Papers Submitted

International Conference on Organic Agriculture and Food Security

3 – 5 May 2007
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Preparation of this Document

In January 2007, a Call for Papers was put out in preparation for the International Conference on Organic Agriculture and Food Security, 3-5 May, to be held at FAO Headquarers in Rome, Italy. Over the course of 3 months, 115 papers related to organic agriculture and food security were submitted by farmers, students, researchers and civil society organizations. This overwhelming response of amazing stories reflects the effort of people around the globe who believe in organic agriculture and its capacity to contribute to improved food security.

Of all the valuable contributions submitted, approximately half were selected by the Conference Steering Committee and are presented in this compilation. Papers were selected on the basis of the number of people/farmers involved with the case studies, the scope of the work, the inclusion of empirical observations and scientific experiments and on the link made between organic agriculture and food security.

In our Call for Papers we had requested that authors categorize their papers based on one of the four food security dimensions: food availability, food access, stability of the food supply system and food utilization. This proved to be a learning experience both for us, the reviewers, and for the authors because, as is so often the case with organic agriculture, the diversity of work and the topics covered could not defined by one area. This process allowed contributors to place their work/experience within the very multidimensional framework of food security.

Keywords for the food security dimensions (that shape the different sessions of the Conference):

- **Food Availability:** productivity, yield comparisons, urban agriculture, local provisioning, food import capacity;
- **Food Access:** agricultural inputs, land tenure, seeds and breeds, environmental services, credit and debt, markets, export, income, labour, employment, agro-ecotourism, knowledge, community development, institutions;
- **Food Stability:** agroecosystem, diversification, resistance to pest and diseases, soil resilience, water resources variability, climate change adaptation and mitigation, energy balance, import dependency; and
- **Food Utilization:** quality, safety, nutrition, health, toxic exposure, storage, processing, transport.

We wish to thank all authors who submitted papers and those people involved with the dynamic research projects presented herein. Limited editing was done to the text in order to reflect the diversity of cultural expressions and languages of our authors.

Sincerely,
Tara L. Moreau
Conference Secretariat, FAO, Rome

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Global

Can organic farming mitigate the impact of agriculture on global warming?

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Introduction

Global warming represents a major threat for food security, especially in tropical countries. It is expected that global warming will worsen the drought and the irregularity of rainfall in many countries. Mitigating the emissions of greenhouse gases is therefore an important challenge that can significantly contribute to improving food security. This can be achieved by reducing CO2 emissions due to combustion of fossil fuels, but also by changing agricultural techniques.

Agriculture is responsible for at least 30% of global warming. This important contribution is due to three gases: CO2 (carbon dioxide), NH4 (methane) and N20 (nitrous oxide). CO2 emissions come mainly from fertilizer industry, from the machinery used on the farm and, according to the production system and to the changes in land use, from the carbon present in the soil. Deforestation is an important contributor to the emissions of CO2 by agriculture. NH4 emissions come from livestock, mainly from enteric fermentation but also from manure and rice fields. N2O comes mainly from the soil (denitrification) and to a lesser extent from animal manure.

The impact of organic agriculture, compared to conventional agriculture, has not been extensively studied. However, some conclusions can be drawn from preliminary research done in this field, in particular on the factors influencing the emissions of greenhouse gases by agriculture.

Results

CO2 emissions

In developed countries the manufacturing of fertilizers - mainly nitrogen fertilizers - accounts for about half of the energy used in agriculture. In developing countries, this contribution can be even more important, due to a less efficient use of fertilizers plants and to a minor mechanization. Since organic agriculture does not use artificial nitrogen fertilizers, it uses less energy than conventional agriculture and therefore emits less CO2. In Europe it has been evaluated that for main crops, organic agriculture uses per acre about half the energy used in conventional agriculture. Considering that the yields are lower in organic agriculture, the advantage of this type of agriculture per amount produced is less important, but it remains an important factor. In European livestock's production, the consumption of energy required to produce one liter of organic milk represents about 25% compared to what is needed in conventional milk production. The reason is that organic cows are predominantly grazing, whereas in many cases, the feed of conventional ones is based on grain and soybean cake.

Carbon sequestration

It is well known that, in many areas of the world, the intensification of agriculture based on artificial fertilizers and deep ploughing has led to a progressive decline in the organic content of the soil. It is estimated that in the North American Great Plains 50% of the soil organic carbon has been lost over the past 50 to 100 years of cultivation. In France, more than 7 millions hectares have an organic matter content of less than 1.6% while it was more than 2% a few decades ago. In tropical countries the deforestation leads to an even faster decline in organic matter. This means an important release of CO2 in the atmosphere, contributing to the greenhouse effect. As confirmed by long term trials, organic agriculture maintains and often increases the organic matter and therefore the carbon content of the soil. This ability to sequester carbon contributes to mitigate the contribution of agriculture to the greenhouse effect.

Nitrous oxide (N2O) emissions

Nitrous oxide is emitted mainly by the soil. The IPCC (Intergovernmental Panel on Climate Change) has evaluated that the emissions represent in average 1.25% of the amount of nitrogen applied as fertilizer. However, this percentage depends on many factors. Very few data are available about the emissions of N2O by organic farming compared to conventional farming. The amount of nitrogen applied generally is lower in organic than in conventional agriculture therefore emissions are lower. Moreover, existing data show that the emissions of N2O increase dramatically when the nitrogen fertilization exceeds the needs of the crops, which happens much more frequently in conventional than in organic farming. It can therefore be concluded that organic farming emits less N2O than conventional farming.

