact between farmers and extension agents (Lindsay, 2011). **Lessons:** One size does not fit all – design and deployment of ICTs must be targeted and focused based on the capabilities of users – farmers, extension agents. Governments need to invest in developing the ICT capacity of public extension.

■ ICTs and demand-driven extension: Rejuvenating traditional services

For several years, CTA provided a demand-driven Question and Answer (QAS) service which evolved into a QAS voucher system using a mix of ICTs that enabled two-way communication. Field agents in the **Uganda Q&A service** recorded farmers' requests using a standard form, took photos using digital cameras and submitted the documentation online. The questions were reviewed by

experts who provided timely responses which were shared with the field agents for transmission to farmers and published online as well, to serve as additional resources. Radio scripts were also prepared using the most frequently asked questions, translated into local languages and widely distributed to farmer listening groups (Kassangaki and Oguya, 2013). **Lessons:** No single extension agent, communication tool or channel can meet farmers' diverse needs given the complex nature of the agricultural sector.

■ ICTs and strengthening linkage between extension, research and farmers

Weak linkages between researchers, extension and farmers have been a major constraint in the application and uptake of new knowledge. **e-Afghan Ag**, an Internet-based resource, provides access to credible, relevant information to agents working with farmers in Afghanistan. It has developed over 500 demand-driven fact sheets on different crops, livestock, and a range of farming topics such as irrigation, post-harvest and watershed management (Bell, 2013). Its "Ask the Expert" service offers a 24-hour turnaround service that can be easily accessed by users. **Lessons:** Extension and advisory services need to be client-focused and needs-driven. They need to provide timely, relevant, credible, beneficial and actionable content through trusted sources and allow for user feedback.

■ ICTs and the knowledge ecosystem for extension

In Costa Rica, the *Instituto Nacional de Innovación y Transferencia en Tecnología Agropecuaria* (INTA) and its partners developed technologies that were relevant and freely accessible but were not used. The **Technological Platform for Agricultural and Rural Information Communication** (PLATICAR), a knowledge

ecosystem, was set up using a Web 2.0 portal that created a virtual environment for communities of farmers, researchers, and other intermediaries to interact and exchange both scientific and local knowledge. This ICT-based approach promoted through PLATICAR sought "to develop an information and computer culture for farmers" so that they could make educated decisions, maximise profits and at the same time reduce the digital gap. The use of ICTs in business and communications grew and became democratised as growers and farmers took advantage of the Internet for product placements, making product offers, getting quotations and receiving early alerts (Cordero and Ramírez Cartín, 2013). **Lessons:** ICT integration provides opportunities for knowledge management which increases access to information and knowledge. Capacity building reduces the digital gap, thereby contributing to democratisation of information and communication and reducing the time taken for the adoption of new technologies/knowledge.

■ Looking ahead

Can the rapid growth and increased access to modern information and communication technologies (ICT) contribute to improving the delivery and effectiveness of extension and advisory services, especially for the benefit of millions of smallholder farmers? The answer is yes, but the agricultural innovation system is complex and information and knowledge asymmetries exist which can facilitate or hinder learning. The social and policy context must be well understood when designing and implementing ICT solutions. In twenty-first-century agriculture, there is no silver bullet for optimising ICT use in extension and advisory services. Farmers and extension agents must be capacitated for achieving the desired agricultural transformation and rural prosperity.

Links, references and further reading:
 ► www.rural21.com

Biovision's Farmer Communication Programme

A circular knowledge dissemination system

In many parts of Africa, formal education and training in agriculture is almost non-existent. Swiss Biovision Foundation supports farmers via its Farmer Communication Programme. While it takes advantage of its close links with research institutions, the ideas and experiences of farmers also flow directly into its course contents.

As recommended by the International Assessment of Agricultural Knowledge, Science, and Technology for Development (IAASTD, 2008) and confirmed by the World Development Report 2008, hunger and poverty can most efficiently be addressed with support for the sustainable ecological agricultural sector and a focus on small-holder farming with locally adapted cultivation methods. Sustainable agriculture is less input intensive and therefore more accessible for resource-limited rural people, which means that it has a high potential for improving the livelihoods of a large group of rural poor and particularly women.

■ Support through information

During his 27 years in Africa, Biovision President Hans Herren grew increasingly aware of the lack of connection between research institutions and those practising in the field. He realised that bridges needed to be built, which was one of the reasons he founded Biovision Foundation in 1998.

At first, Biovision supported exchange between *icipe*, the Nairobi-based inter-

national institute for insect science for food and health, and farmers in Kenya. The exchange soon proved useful for the scientists as well, as they benefitted from the experience on the ground to fine-tune their research.

The significance of organic farming methods in Africa differs from that in Europe: Many African farmers are unable to afford conventional farming methods using pesticides and fertilisers, so that organic farming is an essential alternative. It is vital that these impoverished farming families are given help and advice on how to increase yields without major investment. Furthermore, they are faced with the serious consequences of climate change, they are also anxious to get information on drought resistant varieties of crops they grow and other advice on means to face

the challenges of global warming. Farmers have an enormous thirst for knowledge as formal education and training in agriculture is almost non-existent in many parts of Africa.

One notable project was the introduction of the *Push-Pull method*. This is an integrated, sustainable method of farming that improves maize yields and soil fertility: The stemborer pest is repelled by the smell of *desmodium*, a legume planted as an intercrop between the maize ("Push"). Napier grass is grown as a border crop and it attracts the stemborers away from the maize field ("Pull"). *Desmodium* can also fix nitrogen and neutralise the striga weed as well as keeping the soil moist

Radio interviews where farmers report on their experiences are an integral part of the Farmer Communication Programme.



Photo: Biovision

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for longer. This can increase yields without the use of artificial fertilisers and pesticides. The napier grass is a welcome source of healthy animal fodder, too.

With courses on the field, thousands of farmers were thus provided with a method that allowed them to improve their yields manifold and also supported them in maintaining their livestock. Today, some 80,000 farmers in East Africa are using the method.

While direct contact with the smallholders proved very successful in a number of such projects, it eventually became clear that additional means were required to reach more of the millions of farmers keen on improving their livelihoods with better farming methods.

■ “The Organic Farmer”

In 2005 we launched the magazine “The Organic Farmer” (TOF) for smallholders in Kenya, who previously had limited access to information on organic farming methods. TOF is published monthly in English and Swahili, and today it is distributed to 28,000 farming groups, amounting to a readership of 248,000 farmers in Kenya, Tanzania, Uganda, Burundi and Rwanda. A locally adapted edition for Ethiopian farmers is about to be launched. In addition, TOF is delivered to 266 schools and other

Outreach Programme: Gender equity is key

Women account for more than 60 per cent of the Outreach Programme participants:

- Total number of farmers reached through direct trainings conducted by programme field staff: 43,916 (male: 16,200 / female: 27,716)
- Total number of trainings conducted: 1,888. This is in 3 categories:
Farmer trainings: 1,690; farmers reached: 40,579 (male: 14,652 / female: 25,927)
Youth trainings: 119; youth reached: 1,698 (male: 762 / female: 936)
Trainings conducted in schools: 79; children trained: 1,639 (male: 786 / female: 853)
- Total number of farmers reached through field days and agricultural shows: 18,124
Field days: 107; farmers reached: 11,841 (male: 5,209 / female: 6,632)

Source: Annual Report Outreach Programme

non-agrarian institutions, so that the knowledge is not just being anchored in the minds of future generations of farmers, but the students also go home and share their freshly acquired knowledge with their parents.

Since it was first published in 2005, the print-run of TOF has continued to rise in order to cater for the increasing demand. Its close proximity to *icipe* means that the editorial team has access to scientific resources. This allows the magazine to focus in depth on current problems (e.g. drought in 2011). Farmer groups remain the main target audience for TOF. Regular meetings are held to discuss the content of articles and share experience. The farmers provide the editorial team with feedback and much of the content is determined by this feedback – a process that has helped to increase the farmers’ self-esteem.

edge throughout rural East Africa. In addition to the information published in TOF, information is also disseminated on the radio, by SMS and the Internet platform infonet-biovision.org.

The farmers’ regular feedback is used to ensure that TOF, and FCP as a whole, constantly meets their needs. For example, the layout was updated in 2013, and the magazine now includes a “market” column where TOF readers can advertise and sell agricultural products. This facility is much appreciated by farmers and used enthusiastically. A radio column also takes up questions raised by farmers who call into radio programmes, thus ensuring that contents are relevant to the target group.

■ A mixture of communication channels

TOF-Radio plays an important role in FCP, too. It is a seven-minute radio programme on organic farming methods that runs twice a week. It deals with the issues facing farmers, discusses the latest research findings and allows local farmers to share their experiences with others. Programmes are broadcast in Swahili, one of Kenya’s official languages. They feature regular interviews with farmers who describe their use of the methods advocated by TOF. Farmers profiled in the programme are interviewed locally on their farm or invited to the studio in Nairobi.