Methane (NH4) emissions

Methane emissions are, after N2O emissions, the main responsible of the contribution of agriculture to global warming. Methane emissions from agriculture have three main origins: enteric fermentations of ruminants; fermentation of animal dejections; and anaerobic fermentation of flooded crops (rice).

The production of methane per animal is about the same in organic and in conventional breeding. However, the emission per kilo of milk - or meat - is lower in intensive than in extensive production. This means that it is higher in organic production. But this increase is, at least partially, compensated by the better longevity of organic cows. In fact, in intensive system, especially in milk production, cows have a very short life, usually up to five years: the number of lactations is often less than 2.5, which means that cows emit methane without producing anything during the first half of their life.

The emissions of methane by the fermentation of manure are lower in organic than in conventional breeding, since composting is an aerobic fermentation, whereas the conventional way of keeping manure (heaps or slurry) is mainly anaerobic.

Taking in account the difficulty to measure precisely those different emissions, we can assume that, as far as emissions of methane are concerned, there is little difference between organic and conventional.

Conclusions

It can be concluded that conversion to organic farming contributes to mitigate the contribution of agriculture to global warming. It therefore contributes to the stability of the food supply which is threatened but the climate change. However, more research is needed in order to evaluate further the extent of this mitigation and identify what improvements in organic farming could increase it.

It should be noted that another important way to mitigate the contribution of food production to global warming is to change our food habits, especially – at least in developed countries - to reduce significantly the consumption of meat, mainly of red meat.

Biography

Claude Aubert, consultant, is one of the first agronomists who, 40 years ago, started promoting organic agriculture in France. He is one of the authors of the first IFOAM standards for organic farming and has worked for many years as an adviser in organic farming. He wrote several books on organic farming, among which : "*L'agriculture biologique, pourquoi et comment la pratiquer*", 1972, Le courrier du livre ; "*Onze questions clés sur l'agriculture, l'alimentation, la santé, le tiers-monde*", 1983, Terre Vivante ; "*Bio, raisonnée, OGM, quelle agriculture dans notre assiette?*" 2002, Terre Vivante.

Global

Can Organic Farming Feed The World?

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The only people who think organic farming can feed the world are delusional hippies, hysterical moms, and self-righteous organic farmers. Right? Actually, no. A fair number of agribusiness executives, agricultural and ecological scientists, and international agriculture experts believe that a large-scale shift to organic farming would not only increase the world's food supply, but might be the only way to eradicate hunger. This probably comes as a surprise, even to the readers of this newsletter. But last year—inspired by a field trip to a nearby organic farm where the farmer reported that he raised an amazing 27 tons of vegetables on six-tenths of a hectare in a relatively short growing season—a team of scientists from the University of Michigan tried to estimate how much food could be raised following a global shift to organic farming. The team combed through the literature for any and all studies comparing crop yields on organic farms with those on non-organic farms. Based on 293 examples, they came up with a global dataset of yield ratios for the world's major crops for the developed and the developing world.

As expected, organic farming yielded less than conventional farming in the developed world (where farmers use copious amounts of synthetic fertilizers and pesticides in a perennial attempt to maximize yields), while studies from the developing world showed organic farming boosting yields. (Examples from growing areas as diverse as India, Guatemala, and Kenya found that the sophisticated combination of old wisdom and modern ecological innovations that help harness the yield-boosting effects of cover crops, compost, manure, beneficial insects, and crop synergies in organic farming were particularly useful in dry areas with poor soils where farmers aren't likely to afford agrochemicals any time soon.)

The team then ran two models. The first was conservative, and the second was optimistic, based on yield gaps between organic and non-organic practices in developed and developing countries. The first model yielded 2,641 kilocalories ("calories") per person per day, just under the world's current production of 2,786 calories but significantly higher than the average caloric requirement for a healthy person of between 2,200 and 2,500. The second model yielded 4,381 calories per person per day, 75 percent greater than current availability—and a quantity that could theoretically sustain a much larger human population than is currently supported on the world's farmland.

Skeptics may doubt the team's conclusions—as ecologists, they are likely to be sympathetic to organic farming—but a second recent study of the potential of a global shift to organic farming, led by Niels Halberg of the Danish Institute of Agricultural Sciences, came to very similar conclusions, even though the authors were economists, agronomists, and international development experts. Like the Michigan team, Halberg's group made an assumption about the differences in yields with organic farming for a range of crops, and then plugged those numbers into a model developed by the World Bank's International Food Policy Research Institute (IFPRI). This model is considered the definitive algorithm for predicting food output, farm income, and the number of hungry people throughout the world.

Given the growing interest in organic farming among consumers, government officials, and agricultural scientists, the researchers wanted to assess whether a large-scale conversion to organic farming in Europe and North America (the world's primary food exporting regions) would reduce yields, increase world food prices, or worsen hunger in poorer nations that depend on imports, particularly those people living in the Third World's swelling mega-cities. Although the group found that total food production declined in Europe and North America, the model didn't show a substantial impact on world food prices. And because the model assumed, like the Michigan study, that organic farming would boost yields in Africa, Asia, and Latin America, the most optimistic scenario even had hunger-plagued sub-Saharan Africa exporting food surpluses. In other words, studies from the field show that the yield increases from shifting to organic farming are highest and most consistent in exactly those poor, dry, remote areas where hunger is most severe.

Still, these conclusions won't come as a surprise to many organic farmers. But even some supporters of organic farming shy away from even asking whether it can feed the world, simply because they don't think it's the most useful question. First, even if a mass conversion over, say, the next two decades, dramatically increased food production, there's little guarantee it would eradicate hunger. The global food system can be a complex and unpredictable beast. It's hard to anticipate how China's rise as a major importer of soybeans for its feedlots, for instance, might affect food supplies elsewhere. (It's likely to drive up food prices.) Or how elimination of agricultural subsidies in wealthy nations might affect poorer countries. (It's likely to boost farm incomes and reduce hunger.) And would less meat eating around the world free up food for the hungry? (It would, but could the hungry afford it?)

What is clear is that organic farming will yield other benefits that are too numerous to name. Studies have shown, for example, that the "external" costs of organic farming—erosion, chemical pollution to drinking water, death of birds and other wildlife—are just one-third those of conventional farming. Surveys from every continent show that organic farms support many more species of birds, wild plants, insects, and other wildlife than conventional farms. And tests by several governments have shown that organic foods carry just a tiny fraction of the pesticide residues of their non-organic alternatives, while completely banning growth hormones, antibiotics, and many additives allowed in many conventional foods. There is even some evidence that crops grown organically have considerably higher levels of health-promoting antioxidants. A recent study by the International Fund for Agricultural Development found that the higher labor requirements often mean that "organic agriculture can prove particularly effective in bringing redistribution of resources in areas where the labor force is underemployed. This can help contribute to rural stability."

These benefits will come even without a complete conversion to a sort of organic utopia. In fact, some experts think that a more hopeful, and reasonable, way forward is a sort of middle ground, where more and more farmers adopt the principles of organic farming even if they don't follow the approach religiously. In this scenario, both poor farmers and the environment come out way ahead. And it's likely that the greatest short-term benefits will come as the principles of organic farming rub off on nonorganic farmers, who will come to depend on just a small fraction of the chemicals that are currently used. Anywhere this middle path is adopted, pollution will go down, and yields will go up. And, since it will cost farmers less than the full-blown conversion, many more regions will likely adopt it.

So, the myth of low-yielding organic farming may be fading, but without a massive change of conscience from the world's agricultural researchers and officials, we still won't be pointed in the organic direction. And that could be the real problem for the world's poor and hungry.

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Global

IFOAM's Perspectives on Organic Agriculture, Food Security and Sovereignty

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Introduction

The International Federation of Organic Agriculture Movements (IFOAM) is a global network of more than 750 organizations active in Organic Agriculture. Through its activities it contributes in promoting and enlarging Organic Agriculture and therewith food security; most notably growth is seen in Southern countries.

While affluent regions and social classes struggle with surplus production and surplus consumption, close to one fifth of the global population lives in constant under-nourishment.
The major constraints to food security are found in social, economic and political conditions rather than in production methods themselves. The main solutions to food security problems will therefore be found in social, economic and political improvement.

Organic production has the potential to produce sufficient food of a high quality. In addition, organic agriculture is particularly well suited for those rural communities that are currently most exposed to food shortages. Organic Agriculture puts the farmers, instead of external inputs, at the center of the farming strategy, restoring a decision-making role to local communities, guaranteeing their right to control their own resources and engaging their active participation in a value added food chain. Organic agriculture recognizes the value of traditional and indigenous knowledge and integrates this in its production methods, thereby increasing social capacity and self-value. It relies on ecosystem management rather than external agricultural inputs, which are dramatically reduced by refraining from the use of synthetic fertilizers and pesticides, genetically modified organisms (GMOs) and pharmaceuticals. Pests and diseases are controlled with naturally occurring means and substances according to both traditional as well as modern scientific knowledge, increasing both agricultural yields and disease resistance. Organic agriculture adheres to globally accepted principles, which are implemented within local socio-economic, climatic and cultural settings.

Principles of Organic Agriculture

Organic Agriculture is based on 4 principles: Health, Ecology, Fairness and Care. These principles, which are articulated and decided by the IFOAM membership, serve to inspire the organic movement in its full diversity and are composed as ethical principles to inspire action. The 4 principles can be summarized as follows:
Health: Organic Agriculture should sustain and enhance the health of soil, plant, animal, human and planet as one and indivisible.
Ecology: Organic Agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them.
Fairness: Organic Agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities.
Care: Organic Agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment.

IFOAM's contributions

IFOAM has a 34 year history of dedicated work towards the worldwide adoption of ecologically, socially and economically sound systems that are based on the Principles of Organic Agriculture. IFOAM's strength is its international membership and network which unites the Global Organic Movement and its Experts. IFOAM's strategies and tools generally have a global focus and are discussed and developed by involving

this global network of relevant experts. Throughout its past, the Federation has consistently succeeded at: fostering active debate, networking beyond the borders of class, gender, and region; continually improving organizational structure, policies, standards; working with the diversity of organic movements; producing standards which provided a model for numerous major laws and voluntary standards, (Codex Alimentarius, EU,); and integrating scientific expertise and business sense into the realm of Organic Agriculture.

IFOAM developed training manuals and an online training platform that contains a wealth of information on the practicalities of Organic Agriculture. These accessible materials have helped trainers and farmers to get to know the basics of organic and start working within this new production system themselves.