Photo: Biovision

TOF is the only magazine for organic farming in East Africa and remains a central element of the Farmer Communication Programme (FCP) set up to disseminate knowl-

Much of the content of “The Organic Farmer” is determined by the farmers’ feedback.

Special programmes that run for an hour are also regularly broadcast. The programmes allow the TOF Radio team to reach up to four million listeners a week. The TOF Radio programmes are an ideal complement to TOF magazine and also reach those in Kenya – about 25 per cent – who cannot read. All radio programmes can be downloaded free of charge from the Biovision Infonet.

A further challenge is the fact that there are still plenty of regions where Swahili is not understood by the population. So FCP has just started to cooperate with local radio stations broadcasting in different languages. Eighteen programmes have been produced for each of the two languages Kikamba and in Kalenjin and they will be broadcast in the first half of 2014.

Similarly, social media such as the TOF website and TOF Facebook pages are increasingly important communication platforms. They allow users to obtain advice and share ideas on successful cultivation methods, livestock trials and obtain favourable access to products. The use of social media is targeted particularly at the younger generation.

■ From research to trainer to farmer to research ...

A special advisory service for farmers living in remote areas was created with the Outreach Programme which ensures direct and personal contact with the beneficiaries of the Farmer Communication Programme. It runs 13 Info-Centres, staffed with trained advisors who are equipped with motorcycles so that they can reach farmer groups in remote places for training sessions in their fields. Further information centres run by other organisations are collaborating with FCP. The trainers, who have been specially prepared for their activities, are constantly in personal contact with the farmers and their mission also

includes passing on farmer input to the scientists. Neither do the scientists concentrate solely on monitoring their own trial fields, but they are constantly in touch with the practitioners, also via the Outreach Programme.

■ Scope for improvements

The Farmer Communication Programme is a highly promising approach to improving the livelihood of the rural population in East Africa, and already, there are countless success stories to tell after less than ten years. One important aspect of this approach is that it provides the beneficiaries with knowledge that can be used again and again and can also be passed on at no extra cost, making it truly sustainable.

But so much could and should still be improved. Research needs to take place locally, as the particularities of a region's vegetation and soil, weather conditions and consumer patterns all need to be taken into account. The dividends of this kind of research could be enormous in terms of reducing poverty and hunger across the globe, but not

directly in terms of financial rewards for internationally active private companies in the food business; which is why this research needs to be publicly financed.

Finding the appropriate channels of communication is another challenge. Widespread illiteracy among rural populations in developing countries remains a big obstacle. This is why we are continuously evaluating the effectiveness of the various channels in order to optimise existing channels or building up new ones.

At the end of the day it is the governments that need to take on the responsibility for creating the knowledge and then getting it to the target group. But as long as governments continue to neglect smallholders in their list of priorities for lack of immediate high returns, which is an attitude particularly prevalent in the developing world, the outlook remains difficult. This is why Biovision Foundation has become involved in the political process as well to ensure a paradigm shift in agricultural policy across the globe (see Box). A future for all – naturally!

Biovision's engagement

Seventy per cent of all food produced world-wide comes from smallholders who cultivate 40 per cent of arable land. But particularly in the Global South these smallholders are faced with many challenges, starting with their limited knowledge about farming in general and exacerbated by natural causes such as climate change, or political and economic factors such as lack of market access, insecure land rights and unfair competition through subsidised products from the developed world. So there is an urgent need to strengthen these smallholders by ensuring that they can sustainably increase their yields and their income without costly external input.

One area of support is on a political level. With the final declaration of the 2012 Rio+20 conference calling for the Committee on World Food Security (CFS) to assist nations who want to develop a sustainable agriculture and food sector, there is hope that this approach will find its way into national policies. Biovision Foundation is providing input into this process with a project called "Changing Course in Global Agriculture". This project offers integrated and dynamic planning tools to inform effective, comprehensive and long-term policies geared towards fostering the implementation of sustainable agriculture in the three pilot countries in particular and Africa in general. The project will develop dynamic computer-based models, using a multi-stakeholder approach, as a means for the Governments of Kenya, Ethiopia and Senegal to review, develop and adopt appropriate agriculture and related sector policies.

► www.biovision.ch

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Farmer-to-farmer knowledge exchange

Innovation takes place not only in laboratories, and disseminating knowledge need not depend on classrooms. The Cambodian GIZ project “Best Farmer 2012” is an example of how achievements of small-scale farmers can be appreciated and their co-farmers can simultaneously benefit from new insights.

In late 2012, GIZ outlined and implemented the project “Innovation Competition and Agricultural Show (Best Farmer 2012)” in Cambodia. The mission of this project was to bring together rural small-scale farmers in a collaborative manner to learn from each other’s capabilities and to celebrate rural life and the value of villagers in Cambodian society. In total, GIZ ran three shows in the Kampong Thom district in central Cambodia in December 2012. The aim was to create a public platform where small-scale farmers’ achievements are presented and honoured and which, in contrast to other competing exhibitions, is open to all interested participants and not driven by commercial interests. Also, best-practice and knowledge exchange between local small-scale farmers was to be realised as well as the creation of linkages between the public and private sector. Finally, the events sought to strengthen farmer-driven innovative development by publically rewarding the most successful farmers via radio/

TV broadcasting. Beside the competition and show, an informal setting was created to foster mutual exchange of knowledge and experience among farmers. Farmers and villagers were invited by radio broadcast, mobile promotion, leaflets and posters. Different local NGOs were also involved, which encouraged their network to participate. Public areas providing sanitary infrastructure and display facilities, such as school grounds, were chosen as locations.

The project comprised three major segments (see Figure on page 29), each including different aspects and sub-categories. The core element of the process was the **agricultural competition**. Here, each object on display was individually assessed by a jury of independent judges. The winners were subsequently interviewed on stage to share their knowledge with the audience. Media representatives recorded the interviews. The categories (see Figure) as well as the respective decision criteria were designed in an expert meeting prior to the first event. As a prize for successful candidates, agricultural material was handed out with a water pump including pipes as first prize. In addition, prizes donated by companies displaying in the agricultural show, were awarded to special winners (e.g. vegetable fertilisers for the winners of the vegetable competition). The number of participants in the crop modules was higher compared to the livestock segments due to trans-

portation challenges and risks (e.g. cow vs. carrots).

Complementary to the competition, private companies and retailers were invited to display their products in an **agricultural show**, highlighting new farm products, allowing innovative farmers organisations to reach a wider audience (e.g. farmers associations) and enabling farmers to achieve lower prices as middlemen in the villages were cut out. For advertisement, the companies were invited to donate prizes for winners of the competition segments.

Finally, the event was rounded off by a **cultural festival** displaying the local Khmer culture and by involving children in it (e.g. via a drawing competition highlighting life in the village), which proved to be a good way to create further interest among the villagers.

In total, roughly 1,400 villagers participated in all three events together while 500 small-scale farmers joined the competition. In all sub-categories, the best farmers were publically honoured, receiving awards worth more than 7,000 US dollars in total. The success of these events led to joint continuation efforts by the Ministry of Agriculture, Forestry and Fisheries (MAFF), the Asian Development Bank (ADB) and German Development Cooperation (GIZ). In late January 2014, a total of three shows were realised in rural Cambodia, additional ones will follow (see link at the end of the article).

■ The scientific option

Scientific progress is always a learning process. Nevertheless, agricultural science has so far tended to be developed at the (inter)national level, with knowledge dissemination as a final step out of the ivory tower. Scientists such as Tilman (2002), Lwoga (2012), Nathaniels (2000) and Lado (1998) try to overcome this model by arguing for an improved agricultural science pro-

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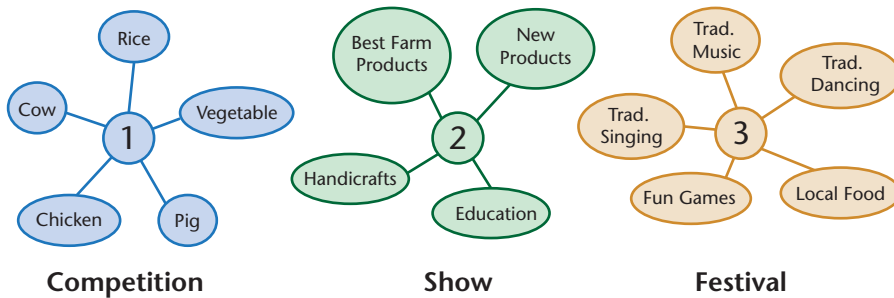
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Three pillars of the Innovation Competition and Agricultural Show (Best Farmer 2012)



cess, characterised by a continuous and active exchange of information between scientists and practitioners. One reason for this is that small-scale farmers' innovations and techniques are characterised by being mainly organised and accumulated through experience and the respective isolated application. And although farmers and practitioners contribute to a "body of knowledge" on sustainable agriculture, they often lack capacity to document and/or systemise their findings which hinders dissemination and scaling up processes substantially.