Through its democratically approved standards and certification system IFOAM facilitates fair and equal market access through development of organic tools for inspection and control such as Participatory Guarantee Systems (PGS) and Internal Control Systems. These systems contribute to strengthening social organization and empowering of rural communities. PGS systems foster the development of local marketing channels that help ensure the self-supporting capacity of communities and territories. Development of markets is important as currently in many cases food production fails to deliver economic returns. The lack of a developed food market gives farmers no incentive to increase production. So land is even left barren! Dedicated markets – whether local or international - for Organic products can mean a major incentive to stay on the land.

Outlook

Organic agriculture is not ‘backward’ but a continuous learning. There is still much research to be done to improve techniques and to learn more on the ecological cycles with which the organic farmer can cooperate.

Organic agriculture can deliver enough food, as compared to conventional production figures. However, it is not only yields that counts, for technical as well as social reasons. In the first place intensive agriculture often focuses upon (one variety of) one crop, whereas organic systems tend to be more diverse – and should thus be evaluated on the basis of total farm productivity, rather than yields of single crops. Farmers may have a preference for multi-functional crops, for example, rice varieties that yield high quality straw (for livestock fodder) as well as grain.
Secondly resource poor farmers often adopt risk aversion strategies that, rather than seek to maximize yields in good years, prioritize insuring against complete crop failure in bad years (i.e. those of drought, disease or pest outbreaks). Thus in terms of food security for the poorest it may be important to think of yields in bad years, when the survival of farm families and rural communities is most at stake.

Evaluating the benefits and the limitations of organic agriculture is complex. The impact of a conversion to organic practices will greatly depend on the starting point of the farmer and farming community, their skills and the resources available to them. The potential of Organic Agriculture to contribute to better food security and sovereignty is not yet fully explored.
www.ifoam.org

Global

Influencing Attitudes of Public Institutions Towards Organic Agriculture as a Means of Promoting Food Security

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Introduction

Public institutions play a key role in motivating or driving the adoption – or non-adoption – of agricultural strategies and technologies. Public institutions, ranging from the supranational (the UN sytem and Bretton Woods institutions) through national government ministries to regional and local authorities, all deal with competing opinions about the causes of food insecurity and how agriculture may best address them. The private and civil society sectors advocate varying opinions. This paper, based on a desk study of available literature, explores public institutions' views on organic agriculture's contribution to food security, and the influences of the private and civil society sectors on this. Its purpose is to identify some of the barriers to greater institutional support to organic agriculture as a means for alleviating food insecurity and how these might be overcome.

The literature distinguishes three approaches: regulation – a central power that regulates, invests in projects, creates infrastructure and so on; market – the voluntary exchange of values by which problems are solved and mutual interests taken care of; and social interaction – negotiation and agreement on concerted action with institutions and rules emerging from this. In these ways institutions can either hinder or facilitate farmers (and others) seeking to satisfy their food security needs and related livelihood objectives.

Results

The role of organic agriculture in providing a high value export option for farmers in the South is now widely accepted and promoted by public institutions (Van Elzakker *et al* 2007) including Southern governments and large parts of the donor community. This market approach to stimulating the uptake of organic techniques and technologies directly improves the food purchasing power of those participating in the scheme, yet such participation favours the higher-potential farmers who, for example, live near major transport routes and/or are able to tap into lengthy supply chains requiring stringent quality control standards.

On the other side of the coin, the premium prices for certified organic food and the threat of lower yields during and/or after conversion, in the eyes of public institutions, tends to disqualify organic agriculture from being considered as a viable option for delivering domestic food security by and for the rural poor. Thus, public institutions' perception of organic agriculture reflects its recent (premium) market-oriented development. This perception ignores the affiliation of hundreds of non-certified organic producer groups in the organic movement and the vision of the organic movement of providing healthy produce through self provisioning and localised production-consumption linkages (IFOAM, 2006). Equally the ecological benefits of organic farming, which provide the second growth vector in the North, are also often overlooked in a Southern context. Yet building resilience against ecological stresses and disasters (storms, droughts, pests etc.) is a major precondition for achieving food security and should not be regarded as a luxury policy option that creates a more attractive landscape.

Public institutions make decisions through evidence-based policy. There is strong evidence from the private sector on the effectiveness of market-led organic approaches in increasing household incomes and therefore food security. Yet literature on the work of numerous Non-Government Organizations (NGOs) and **CSOs** promoting organic production for self provisioning and developing local production-consumption linkages is poorly developed. Although there are detailed statistics on certified organic land (Willer and Yuseffi, 2007) there is very little information on the scale, impact and potential of non -market based organic food security initiatives, the potential for up-scaling them and the support (financial and logistical) required to do so. Exceptions to this are Pretty *at al*'s global survey of sustainable agriculture (2001), which adopted a rather loose definition of sustainable farming, and IFAD's regional studies in Latin America and Asia, which

gradually broadened their criteria from basic yield and profitability analyses to include socio-economic impacts and food security (IFAD, 2003, 2005). Civil society actors find it difficult to address this challenge as they lack the training, motivation or resources to compile reports in a way that is comparable with other trials and evaluations. This situation is exacerbated by the often blurred boundary between 'sustainable' and organic agriculture. Many projects (for example Low External Input Sustainable Agriculture or LEISA) may in practice be organic but not identify themselves as such.

As well as the above influences of the private and civil society sectors, factors within public institutions themselves also impede the promotion of organic agriculture. In Cuba, where State institutions were forced to address food security needs through low-input agriculture in the 1990s, these factors included an avoidance of the real situation of small farmers and the real need for change, competition between individual scientists advocating high-tech solutions, the fatalistic attitude that change will take too long or requires external intervention, a focus on high potential farmers) and fears of losing control through a more decentralised, organic production process, and of declining yields (Wright 2005). While Cuba's governance structure may not be typical, in that it is highly statist, this demonstrates that the influence of the corporate sector is not the only obstacle to organic farming being promoted as a means of alleviating food insecurity.

Conclusions

On one level, therefore, there is a great need for published evaluations of the experiences of organic agriculture in directly addressing food security issues. These need to adopt a more holistic and long term approach than studies of gross yields (of single crops) or economic returns. Without such evidence it is unlikely that public institutions will re-evaluate organic agriculture's potential in improving food security. Civil society reports have identified the need for the recognition of multifunctionality of agriculture in order to reflect the centrality of the environment in supporting the livelihoods of the rural poor.

But this is only half the battle. Behind their public face, public institutions are rarely homogenous in their outlook, but rather are composed of individuals with different views about what works (and what doesn't) and different departments competing for resources. Often they give more credence to some groups than others. While public institutions give greater credence to market based approaches in developing policy and strategy, organic agriculture will struggle to be a mainstream approach because, non-certified organic agriculture in resource-poor situations, does not provide many commercially interesting opportunities Overall, therefore, as well as using market approaches for stimulating organic agriculture, institutions may need to employ the other two approaches outlined at the start of this paper when influencing agricultural change and in particular develop more collaborative interaction with civil society groups.

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Biographies

Dr. Nicholas Parrott is an English language editor and freelance researcher based in Wageningen. He is co-author of the Real Green Revolution (2002). Formerly a Research Associate at the University of Wales, Aberystwyth and Cardiff, he has recently undertaken commissions on the development potential of organic farming for HIVOS (NL), DARCOF (Denmark) and BOKU (Austria). Contact: info@textualhealing.nl

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Dr Wright holds 20 years of practical, research, policy and project management experience in organic agriculture and sustainable development, including within the CGIAR system, DFID and the UN. In 2005 she completed her PhD on organic agriculture and food security in Cuba. At HDRA, Dr Wright builds knowledge capacity and undertakes development research and consulting on diverse topics such as HIV/AIDS, organic and fair trade exports, farmer seed systems, dryland agroforestry and disaster mitigation. Currently working with partners in Sri Lanka, Cuba, Kenya and Afghanistan.

Global

Why CO2 Emissions from Soils are Important and Must be Included in Global Carbon Footprint Reduction Targets

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Carbon dioxide (CO2) emissions from soil are not included in Kyoto inventories; neither are they included in greenhouse gas (GHG) inventories from Canada, USA, EU nor the UK 1(other than from a few specific regions eg fen soils in Norfolk). There are provisions within Kyoto protocol: Article 3 Principles, Para 3: 'policies and measures should… be comprehensive, cover all relevant sources, sinks and reservoirs of GHG and….. ..comprise all economic sectors.' Yet, no directive to include CO2 from agricultural soils is apparent.

It has been suggested that up to 50% of the total global CO2 emissions until 1990 have come from soil carbon losses due to a variety of factors: intensification of farming, reliance on fossil fuels for energy and fertiliser, changes in land use, increasing temperatures, desertification, salination and erosion. To picture the scale involved, a reduction of 50% (and more is common) of soil organic matter (SOM) of a soil (say 3%SOM) previously in equilibrium over a relatively few years can release 72tons of CO2 into the atmosphere per hectare. If we estimate 1.5 billion global hectares of agricultural land then this means 109 billion tons CO2 released. To put this large figure into context total global annual GHG emissions are 26 billion tons CO2 equivalent (UK – 656mt).

In the recent Intergovernmental Panel on Climate Change Report, scientists warn that soils will join oceans and cleared forests as major contributors to climate change as rising temperatures bring the respective " tipping points" closer. This is not inevitable in all soils. United Kingdom Department for Environment Food and Rural Affairs (Defra) reports that 18% of UK soil carbon has been lost to emissions over a 12 year period and recent research indicates UK grassland now may be an emitter of CO2- even in the winter. Indeed, agriculture itself is now a net emitter of GHG which is extraordinary given the massive Greening of the UK and its potential to sequester. However, it is often stated that agriculture only contributes around 9% of total UK GHG- mostly being nitrous oxide (N2O) and methane (NH4). CO2 is seen as being insignificant. If, however, you include the Defra figure of 18% annual loss or 13mt of soil carbon © lost annually (equates to 7% of UK emissions) and the 20 mt of CO2 released annually from manufacture of 3 m tons N fertiliser (and this is directly connected to soil carbon loss-in arable if not all soils) which adds another 3% to UK GHG totals- the farm gate figure is 19%. Add the 9% GHG figure attributed to post farm gate distribution, processing etc and agriculture becomes possibly the single most important threat to our climate. Recent Defra publications attribute between 20-30% of EU GHG emissions to agriculture but do not include direct refrigeration emissions which can add another 3% to the food total.

Soils are under further new pressures from climate change; drought, severe weather patterns and events leading to increased degradation and further erosion but also demand for change in land use to provide energy substitutes ie biofuels and biomass.