In Tanzania, for example, indigenous agricultural knowledge is acquired and shared within a weak network only, resulting in frequent knowledge losses. Furthermore, the example of seed fairs revealed a strong interest on the producers' side to learn new methods and try out new alternatives, with this being based more on a community's or individuals' own ingenuity than on external expertise. In this context, the international scientific project Trans-SEC (www.trans-sec.org) was launched in May 2013, aiming at the identification and testing of innovative and best practices along the small-scale agricultural value chains, with the respective knowledge transfer and adaptation as well as optimisation in accordance with local conditions. The responsible scientists at ZALF are in the process of outlining and publishing a concept to utilise the Cambodian experience as a blueprint for the scientifically adequate identification of agricultural forerunners on the one hand and simultaneous knowledge

dissemination on the other. Although short-term application is determined in accordance with financial and time restrictions, the design and publication of a respective concept will help to foster the formulation of e.g. competition criteria and overall challenges and restrictions in the long run.

■ Challenges and opportunities

There are still hurdles to overcome and blueprints to be designed in detail before such a framework is applicable in a wider geographical focus. First, a sustainable financial framework needs to be installed as the Cambodian event still costs 24 US dollars per participant. This might be achievable via integrating local authorities financially or via sponsoring by private companies. Second, and what is especially interesting from a scientific angle, there is the design of a general framework for the reproducibility of these events and subsequent local adaptation. In Cambodia, for example, cows, pigs and chicken were chosen as major categories of the competition, with height and weight being important criteria. However, the lesson

learnt is that local breeds are not able to compete with imported breeds when these criteria are applied, despite their being better adapted to the Cambodian setting. Another example includes the involvement of fruits and caretaking of fruit trees in the competition.

Generally, the "Best Farmer 2012" project revealed that a focus might be upon local varieties, adapted cultivation methods as well as the status of crops (hulled vs. de-hulled). In livestock-related competitions, age, sex and especially purpose of production should also be integrated in an evaluation system. Furthermore, this concept holds the potential to display achievements of socially excluded groups, such as women-headed households, in individual competitions. Potential amplification might also be achievable by explicitly combining this concept with a seed fair concept, as outlined by Nathaniels (2000). However, close monitoring is required to ensure that negative effects and implications of nation-wide agricultural shows are avoided. These events are predominantly designed for so-called progressive and commercial farmers, and they tend to neglect minor crops, focus on formal scientific achievements and, especially, undermine local knowledge and traditional local cultures.

Blog on the "Farmer of the year 2013":

► <http://agfest.wordpress.com>

References: ► www.rural21.com

Two participants in the competition category "Vegetables" with their products.

Photo: D. Diehl



Combining research and rural extension to the benefit of small farmers

From lab to field to market

“There is plenty of innovation. The trick is to get it to the farmers,” it is often said when technology transfer to farmers, and smallholders in particular, is referred to. In addition to the financial resources, they often lack the knowledge needed to be able to benefit from the new technologies. The ‘whole value chain approach’ of the Africa Harvest organisation shows how technology transfer can work.

Africa is witnessing economic growth of unprecedented proportions, but it is also the only continent in the world where the total number of hungry people has gone up since 1990. The challenge to transform the vision of a food-secure Africa into reality is a daunting one. The continent will need to invest more in agriculture, create safety nets and social protection for the poor, guarantee the right of access to land and water resources and target smallholder farmers and young people.

Africa Harvest, whose vision is to be a lead contributor in freeing Africa from hunger, poverty and malnutrition (see Box on page 32), believes the “game changer” will be the provision of seeds and clean planting material to farmers. However, when people talk about seeds in international and regional meetings, the focus is on grain, especially maize. Few think of food security crops such as vegetatively propagated crops like banana, sweet potato or cassava. Africa Harvest is convinced that in order to achieve the vision of a food-secure Africa, we will need to focus attention on the provision of clean planting seeds of these crops to farmers.

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■ A strong research network ...

Africa Harvest relies on laboratories in Kenya, South Africa, Israel and India to provide farmers with a large number of plantlets. In the labs, these plantlets are produced from single shoot tips in a relatively short time. This removes the bottleneck of large-scale field multiplication. Tissue culture (TC) or micro-propagation technology is applied in this context. It is a tool that is simple to use in producing clean and massive amounts of plantlets from meristems and tiny shoot-tips or other plant parts through sterile in-vitro techniques on artificial growth media. This is done in growth chambers or growth rooms.

The technology can be used for vegetatively propagated crops (VPCs) such as sweet potatoes, cassava, yams, flowers and vegetables. Unlike seeds, the TC produced plantlets are uniform and grow vigorously as they come from carefully selected plants. The TC technology has the added advantage of eliminating many diseases and pests from the produced plantlets because of its sterile nature, with the exception of viruses. The viruses are eliminated by selecting and propagating clean healthy plant stocks that have been virus-indexed.

Tissue culture plant growth is synchronous, enabling the exact timing of flowering, harvesting and marketing

to maximise opportunities, especially for the banana sub-sector. TC planting materials can be disseminated rapidly, and crop yields are uniform and higher when compared with conventional planting material. Africa Harvest only supplies farmers with TC material that is indexed for diseases as part of quality control and genetic integrity.

■ ... combined with a comprehensive value chain approach

The success of Africa Harvest is primarily linked to using the whole value chain (WVC) approach in project implementation. The overall focus is to remove barriers and bottlenecks, improve and increase productivity, enhance farmers’ access to products and services (including microcredit) and link them to reliable markets. The



rationale behind this is to depart from a common practice where development programmes introduce improved technologies to increase production, neglecting the rest of the value chain activities where many constraints and barriers slow down or prevent technology adoption.

Awareness creation. The WVC approach begins with awareness creation and farmers' aggregation into functional groups. At the heart of this are demonstration plots which enable the farmers to understand the improved innovation. A concerted effort is made involving the use of local administrators, government extension agencies and the mass media, especially the local FM radio stations that broadcast in the local vernacular.

Africa Harvest's experience with farmer group mobilisation is that groups that come together because of common interests are more sustainable. Those that tend to have short-term goals may not be compatible with long-term project goals. In the mobilisation phase, it is therefore important to ensure the messaging on what, how and why. Especially the *why* needs to be very clear to have a buy-in to the project. During capacity building, the duration of training, start time and venue need to be well considered to ensure gender inclusion; there is a place or time that makes it difficult for men, or women, to participate.

Nursery entrepreneurs are supported with technical training and materials such as shade nets, potting bags etc.

Accessibility. Once the innovation has been introduced and accepted by the target community, the next step is to ensure that it is accessible to the potential beneficiaries. Africa Harvest works with the private sector to ensure the communities access the innovation at an affordable price. Wherever possible, mechanisms for subsidies are put in place to support the most vulnerable households, while cost sharing is given due focus as well, particularly with regard to long-term sustainability. Micro-credit institutions are also brought on board at this juncture to diversify sources of capital and to increase financial literacy and use at the community level.

Communication. During this phase, Africa Harvest actively uses a combination of communication technologies. We have built a Short Message Service (SMS) platform to communicate critical information in local language. Information such as where to find inputs, upcoming events and market opportunities is sent to farmers in our database. Community radio is also used extensively to communicate information to the farmers during the beginning of planting/rainy seasons. Over time, this has become a very interactive medium as farmers call in to ask questions or participate in various quizzes and competitions.

Training. After recruitment, farmers undergo comprehensive training that is geared towards equipping them with skills and knowledge to successfully exploit the potential of the new, clean



Photo: Africa Harvest

planting material. This is a demanding phase requiring constant engagement with the target community to ensure that they go through one complete cycle. Those who do so successfully become trainers for new entrants, and this continues to create a positive snowball effect.

Community leadership. The success factors at this phase are often related to getting the right, dynamic and forward-looking community leadership. If the right skill is imparted and received, then success is almost guaranteed. Appreciating the architecture of local institutions and the individual leaders is also critical. Africa Harvest works with partners such as Kenya Agricultural Research Institute (KARI) and the Ministry of Agriculture; individuals from these institutions are held in high regard by the farmers. Information or projects backed by the two institutions are likely to be well received and successfully implemented by the target communities.

Marketing. The final step in implementing Africa Harvest projects is to support marketing activities. Success in engagement with smallholder farmers can only be achieved if the surplus produced by a household can be used to generate income. Different marketing approaches have been adopted, depending on the unique situation facing farmers. Generally, Africa Harvest has focused on trying to unlock more



Photo: Africa Harvest

Africa Harvest is helping farmers to bulk large volumes of bananas for marketing and linking them to potential traders.



Photo: Africa Harvest

Farmers learn how to apply good agronomic practices in their banana orchards.

ing lessons learnt. For example, we have learnt not to give handouts to farmers. Where farmers make a contribution – even in kind – there is a higher

returns to banana farmers by tackling the inefficiencies inherent in the supply and distribution system. Africa Harvest's communications programme complements each of these activities by empowering people through education and facilitating knowledge transfer.

chance of success. We have also learnt that after mobilisation, it is critical to identify the most promising groups. The energy levels and dynamism of these groups requires disproportionate attention, so they become pockets of excellence that other groups can learn from.

■ Challenges and lessons learnt

Africa Harvest has also faced many challenges in the implementation of its projects. Some of these challenges relate to low acceptability of agricultural-related activities among the youth. Most look at agriculture as all drudgery that has little pay. Often, groups are mostly composed of the elderly and recent retirees who are looking for something to keep them busy. Some do not have the energy to complete the projects. To have fully functional value chains, the government needs to lend its support by creating an enabling environment; the quality and inspection of tissue culture labs has not really been put into place, and there are no policy frameworks to guide quality issues. Other challenges relate to groups being established as self-help groups whose legal and operational systems are weak or non-existent. Though membership is voluntary, it becomes difficult to work with errant members of the group, especially when the by-laws are not followed.

Overall, Africa Harvest has continued to tweak its approaches by incorporat-

Africa Harvest

Africa Harvest was founded in 2002. Its aim is to improve the livelihoods of rural communities in Africa by the application of innovative technologies, combined with imparting knowledge and disseminating information as well as better access to markets. Its focus is on the banana sub-sector. In partnership with the Kenya Agricultural Research Institute (KARI) and other stakeholders, Africa Harvest has in the last ten years successfully introduced the tissue culture (TC) banana technology at the commercial level in Kenya by facilitating smallholder farmers to access over 6 million TC plantlets. More than 250,000 farmers have benefitted directly from Africa Harvest's projects, funded by, among others, the Rockefeller Foundation, DuPont-Pioneer, and the Alliance for a Green Revolution in Africa (AGRA) and US Agency for International Development (USAID).

As a publicly-funded organisation, Africa Harvest's role is to identify and unblock value chain challenges to ensure maximum value is unlocked for farmers. The foundation facilitates technology transfer through learning visits for both public and private sector entities. This has resulted with a thriving private sector business in the provision of clean planting material. Some of the TC banana plantlets are also imported from South Africa and Israel through public/private sector partnerships.

■ Obstacles

Despite all the advantages of tissue culture (TC) technology, its commercial application is still very limited in Africa. Several CGIAR Consortium institutions have mandates for the improvement of vegetatively propagated crops (VPCs). The International Institute for Tropical Agriculture (IITA) has the global mandate for cassava, banana, plantains and yams. Bioversity International focuses on bananas, while the International Potato Centre (CIP) has a mandate for potato and sweet potato, roots and tuber crops. The institutions have invested significant efforts designed to introduce new, improved crop germplasm to target countries for evaluation and testing on a rather small scale through partnerships with National Agricultural Research Systems (NARS).

➤ www.africaharvest.org

A (women)farmer-first approach – a case study from Papua New Guinea

The Government extension services in Papua New Guinea (PNG) are weak. There is a general lack of money and staff, and the country has a poor infrastructure. Above all small-scale farmers in remote areas are left out of developments. This applies in particular to women farmers, despite their providing 85 per cent of the rural workforce.

At the beginning of the new millennium, an extension concept was designed to test a novel approach, the contracting out of support services to service providers. This concept was applied in the "Smallholder Support Services Pilot Project". As a farmer myself, I was enthusiastic and admired the concept, the aim of which is to increase production, productivity and income of smallholder households while ensuring sustainability of farming systems. I decided to take the concept to women farmers, who are responsible for a major share of the country's food production. It seemed a good way to enhance the status of women in the country's agriculture.

The concept is based on the following ideas:

- Women set the agenda by developing their own activity – based on what they have, and at no cost from the start.
- Women (usually individuals at small-scale level, locally based entrepreneurs) apply for registration, and we assist them in implementing their plans.
- Women manage their own projects together with their executives.

The women hold regular meetings in which they determine the topics of extension according to their needs and suiting their area. Often, the focus is on infrastructure and transport issues. They then discuss the problems and possible solutions with their executives. These are local service providers acting as "expert farmers" who have demonstrated compe-

tence in training other local farmers. This service is free of charge for the small-scale women farmers.

One of the project's major achievements is that women have now organised themselves and are able to report on their achievements. For example, they have learnt how to use new techniques in yam planting and rice farming or in vegetable growing. In addition, they have succeeded in improving their marketing skills; now they are able to sell their produce to wholesalers and many other market outlets. This is a crucial step, for most of them are subsistence farmers. The project has also changed the way the women see their work; now, they regard themselves more as "businesswomen". In the course of the project, they are trained to do basic bookkeeping, too. And we link them to financial institutions so that they can have access to credit facilities.

As to knowledge transfer, we partner with research organisations such as the National Agricultural Research Institute (NARI). In addition, we arrange field days, demonstration plots and other activities enabling practical learning. We have also achieved networking with other organisations, such as the Australian Women in Agriculture Association and other partners.

The project started in 2006. It now operates in 20 Provinces of Papua New Guinea with 118 registered groups of 15-25

members each. We are also considering establishing a network in the Solomon Islands and Vanuatu.

In Papua New Guinea, it's women who do the bulk of the work, but it's the men who decide how the profits are spent. In general, women do not own land – with the exception of some Provinces where there are matrilineal societies and women are land-owners and decision-makers. As was to be expected, some obstacles had to be overcome in the early stages of the project. But generally, all male farmers are very supportive as they see women benefiting from the networks. After all, promoting the women benefits the family as a whole, and they are making a contribution to earning an income and to food security.

Participatory, demand-driven extension projects improve relevance, ownership and adoption by smallholders. And they yield a positive return on investment in extension programmes. Surveys have shown that the cost effectiveness and impact of extension services per farmer contact is more than double that of services provided through conventional government officer-delivered extension services.

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In Papua New Guinea, more than four million people (84 % of the population) depend on subsistence and semi-subsistence agriculture. Agriculture accounts for 26 per cent of GDP.

Photo: M. Linibi



International Women's Day

Empowering rural women in India – it's high time!

Publicly elected women representatives in India ought to take advantage of their influence to defend women's rights.

The Constitution of India guarantees all women equality [Article 14], no discrimination by the State [Article 15 (1)], equal opportunities [Article 16] and equal pay for equal work [Article 39(d)]. Furthermore, it stipulates that practices derogatory to the dignity of women be renounced [Article 51 (a) (c)]. The Constitution also allows the State to make special provisions in favour of women and children [Article 15(3)] and secure just and humane conditions of work and maternity relief [Article 42]. The Government of India declared 2001 the "Year of Women's Empowerment", and the National Policy for the Empowerment of Women came into force in that year 2001.

■ Ambitions and reality

So much for the official side. But in reality, things are very different, as the living conditions of women in rural areas show. For many centuries, rural women have been putting in unfathomable, unbearable and inadequately paid joyless drudgery to earn for their families' livelihood and provide food security to the country's 1.28 billion people. Most rural women face a pathetic plight, having to collect firewood, fetch drinking water, search fodder to feed cattle, work on their meagre land to raise crops or as labourers on other farms, take care of children, etc.

Agriculture and allied sectors in India employ 89.5 per cent of the total female labour. About 84 per cent of all women are engaged in agriculture, either as cultivators or labourers, as against 67 per cent of male workers. Women constitute about 66 per cent of the agricultural workforce. Around 48 per cent

of self-employed farmers are women and 64 per cent of the informal sector workforce depending on agriculture is represented by women.



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■ More work, fewer rights

In spite of the fact that more and more women are engaged in farming as men are migrating to urban centres for work, their situation remains unsatisfactory. Not only they are invariably paid lower wages than men for the same agricultural work, they also have to work much more. In the Himalayan region, for example, a woman works 3,485 hours a year on a one-hectare farm as compared with 1,212 hours by a man and 1,064 hours by a pair of bullocks.

Despite nearly 400 million women out of the total 600 million female population depending upon crop, livestock and fish farming, forestry, agro-processing and agri-business for their livelihood, they are unable to access resources such as land, water and capital. Land ownership titles are often in a man's name. Men either take or dictate the decisions concerning farming and women have to carry them out. Men market farm produce, which gives them complete control over household finance. Without legal ownership of the land, women have no access to credit. Only 11 per cent of women in India have access to land holdings, and even they are mostly only small and marginal farmers. About 86 per cent of female agricultural labourers and 74 per cent of female farmers are either illiterate or have education below the primary level. Average education of a female agricultural labourer was less than one year in 2004–05. An Oxfam International study in the state of Uttar Pradesh shows that 6 per cent of women owned land, less than 1 per cent participated in Government training programmes, 4 per cent had access to institutional credit and 8 per cent had control over agricultural income.