The question then becomes; what can we do about it? It is accepted that adding carbon to agricultural land increases soil carbon reserves even though there is a debate on whether equilibrium levels may be reached and when. There also can be a debate as to the form recycled wastes should take and this has much to do with the fundamental difference between adding organic materials and adding or creating humus- quite different materials and properties but with the same base. It is accepted as practical that one tonne of C can be added to the soil carbon bank annually. (few of which will reach an equilibrium within 40 years). This is 1.5 billion tons of C annually on a global basis or 25% of our reduction target. In the UK, this could mean around an extra 7% of annual GHG emissions reduction target.

The argument that, for technical reasons, this can only happen for a relatively short time can be answered by:

- To reach equilibrium would take 20-100 + years which is exactly the period when we need the greatest development in carbon sequestration.

- Neither do we know that equilibrium is reached at soil organic matter (SOM) levels of 4% or 6% if the organic matter is returned as, or converts to, humus – or near humus. It is important to differentiate. The latter derives from the former subject to specific management conditions. This brings us into the realm of the soil food web and its players who themselves are a large source of carbon. It is said that a lower equilibrium may be reached but then the energy source for the food produced would derive from imported Nitrogen produced industrially and creating 5 to 7 tons CO2 for every ton of fertiliser. This is simply emissions by another route.
- It is also important to differentiate between the "breaking down "organisms, emitting CO2, in the soil (the thermphiles) and the carbon consuming bacteria (the mesophiles). The biology is the crucial matter if we are to contribute to the Global GHG action plan.The benefits or otherwise of raw or partially rotted manures and slurries within soils can be debated but this is merely a technical issue and the science is reasonably well understood.

Importance of Soils with high humus and SOM levels: Soils are a critical natural capital and require investment to maintain their value to society. Changes to land use and agricultural practices over the past 50 years have led to salination and desertification which must be reversed if the population is to be fed properly. On the contrary, soils able to be managed to higher humus fractions and SOM levels can allow for greater water infiltration and retention without impairing yield and so maintain a scarce and essential resource. Such soils also have lower energy requirements for their cultivation. It is also the case that the poorer the soil due to human intervention, the greater the response to good biological management.

To achieve lower GHG emissions and avoid cataclysmic climate change and reduce water use and waste while feeding the worlds population is a daunting challenge in the extreme but ignoring the role of agricultural soils will seriously hinder this work. Indeed, the substantial and universal improvement to the worlds' soil is without question one of the most significant contributions to be made. It requires the inclusion of soil carbon emissions in all national carbon inventories, the further extension of returning all possible organic wastes to the land through controlled composting processes on macro and micro scale and the rewarding of farmers –whether conventional or organic- of tradable carbon rights to encourage this. The soil is a natural carbon sink - one of the few we have.

Notes and References

1. Defra – UK emissions
2. 220t. x 0.60 x 0.4 = 53t C x 44/12= 194t CO2 per hectare- over 20years.
3. 16 million ha x 0.25 x194 t=776mtCO2 / 20 years= 39mt CO2 p.a. = 6% UK GHG emissions. Arable land only. Assumes 1/5th of 1% of SOM lost p.a.
4. Defra emission data from all sources- 55mt Co2 equiv. From methane, nitrous oxide and Co2. = 8% of UK GHG emissions.
5. 15 billion ha x 2200t x 0.005%x 0.60 = 9.9bn.tonsC x 44/12= 36bn t CO2 over 2 or years.
6. Bellamy et al 2005
7. Article Nature 2005 . Soils, carbon and emissions.
8. Report: Cranfield/Silsoe . Energy comparison 2006.
9. Soil bacteria weight approx.. 8t. p. ha; earthworms to 2 tons ;protozoa 1,5t per ha, nematodes 0.2 to o.4 t. per ha . fungi . Total 15t. to 40t. range.
10. 1977- 2003 DOK trials - FiBL institute for agricultural research; also 20year trials at Rodale Research Inst. USA showing net increase in soil carbon of 813 kgs per ha and carbon sequestration of 1.1 tons Carbon per ha.
11. 15t per ha compost x 0.60 = 9t C per ha x 4 million arable ha UK
12. 39mt (4) /44x12 = 10.6mt
13. Various. Soil association policy paper.

Biography

Peter Segger started farming organically in 1974 and has been involved in the UK and International organic movements since then. He is also founder of Organic Farm Foods Ltd- the pioneer and leading UK distributor of organic fresh produce. He is the Chair of the newly established community initiatives in Wales to prepare agriculture and food for a time when fossil energy becomes unaffordable- the Transition Towns Initiatives.

Global

The Current Status of Organic Farming in the World - Focus on Developing Countries

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Introduction

It is generally acknowledged that organic agriculture can contribute to socio-economic and ecologically sustainable development, especially in poorer countries. The market for organic products is growing and offers producers and exporters in developing countries opportunities to improve their incomes and living conditions. But what role does organic farming play in the poorer countries? Some current data are presented in this paper, based on the global survey on organic farming carried out annually by the Research Institute of Organic Agriculture FiBL and the Foundation Ecology and Agriculture SOEL in co-operation with the International Federation of Organic Agriculture Movements IFOAM.

Organic agriculture is developing rapidly and is now practiced in more than 120 countries of the world. Its share of agricultural land and farms continues to grow in many countries. According to the latest survey (Willer/Yussefi 2007), almost 31 million hectares of agricultural land are managed organically (data as of end 2005). This constitutes 0.7% of the agricultural land of the countries (123) covered by the survey. In total, Oceania holds 39% of the world's organic land, followed by Europe (23%) and Latin America (19%). Currently, the country with the largest organic area is Australia (11.8 million hectares). The proportion of organically compared to conventionally managed land, however, is highest in Europe. In the European Union almost 4% of the land is under organic management.