■ Discrimination starts even before a child is born

The prospects of women achieving equal ownership are already dashed at an early stage. For example, despite being officially banned by the Child Marriage Restraint Act of 1929, child marriage is still a common practice. The worst feature of this practice has been that the child widows are condemned to a life of great agony, with their heads shaved, living in isolation, and shunned by the society. According to UNICEF's

“State of World Children, 2009” report, 47 per cent of India’s women aged 20 to 24 were married before the prescribed legal age of 18 years, with 56 per cent in rural areas. About 40 per cent of the world’s child marriages occur in India. The Immoral Traffic [Prevention] Act was passed in 1956, yet cases of immoral trafficking of young girls and women have been increasing.

Although all medical tests determining the sex of the child have been banned, India has a high masculine sex ratio. Many girls die before being born or reaching adulthood. This is attributed to the female infanticide and sex selective abortions, most of which are owing to the dowry tradition. According to a 1997 report, at least 5,000 women die each year because of dowry demand. In India, parents almost always have to pay money to their daughters’ in-laws either before or at the time of their marriage. But even after marriage, some in-laws or the daughter’s husband may continue to demand dowry. If the dowry is not paid, this can result in the daughter being harassed to the extent that she ultimately commits suicide. While laws do exist to prevent this, the enforcement machinery is weak, and the judicial process is very lengthy. Such cases are well-documented in numerous police records, as is a high incidence of crimes against women. Domestic violence is a daily occurrence. The National Crime Research Bureau reported in 1998 that the growth rate of crimes against women would be higher than population growth rate by 2010. Not much has changed in this respect since the Protection of Women Domestic Violence Act came into force in 2006. Many cases are not registered with the police due to the social stigma attached to rape and molestation cases or inaction on the part of police.

■ Following the example of developed economies

The developed economies of USA and Europe have already demonstrated strict compliance with laws concerning women’s rights and status through most effective Law and Order enforcing machinery and efficient judicial system. Since India is expected to emerge as an economic superpower, the publicly elected women representatives – the existing and the future ones – ought to follow their example and accord priority to the following issues:

Health and family planning. Average female life expectancy in India is low compared to many countries. In a large number of families, particularly in rural areas, the girls and women including mothers face nutritional discrimination within the family and are anaemic and malnourished. Maternal mortality in India is second highest in the world. The health professionals supervise only 42 per cent of births in the country. Most women deliver with the help of women in the family who often lack the skills and resources to save a

mother’s life if she is in danger. The average woman in rural areas has little or no control over her potential for reproductive. Women do not have access to safe and self-controlled methods of contraception.

Education. Studies confirm that female literacy has a significant influence in improving the social and economic status of women. The female literacy rate is woefully lower than that of males. Compared to boys, far fewer girls are enrolled in schools, and many of them drop out of school education. According to the U.S. Department of Commerce, the chief barriers to female education in India are inadequate school and sanitary facilities, a shortage of female teachers and a gender bias in curricula.

Enabling environment. An enabling environment should be created in rural areas that can facilitate all rural women easy access to fuel, safe drinking water, sanitation, education, insurance, healthcare and the public distribution system. While women-farmers should be enabled to have hassle-free access to credit, inputs, technology and marketing and their non-institutional debt should be redeemed by institutional credit, rural women need to be relieved from the joyless drudgery of agricultural tasks through adequate and planned mechanisation of agriculture and assisted in taking up non-farm sector income-generating activities.

Land and property rights. In most Indian families, women do not own any property in their own names and do not get a share of parental property. Some of the laws discriminate against women, when it comes to land and property rights. Married daughters, when faced with marital harassment, have no residential rights in the ancestral home. Christian women have not yet received equal rights of divorce and succession.

Decision-making process and position. As per 73rd and 74th Constitution Amendment Acts, all local bodies should reserve one-third of their seats for women. Through Panchajati Rai Institutions (PRIs) – Rule of Village Committees – over a million women have enrolled in political life. Nevertheless, women are still under-represented. Elected women representatives in PRIs need to be intensively trained to develop skills. They require capacity building and knowledge management that can help them generate adequate confidence to participate effectively in decision-making processes as well as occupy decision-making positions.

National Commission for Women. A nodal office of the National Commission for Women should be established in each block and district to protect the rights of women, girls and children in general, voice their issues and concerns, pay undivided attention to monitoring compliance with the existing Laws and establish effective co-ordination with other related offices.

The “Green charcoal chain”

German Development Cooperation has developed an approach for the sustainable production of charcoal that has proved to have a considerable impact in Northern Madagascar. Since both environmental and socioeconomic aspects are addressed in a very effective way, this approach has high potential referring to global challenges such as land degradation, rural poverty and climate change.

In sub-Saharan Africa, wood-fuels have always been the most important energy carrier, including in urban centres where charcoal is chiefly used for cooking. Even in a middle- and long-term perspective, wood energy and charcoal will remain the major energy source for most African countries. Already today, more than half of the world-wide charcoal production, about 24,000,000 tons, is consumed in Africa. Between 1992 and 2007, the production of charcoal in Africa grew by 65 per cent, a trend expected to continue in line with population growth. Only about 10 per cent of the population have access to modern energies like electricity and gas.

Dry forest ecosystems (with up to 1,500 mm precipitation per year) supply about 80 per cent of the energy needed by the rural and urban population in sub-Saharan Africa. Such forests are hardly ever subject to regulated and sustainable management, resulting in overexploitation and degradation. Around urban centres in particular, degradation and deforestation progress

in a concentric fashion, with desertification as the inevitable end-result. Due to the dry forests' low increment rates, charcoal production tends to destroy this vulnerable ecosystem. Moreover, conversion of forests to farmland and mounting degradation further impair the dry forests' potential to supply wood. Weak forest governance, commonly regarded as the biggest obstacle to sustainable forest management in sub-Saharan Africa, likewise restricts wood energy supplies (of charcoal in particular) from natural forests.

Natural forests aside, wood energy originates from various sources such as trees outside of forests, agroforestry, agricultural plantations and tree plantations. Considering the huge and increasing demand for energy wood and the decreasing potential of sustainable production in natural forests (especially around urban centres), it becomes clear that this mix of energy wood

sources needs to prioritise more productive sources. Consequently, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH pioneered an approach in Northern Madagascar to boost sustainable charcoal production through wood plantations. Its main features are presented in the following.

■ The case of Northern Madagascar

Over the last two decades, progressive deforestation at a rate of 0.6 per cent per year and subsequent erosion has already stripped Madagascar of many of its fertile soils, directly affecting the country's population of 20 million, especially in rural areas. Creating a vicious circle, loss of soil fertility has

Newly created plantations ease the pressure on natural forests. Using the RVI approach has allowed 49,000 hectares of forests to be preserved.

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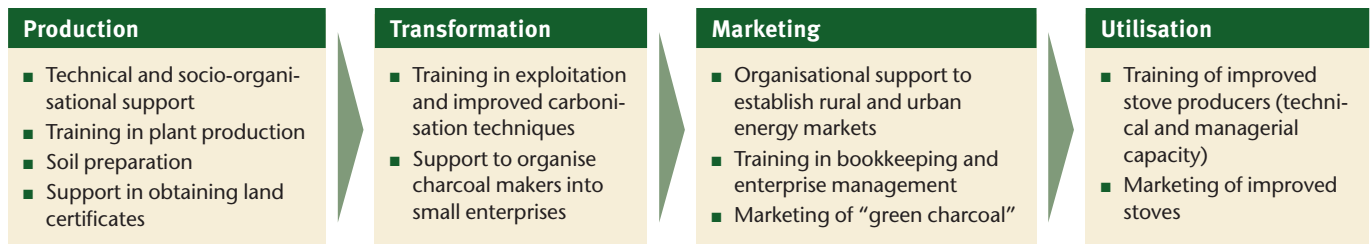
ECO-Consult

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Photo: GIZ/ECO



RVI services addressing the whole value chain



driven many small/subsistence farmers into charcoal production. Primary forests, secondary forests and savannah are used, often illegally, as a freely accessible resource. Eighty-five per cent of all Madagascan households depend on woodfuel. Population growth and urbanisation further increase the demand for charcoal. Yet, despite its significance and potential (as illustrated by an annual turn-over of about 125 million euro), national policies tend to almost entirely omit charcoal. This further fuels unsustainable and inefficient production, and, by extension, deforestation and soil degradation. Eventually, opportunities to modernise the charcoal value chain are lost, and government revenue is foregone – not to mention the longer term loss of wood-fuel supplies.

■ Private tenure as the basis of the value chain approach

Unlike community forest management, the RVI approach (*Reboisement Villageois Individuel*) prioritises individual smallholders as forest stewards with secure tenure rights. At its core, surplus/freely disposable wasteland unsuitable for other purposes is to be reforested with the goal of producing wood-fuel in a sustainable and highly efficient manner. To realise this goal, the project

1. fosters community consensus on setting aside wasteland for reforestation, subject to participatory land use planning,
2. promotes the formation of smallholder groups willing to undertake reforestation efforts,

3. supports allocation of plots to individual households, and
4. facilitates formal registration of tenure rights in recognition of and conditional on predetermined performance benchmarks (a minimum 80 per cent survival rate one year after planting).

Mechanical soil preparation along contour lines serves to break up topsoil compaction and increases water infiltration, making tree growth more resilient to climate change. Investment per hectare amounts to about 210 euro, 66 per cent of which is covered by technical assistance, with the remainder being provided by plantation owners through their own labour. Furthermore, during the exploitation phase the charcoal producers are instructed to operate more efficient charcoal kilns. Networking support helps to create small rural businesses with better market outreach and easier proof of origin of sustainably produced fuel ("Green charcoal chain"). NGOs have been specially qualified by the project to train and advise the small farming households in the implementation of the approach.

The RVI approach thus addresses the full value chain, from the sustainable production of wood-based fuels to their processing, conversion, distribution and marketing, all the way to end-consumers and related technology such as improved kilns and stoves. A comprehensive GIS-based monitoring has been set up to monitor selected indicators along the marketing chain of forest products and compiled to an "atlas". In addition, livelihood indica-

Success factors at a glance

- **Good governance** – Innovations include forward-looking policies, e.g. "Vision 2020"
- **Subsidiarity** – Technical services are relieved of what they cannot afford to achieve. Trained NGOs bridge the gap between executive authority and target group.
- **Decentralisation** – Takes management functions to those directly concerned.
- **Legalisation** – The approach assists in setting tenure/use arrangements (communal decree).
- **Tenure security** – Allocating individual legal titles to people is the driving force of the approach – rather than counting on community property and management alone.
- **Efficient technologies along the value chain** – Quadruple the output on the basis of equal raw material.
- **Simplicity** – Requires no complex community institutions or management regulations in comparison to community based forest management.
- **Formalisation** – Legalisation of representative user group bodies providing income to communities, forest administration through legal taxes and dues.
- **Economic returns** are quick and tangible.
- **Empowerment, devolution** – Transfer of user rights and duties to user groups according to jointly set-up quality standards.
- **Capacity building** – Ensuring up-scaling, efficient steering and sustainable implementation.



Photo: GIZ/ECHO

Overall, 2,900 households have afforested 7,000 hectares of wasteland around 68 villages.

bush fires in the afforestation zones decrease, since the owners of the forest plots have a strong interest in protecting their property. Coupled with efficient technologies, this has resulted in the preservation of about 49,000 hectares of natural forests, with corresponding carbon sequestration.

Poverty alleviation. Small farmer households participating in the RVI own up to three hectares of energy forest, enabling them to produce about 2.9 tons of charcoal a year for at least 27 years without any additional investment. This results in a doubling of their annual income compared to the rural average. For many people, the increase will be significantly higher, since about 30 per cent of farming households belong to the poorest landless section of the population. RVI also gives women greater opportunities to own forest plots (current share 33 %) and thus strengthens their economic position in society. The 7,000 urban households (roughly equivalent to 33,000 people) using improved stoves save some 733 tons of charcoal a year, worth a total of 101,000 euro or 14 euro per household (which corresponds to an 18 per cent drop in expenditure).

Energy supply. Of the total afforested area of 7,000 hectares, 800 hectares can be logged each year. This, combined with the efficient utilisation technologies, enables production of a total of 3,500 tons of charcoal, meaning that, particularly in the regional capital of Antsiranana, about 33,000 people (30 % of the town's population) can be sustainably supplied with domestic energy.

Local capacity development. Local service providers (e.g. NGOs and small private businesses) are increasingly capable of providing professional advice and continuous support to the relevant

target groups. Most of the initial participants have by now attained sufficient skills to carry out the afforestation work independently. Village-level networking has the concerned stakeholders' decision-making rights at the local level, particularly on important issues such as land use planning. For some municipalities, regulated charcoal production has turned into a source of tax revenue.

■ The way ahead

Even though some headway has been made in providing alternative energy sources, wood energy will remain centre-stage in sub-Saharan Africa. Within the wood energy segment, diversification of sources is essential in order to reduce pressure on natural forests, especially in regard to charcoal production. Therefore, existing and proven good practices such as the RVI approach from Madagascar warrant wider dissemination with a view to achieving large-scale impact. For this reason German Development Cooperation is currently assessing the feasibility of expanding this approach to other African countries. Wood-fuel plantations are also a very promising way of rehabilitating and valorising land that has already been degraded. Furthermore, they provide sustainable income for the rural population which, in consequence, is much less affected by extreme weather events threatening annual crops. In this context, the RVI approach was presented at a side event of the UNCCD COP 11, in September 2013, in Namibia that explored innovative approaches to combat land degradation and strengthen the resilience of rural people through sustainable wood energy production. It has been agreed that planted forests for wood energy have an undeveloped potential to contribute to these targets.

References: ► www.rural21.com

This article reflects the personal views of its authors, not of their institution.

tors on the level of the target groups are periodically assessed and integrated.

■ Multifaceted impact

The RVI approach is not only pro-poor, pro-development and a potential driver of sustainable economic growth (green economy), but also highly valuable in mitigating biodiversity loss and climate change. Unlike other community based forest management approaches, RVI relieves governments of the need for organisational and governance interventions, yet retains many of the same environmental benefits. Once the plantations are established, the process of managing, harvesting, and replanting is self-sustaining through wood sales revenues.

Environment. Overall, 2,900 households have so far afforested 7,000 hectares of wasteland around 68 villages, mainly using eucalyptus. Since mechanical tillage is mandated by the approach, degraded areas with compacted top-soils can be valorised through rehabilitation. Newly created plantations ease the pressure on natural forests, especially around protected areas under threat of conversion for charcoal production (biodiversity conservation as a co-benefit). Additionally,

“Zero pesticide” vegetables for the Indian market

In the Indian state of Karnataka, the First Agro farm has more than 40 varieties of vegetables on sale, all of them free of chemical residues. Both hotels and restaurants as well as more and more retailers are appreciating the range of certified products from this young enterprise.

The farm First Agro lies in Talakad, near Mysore in Karnataka, India. The farm is located in Cauvery Cluster, named after the River Cauvery, and is spread over 45 acres of land. Entering the complex, one notices boxes of bright red cherry tomatoes and huge Heirloom tomatoes stacked over each other. The boxes are pasted with a certified ‘zero pesticide’ trademark.

First Agro, which was set up in 2011, grows more than 40 varieties of Indian vegetables, herbs, lettuce and exotics in a mixture of field and greenhouse cultivations. The company has set a high bar for pesticide-free commercial farming in India. First, it has adopted the Codex Maximum Residue Limits (MRLs) for Pesticides and Extraneous Maximum Residue Limits of the World Health Organization (WHO) for its farm production. MRLs for pesticides have been established by Codex to ensure that consumers are not exposed to unsafe levels of hazardous and toxic materials. Every batch of First Agro produce is tested and certified by reputed Food Safety Test laboratories to ensure ongoing compliance with Codex standards. The company’s lab reports are clean – there is not the slightest trace of chemical in the vegetables they produce. Second, their integrated pest and



Photos: First Agro

Photo left: First Agro founder and CEO Naveen MV. Photo right: First Agro director Nameet M discussing vegetable taste and growing practices with five-star hotel chef Jolly.

disease management (IPDM) eliminates 90 per cent of common pest issues in agriculture. Third, their drip irrigation system reduces water consumption by 70 per cent in comparison to conventional agriculture. Also, the plastic and packaging material is biodegradable.

First Agro is based on the initiative of three Indian entrepreneurs with very different backgrounds. Naveen MV, who used to live in the US, can boast 24 years of experience as a business leader in building and scaling business units of leading global organisations in America and the Asia-Pacific region. His brother Nameet M was a pilot in Vancouver, Canada. He spent time with farmers there to learn various techniques of farming. He is also a subject matter expert in olericulture (the science of vegetable growing), hydroponics (soil-less farming) and Integrated Pest Management. With hands-on experience in working with multiple horticulture

growers in Canada over many years, he now works on the ground at Talakad, having relocated from Canada. Their cousin KN Prasad, who joined the two founders, brings with him over 25 years of cross-functional experience in agriculture supply chain and Information Technology across diverse areas like sales & marketing, supply chain management, operations, customer service and finance. Prasad had previously co-owned and managed his family’s farm plantations in the state of Karnataka for more than a decade and has deeper experience in agriculture and supply-chain management.