Results

The analysis of the global organic data for the countries on the list of recipients of Official Development Assistance (DAC List[1]) shows, that one third of the world's organic land is in countries on this list. Most of this land is Latin America followed by Asia, Africa and Europe. The leading countries in terms of organic land are Argentina (3.1 million hectares), China (2.3), Brazil (0.85) and Uruguay (0.76). The highest percentages of organic land are in East Timor (6.3 %), Uruguay (5.1 %), Mexico (2.9 %) and Argentina (2.4 %) – in these countries the shares of organic land of all agricultural land are thus comparable to those in Europe. These countries are, however, clearly exceptions. Out of the 80 DAC countries covered by the survey only ten have a higher share of organic land than one percent of the agricultural area. Thus, compared to the developed countries, organic farming in the DAC countries is lagging behind.

Table: Main land use in organic agriculture in the countries of the DAC list (hectares)

	Africa	Asia	Europe	Latin America	Oceania	Total
Arable land	60'999	66'956	247'907	306'840	0	682'703
Permanent crops	292'522	55'104	16'120	488'934	100	852'779
Permanent grassland	35'716	710'900	10'440	3'776'461	0	4'533'516
Other (e.g. forest)	37'396	990	60	10'531	0	48'977
Other crops	7'796	998'122	75'419	38'890	0	1'120'226
No information	456'076	993'253	1'852	1'187'664	0	2'638'846
Total	890'504	2'825'325	351'799	5'809'320	100	9'877'048

Source: FiBL-SOEL Survey 2007 (Willer/Yussefi 2007)

[1] For this paper the countries listed on the List of Recipients of Official Development Assistance (ODA) of the Development Assistance Committee (DAC) of the Organisation for Economic Co-operation and Development (OECD) were analysed. The list is available at www.oecd.org/dataoecd/23/34/37954893.pdf

Even though not for all DAC countries land use details were available the statistics show that the shares of grassland (almost half of the organic land in these countries) and those of permanent crops are, compared to Europe and North America, relatively high. Arable land is of minor importance. This can be attributed to the fact that export plays a high role – either of meat products (mainly from Latin America) or of permanent crops. The most important permanent crops are export crops such as coffee (309'000 hectares); olives (85'000 hectares), cocoa (76'000 hectares) and sugarcane (30'000 hectares) showing that certified organic products provide access to attractive international markets (Kilcher 2007). Local markets are, however, still underdeveloped, even though in most countries of Latin America (Lernoud 2007), Asia (Kung Wai 2007) and also some African countries (Elzakker et al. 2007) they are growing. According to Organic Monitor (Sahota 2007) Europe and North America generate most global revenues with organic products.

Conclusions

Clearly a strong organic movement and government support has a positive influence on the development of the organic sector. Many countries, particularly in Latin America (Brazil, Bolivia), are now launching action plans for organic farming, one motive being to increase domestic food sovereignty. Another form of government support is the implementation of government regulations in order to ease export of organic products. In Latin America more than ten countries on the DAC list have an organic legislation, in Asia six countries and in Africa two countries (Huber et al. 2007). More countries are in the process of drafting laws. Some countries are now on the Third Country list according to EU regulation of organic farming (Argentina, Costa Rica, India).

From the data gained through the global organic survey, it is clear that in many developing countries organic farming plays an increasingly important role. In the light of booming organic markets (reaching 40 billion US dollars in 2006) it can be assumed that the market/export potential for organic products continues to be high. However, to assure food security with organic products not only in industrialised countries but also in countries in the south, more effort should be put in developing local markets.

In order to be able to draw clear conclusions on the potential organic farming has for food security including supplying domestic markets more data than available so far are needed, covering for instance information such as domestic supply with organic food, export volumes and information on yields. There is a clear need for governments to provide better data. With more and more countries implementing organic farming regulations data collection activities should be eased in the future, and governments should support such activities.

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Biographies

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Argentina (Food Utilization)

Willingness to Pay for Organic Food in Argentina: Evidence from a Consumer Survey

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Introduction

Most food markets do not count on complete information about food quality for consumers. Quality has become a key concept in the new approaches of the Demand Theory (Lancaster, 1966), and food quality information has turned into a crucial factor when explaining the existing differences between demand profiles.

Total organic production in Argentina reached 71,748 Mt. in 2005 (SENASA, 2006); 94 percent was destined to the foreign market in the same period. The domestic market, on the hand, demanded as little as the remaining 6%. The biggest marketing export volumes are cereals (corn and wheat), oils and soybeans. Fruits, such apples and pears, and industrialized products such as sugar and wines comprose the second largest export volues and aromatic herbs rank third. Cereals and oils are central products in the domestic market due to their high volume, and vegetables and pulses are noteworthy because of their diversity.

The purpose of this paper is to estimate consumers´ willingness to pay (WTP) for different organic food products available in the Argentinean domestic market. The results of study are expected to provide some useful governmental evidence to support the promotion of organic production, regulation processes and labelling programs in Argentina so as to contribute to organic food domestic market expansion.