■ From idea to implementation

“We realised that each time we visited India, the price of vegetables had changed,” Naveen recalls. “A thought then occurred to me – instead of complaining, why don’t we do something

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about it? We wanted to be a catalyst," says Naveen, adding that they had started their venture with a social and commercial objective. The idea, which was conceived in 2007–08, took a good two years to implement. During this time, the young entrepreneurs made frequent trips to India. "We noticed at least 6–7 intermediaries in India," says Naveen. "The produce changed many hands. How could people know where their vegetables come from? There was no regulation on pesticide use."

Operations were started in 2010, on untilled, untouched land in Talakad. Production commenced towards the end of 2011. In 2012 and 2013, the company was perfecting methods and growing vegetables. "I tried and failed almost 16 times, and the learning happened," Nameet says.

First, the consumption pattern of people was mapped. On average, an individual consumes 200 grams of vegetables a day. Once they had established the pattern, the entrepreneurs approached retailers. "When we told them that we were India's first commercial producers of zero pesticide vegetables, about 50 per cent of them had no clue," says Naveen. "Some people did have a notion of what we were doing, but there was no clarity." Naveen introduced cherry tomatoes in green, yellow, purple and chocolate colour as a part of the research exercise. He had the idea of children relishing colourful tomatoes. "Most retailers were shocked," says Naveen. "For them, the question was: 'How can tomatoes be in green and

yellow?' It was important to have alignment between them and the suppliers to service the consumers," he adds.

■ Exotic varieties for discerning customers

First Agro's research and development led to the introduction of new vegetables. For instance, flying-saucer shaped Bishop's Crown chilies, which almost went extinct, were tried as a part of the research and development exercise. The chilies soon added to their range of products (see Box). The same holds true for Jalapeños. "Today, First Agro is the only supplier of Jalapeños in India. They are sold at Rs 65 per kg," says Naveen.

Distribution is via two major business units. First, there is retail, where First Agro produce is grown and sold under the brand name of First Agro by all large and mid-size retailers in India. It is on the market as packed produce with 'First Agro' and 'Zero Pesticide' logos. The second business unit is 'Chef-Garden' which caters to institutional customers – global international hotels and fine-dining restaurants. Chef-Garden customers are provided with backward integration from their menu to farm production, and dedicated productions are run for many large hotels and fine-dining restaurants. "In the past, the hotels imported vegetables, paying eight to ten times more. Almost 30 per cent of imported vegetables were wasted in transportation," Naveen says. Today, First Agro supplies these vegetables.

The price of First Agro is about 10 to 40 per cent higher than the conventional market price. "More and more consumers

demand healthy food," says Naveen. "And when the consumers gain, the retailers also gain." If tomatoes are sold at 10 Rupees (Rs) per kilo in market, First Agro will sell them at Rs 20 per kilo. Consumers who are above middle class and who insist on healthy food are eager to buy these products. Price calculation is based on the cost of production. This can be best explained with the price of beans. When the price skyrocketed to Rs 42 in the market, First Agro were selling at Rs 35. "There were people who asked us why we did not raise the prices of vegetables when there was demand," Naveen says. "Our objective was not to keep pushing the prices up and down, but to maintain food safety."

There are times when tomatoes are stocked up, unsold. In this situation, the aim is to make vintage style sun-dried tomatoes and pasta sauces for better shelf life. Since three to four tons of compost is needed every week, some of them are used as feeds in compost bins. "Nothing goes wasted here," says Naveen. The company plans to have a processing unit in place to make pasta sauces and purees, cut vegetables, etc.

■ Sophisticated pest and disease management

First Agro works with a matured integrated pest and disease management regime. For instance, organic companion plants like mint and coriander assist pest management. "Using a combination of neem oil, beneficial insects and microbes, garlic-chili spray, pheromone insect traps and companion plants, we are able to manage about 90 per cent of the common pest issues in agriculture," says Naveen. For every bad insect, there is a beneficial one. For instance, pests such as carrot fly or armyworm hate the presence of garlic and coriander. The major pests of tomatoes are aphids, thrips, spider mites, pin and fruit worms and stink bugs. Here too, there is no need to apply chemicals. Instead, the company uses coloured sticky traps for



Photo: S. Balasubramanian

Barbados is believed to be where Bishop's Crown chilies originate from.

aphids and thrips and neem oil to manage pinworms, fruitworms and stink bugs. Spraying the leaves with minced garlic helps against various pests.

In Brinjals (eggplants), Fruit and Shoot Borers (FSBs) represent the greatest threat to the harvest. First Agro uses sex pheromone lures to trap male moths. The pheromones emit the smell of the female insect. The male insects are attracted and fall inside the trap. "Using the pheromone lures, if we are able to trap maximum number of male moths, we can break the cycle of the female moth laying sterilised eggs. Moth population is then controlled," Naveen explains. The company uses *Trichogramma chilonis*, another beneficial insect. *Trichogramma chilonis* controls the population at the stage of egg. Once the eggs are destroyed, the FSB birth cycle is stopped. Neem oil helps to control the adult moths of FSB and thrips effectively.

The Eggplant Fruit and Shoot Borer has been a reason of worry for farmers growing Brinjal. Rampant use of pesticides has played havoc with the lives of common people and farmers in India after the Green Revolution. The negative impacts of pesticides have been well documented, says Kavitha Kuruganti from the Association for Sustainable and Holistic Agriculture. The Association, which comprises 400 organisations, was created in May 2010, as a response to the need felt amongst civil society that as a nation, India was not doing enough to address the issues of rural livelihoods, food and seed sovereignty and security and thereby, sustainable development. Kavitha Kuruganti believes that people's attitudes are changing today. "There is demand for organic produce, and the industry is growing at the retail end," she says. However, there are no numbers to document the percentage of organically produced vegetables in India. For Kuruganti, the way to go is to combine traditional practices of organic farming with modern techniques.

■ On-the-job training

When First Agro started production, the biggest challenge was finding human resources. For the supervisory level staff, they recruited from reputed agriculture universities in India and were specifically on the lookout for people who had studied olericulture, entomology or botany as part of their Bsc/MSc degree in agriculture or horticulture. The trainees then underwent on-the-job training for a period of two years under an assistant grower or chef grower. The farm works with documented and Intellectual Property (IP) driven 'Integrated Pest & Disease Management' cultivation methods for Zero Pesticide and non GMO (genetically modified organisms). In the last three years, the company has nurtured more than twelve growers who now have significant experience in zero pesticide methods. For unskilled agriculture labour work, the farm hires part-time labour from neighbouring villages.

A total of 42 people are now working on the farm. There is a need for one to two people per acre depending on what they are growing, and this keeps changing with their research and development and the demand for certain produce. About 40 per cent of the workforce are women. "Empowering rural women is crucial for reducing poverty and making them self-sustainable," says Naveen.

■ The vision: covering the entire Indian market ...

The agripreneurs are looking ahead. "Our plan is to set up 1,500 acres of pesticide-free production across 16 locations in North, West and South India over the next five to seven years. Each of our clusters, with 100 to 150 acres, will be named after Indian rivers. The farm will be integrating production, pack house, cold storage and processing centre," says Naveen. Investments to the tune of 20 million US dollars

First Agro vegetable portfolio

First Agro offer a wide range of indigenous and exotic vegetables:

- 32 varieties of heirloom tomato
- Pink and chocolate Tushita cherry tomatoes
- Orange and pink-coloured tomatoes
- Bird's Eye chili in white and black colour
- Bishop's Crown chili
- Jalapeños chilies
- American Slicer Cucumbers
- Red Baby Mustard
- Red Baby Pokchoy
- Red and white Tatsoiy
- Red Komatsuna
- Wild rocket
- Baby Swiss Chards in various colours
- Orange, chocolate, white and purple-coloured capsicums
- 16 varieties of microgreens
- Salad: a range of Oakleaf, Lollo Rosso, Lollo Bianco, Romaine and Butterhead
- Common Indian vegetables like Brinjals, carrots, radish, etc.

The farm is also a pioneer in growing 'Living Greens' for its Chef-Garden customers. Basically, multiple lettuce, Asia-Greens and herbs are grown as living plants using hydroponics where natural coco-peat is used to grow these small plants. The live plants are shipped to Chef customers and are harvested in the Chef's kitchen for a true 'Farm to Fork' experience.

have been earmarked for this venture. The company has plans to grow salads without soil using solar panels to support the crops. As of October 2013, it has shipped 30 tons of fresh produce every month under the 'First Agro' brand. They are seeking to increase this amount to 40 tons a month in the near future. Although rice and wheat are staple food in India, the nutritional value comes from vegetables. With increasing ailments and food safety issues, First Agro is optimistic that things are posed to change: "We are targeting to be among the top three best-known brands in Fresh Produce over the next ten years as a pan-India brand."

Desperate quest for resistant bananas

The world is home to more than 1,000 varieties of bananas. However, 95 per cent of all bananas sold commercially belong to the Cavendish variety. Recently, a particular strain of the soil fungus *Fusarium oxysporum* sp. *Cubense* (Foc) – Tropical Race 4 – has been detected in banana plants grown for export in Mozambique and Jordan. As in most banana-producing countries, the variety accounts to the Cavendish. Scientists fear that if the banana fungus spreads further, the popular Cavendish banana could become critically threatened around the globe.

The fungus causes the incurable Panama disease, or Fusarium wilt, that rots bananas. In the 1950s, another strain of the banana fungus nearly wiped out the Gros Michel cultivar, once as common as the Cavendish variety, reports the magazine *Scientific American*. After the fungus had decimated banana populations in Central and South America, producers switched to the Cavendish, which was resistant to that strain. But Cavendish is susceptible to the new Foc Tropical Race 4 (Foc-TR4) strain, and could meet the same fate as Gros Michel if the fungus reaches Latin America, scientists fear.

The Foc-TR4 strain was first detected in Asia in the 1990s, and is now found in Taiwan, Indonesia, Malaysia, the Philippines, China and northern Australia.

The outbreak in Jordan, reported end of October 2013, was the first to be described outside those nations. The Mozambique outbreak was reported in November 2013. Nobody is sure how the fungus arrived in Jordan or Mozambique, writes *Nature* in another article. Migrant workers from Asia might inadvertently have brought contaminated soil with them. Another possibility is the import of infected rhizomes, the stems from which banana plants propagate. But much of the Cavendish industry now uses tissue culture, which produces pathogen-free plantlets.

Another banana fungus, *Mycosphaerella fijiensis*, which causes the leaf disease Black Sigatoka, has also emerged during the last years to threaten the world's commercial banana crops. To date, the industry's only defence is to spray enormous amounts of fungicides over plantations, which has serious human health and financial implications. The UN Food and Agriculture Organization is now working with the International Atomic Energy Agency (IAEA) in a bid to tackle the disease. The Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, which pioneered mutation breeding using tissue culture, is developing banana mutations which are resistant to the Black Sigatoka fungus. In the case of bananas, the mutation process calls for irradiating thousands of plantlets with

doses of gamma rays or X-rays that cause random mutations. Then it is a matter of screening to see if the mutations have

affected the genes in a way that could lead to the sought trait – in this case, resistance to Black Sigatoka. To date, the Joint FAO/IAEA effort has led to the development of three banana plant mutations which, under laboratory conditions, show a resistance to the Black Sigatoka toxin. According to the FAO, the next step will be to take the plantlets to the field, to determine if the bananas they produce outside of the laboratory are still resistant.

The goal of the work is to help small farmers and medium-size producers. The improved banana – coming from the FAO/IAEA laboratory – has produced commercial bananas that provide Sudanese farmers with a 30 per cent higher yield. The project also introduced 600 Sri Lankan families to micro-propagation techniques that increased family income 25-fold. Such has been the success of the measure that the Sri Lankan Government has recommended that local farmers consider switching from subsistence rice to value-added banana. The experiences gained in the joint FAO/IAEA project may also be an option for fighting the Fusarium (Foc-TR4) fungus.

According to the *Nature* article, progress in creating bananas fully resistant to Foc-TR4, either by classical breeding or by genetic engineering, has so far been limited. The wild Asian banana *Musa acuminata malaccensis*, the genome of which was published last year, seems to be resistant, and researchers are experimenting with putting its resistance genes into the Cavendish. The resulting transgenic specimens have been in field trials on contaminated ground in Australia for 18 months, and are looking “very promising”, says James Dale, director of the Centre for Tropical Crops and Biocommodities at Queensland University of Technology in Brisbane, Australia. But he cautions that the full results are not yet in. (Wilcke/FAO/ScientificAmerican/Nature)



Photo: S. Richter

The popular Cavendish banana could meet the same fate as Gros Michel if the fungus Foc-TR4 reaches Latin America.

In brief

■ Researchers successfully grow seed yams in the air

Researchers at the International Institute of Tropical Agriculture (IITA) have successfully grown seed yams in the air. Yams, a traditional root crop in many African countries, usually get attacked by pests and viruses which lead to diseases. The yams are also cut and prepared as seeds for planting. Many of them harbour diseases that may not be evident at the time of planting but become manifest in the growing plant, causing harvest losses. Dr Norbert Maroya, Project Manager for the Yam Improvement for Incomes and Food Security in West Africa (YIIFSWA) project at IITA, reported that together with a team of scientists, he successfully propagated yam in preliminary trials by directly planting vine cuttings in Aeroponics System (AS) boxes to produce mini-tubers in the air. Aeroponics System is the process of growing plants in an air or mist environment without the use of soil or an aggregate medium. The technology is widely used by commercial potato seed producers in Eastern and Southern Africa. "With this approach we are optimistic that farmers will begin to have clean seed yams for better harvest," said Mr Maroya.

Preliminary results showed that vine rooting in Aeroponics System had an at least 95 per cent success rate compared to vine rooting in carbonised rice husk with a maximum rate of 70 per cent. Rooting time was much shorter in aeroponics. IITA believes that aeroponics is coming at an opportune time for African farmers. Traditionally, seed yam production is expensive and inefficient. Farmers save about 25 to 30 per cent of their harvest for planting the same area in the following season, meaning less money in their pockets. Moreover, these saved seeds are often infested with pathogens that significantly reduce farmers' yield.

■ Understanding carbon storage

Scientists at Technische Universität München (TUM) and at Helmholtz Zentrum München in Germany have worked out how organic carbon is captured in the soil. The result they have arrived at is that carbon is only bonded to certain soil structures. Therefore, the soil's capacity to absorb CO₂ has to be reassessed and integrated into new climate models, the scientists write in a study that was published in the online journal *Nature Communications*.

As Professor Ingrid Kögel-Knabner, Director of the Soil Science Chair at TUM, explains, it is known from previous studies that carbon bonds to very small mineral particles. In their recently presented study, the researchers demonstrate that, in addition to size, the surface of the minerals also plays a role. "Carbon bonds to minerals that are just a few thousands of a millimetre large – and there, it docks almost exclusively onto rough, angular surfaces," Kögel-Knabner explains.

The scientists believe that the rough surfaces of minerals provide a habitat that microbes can thrive in. The microbes process the carbon and are involved in bonding it to the minerals. "We have found regular hotspots with a high share of carbon," says Cordula Vogel, who played a key role in the study. "Also, carbon bonds to those places that already contain a high percentage of carbon." However, these carbon accumulation hotspots can only be found on around 20 per cent of mineral surfaces, the scientists report. It was previously assumed that carbon was evenly distributed in the soil. "The results of our survey can now be used to pinpoint those soils that are especially good at sequestering carbon," Kögel-Knabner explains. "These insights have to be considered in carbon cycle models".

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The screenshot shows the Rural 21 website interface. At the top, there is a navigation bar with links for Home, Contact, Subscribe, E-alert sign up, About, and RSS. The main header features the 'Rural21' logo and the tagline 'The International Journal for Rural Development'. Below the header, there is a search bar and language options for English and Français.

The main content area is divided into several sections:

- News:** A featured article titled 'African Union pledges to end hunger in Africa by 2025' dated 19.02.2014. The article mentions the African Union (AU) Member States launching the Year of Agriculture and Food Security at their Annual Summit in Addis Ababa, Ethiopia.
- Scientific World:** An article titled 'Banana fungi to threaten world banana production' dated 26.02.2014, discussing two fungus diseases threatening commercial banana production.
- A closer look at...:** An article titled 'Agricultural policies' dated 12.12.2013, discussing changes in agricultural development and policies over the last few decades.
- COMING EVENTS:** A list of upcoming events, including '25-28 February 2014 Bangkok, Thailand' (SEAVEG 2014) and '25 - 28 February 2014 - Freising-Weihenstephan, Germany' (Annual Conference of the Society for Tropical Ecology).
- CURRENT PRINT ISSUE:** A section for the current print issue, 'Rural21 Vol. 47 Nr. 4/2013', with links to see, order, or subscribe to the issue.
- Our Partners:** Logos for partners including GIZ, Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung, and Schweizerische Eidgenossenschaft.

The screenshot shows the Rural 21 Facebook page. The page header includes the Facebook logo and the text 'Rural 21 is on Facebook. To connect with Rural 21, sign up for Facebook today.' Below the header, there are several photos and posts. One post features the Rural 21 logo and the text 'Rural 21 The International Journal for Rural Development'. Another post says 'Imagine a world without bananas!'. The page also shows a 'Like' button with '187' likes and a 'Share' button.

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