The Contingent Valuation Method (Ara, 2002; Chen et al., 2002) was selected to estimate willingness to pay (WTP). The data in this study derives from a food consumption survey conducted in Buenos Aires city, Argentina, in April 2005, by applying a semi-structured questionnaire. 301 surveys were completed by trained interviewers who intercepted respondents in the largest supermarket chains and also in an important specialized organic store. The parameters estimates for the selected products were obtained by applying a Binomial Multiple Logistic Regression.

Results

In the Argentinean domestic market, many consumers are willing to pay higher prices for healthy products, i.e. organics, because they increase their utility level reducing health risks. Even if the part these "safe products" play in the food consumption budget is still small, they are considered a market niche of great potential growth. The main restrictions to expanding the domestic demand is the lack of information available to consumers; prices over those of conventional foods; and the limited and erratic domestic supply. Besides, many consumers do not trust the certification proceedings carried out by private certification agencies. (Rodríguez et. al., 2007). In this study, the selection of the Contingent Valuation as the method applied to estimate consumers´willingness to pay resulted from a theoretical and empirical analysis concerning those methods most commonly applied.

Results from empirical works carried out in countries with a significant level of organic food consumption demonstrate that the main reason why these foods are acquired is associated to health care, either because of disease suffering or disease prevention. (Kuchler et al., 2000) Besides, due to their low pesticide-residue content, these products are considered as beneficial, at least speaking of vegetal-origin products. (Weaver et al., 1992; Baker, 1999) As regard meat products, e.g. chicken meat, the risks perception linked to hormone use along the productive process is remarkable. (Farina & de Almeida; Rodríguez & Lacaze, 2005)

Argentineans seem to be "Europeanized" in so far as they place no trust in the regulatory system's ability to monitor and guarantee food safety. (Rodríguez et al., 2006) In Córdoba, Mendoza and Mar del Plata cities consumers do not trust organic certification bodies. They usually link organics with local, homemade and

handmade food, and, therefore organic producers and retailers constitute important credibility sources, attracting relatively more consumers (Rodríguez & Lacaze, 2005). The key factor for organics consumption in Argentina seems to be the concern for a regulatory system. For all the estimated models, even though 74% of the respondents affirm that the regulatory bodies are inefficient, 70% believes that food regulation should be public rather than private. Undoubtedly, current prices play a critical part in WTP determination for these differentiated quality products. In all the estimated models, 75% of the respondents states that they would buy organics more frequently, if they were cheaper.

Based on the results of this research, the prices consumers are willing to pay for organic regular milk, whole wheat flour and fresh chicken are below market prices, though near. Hence, if effective prices were slightly reduced, these differences would get reduced as well, and, in consequence, consumers would have greater access to these products of better quality. The WTP estimated for organic leafy vegetables is slightly above the effective market price, thereby fostering optimum growth perspectives for its production, even when the regular supply of these vegetables in the market remains a real challenge for producers.

In Argentina, consumers´ perceptions about organic food quality are better WTP´s predictors than other socio-demographic variables such as respondent´s gender or age. (Rodríguez et al., 2006) The better educated consumers, who eat healthy food, and consider food control organisms as 'inefficient', are more likely to buy organic products. According to these results, educated people seem to be more exposed to diet and health information sources, and can better understand and process them.

While in 2002 organic regular milk seemed to be cheaper than conventional milk, in 2005 the opposite occurred with a 13% price premium. This could be explained by the sharp increase of dairy products since 2003. The same applies to organic leafy vegetables which registered a dramatic rise during 2002-2005.

Conclusions

To conclude, scarcity as well as high price premiums are identified as the most difficult obstacles to overcome when it comes to domestic consumption expansion in Argentina. The involvement of general food retailers in the organic food market is of major importance and should be encouraged in order to increase organic products market share. Therefore, an increase in production levels is a must together with reductions in production costs and processing and/or trading costs, which, in turn, translate into sale price reductions, and into an increase of organic products consumption.

Most countries with lower consumer price premiums have a common national label, and such label recognition by consumers is usually high. As mentioned in other studies, pull strategies should be applied to promote organic market growth. To do so, the organic market actors must convince themselves that there is a growing consumer demand for organic food and that any efforts they make to increase the supply of organic products will enhance their competitiveness; however, a high level of market transparency must be assured. Argentinean current system does not contribute to smallholders' farms inclusion through regional development programs, thereby streightening the asymmetric distribution of benefits. As consumers claim, research, consumer food education and counselling programs should be further supported. As economists, the challenge for further research is to reinforce our methodological skills, in order to improve more accurate estimations of consumers' willingness to pay.

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Biography

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Bangladesh (Food Access)

Nayakrishi, New (agri) Cultural Movement of Bangladesh

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Introduction

Nayakrishi Andolon incorporates traditional knowledge, wisdom and appropriates newer ideas and scientific innovations that are suitable for farmers and the environment. The Nayakrishi, or the new way to relate productively with nature, is essentially an 'andolon' or movement of the farmers of Bangladesh to produce healthy food, a healthy environment and a happy life. Initially the farmers stopped the use of pesticides mainly on the grounds of health and then started using green manures and compost. As experience grew, Nayakrish farmers enhanced the efficiency of land, water, biodiversity, energy and seeds.

Subsistence farming has been practiced in Bangladesh since time without date. The Green Revolution was introduced in the mid sixties of twentieth century. Significant increase of food grain production has been achieved at the cost of the following:

- Soil degradation including loss of nutrients, loss of organic matter, soil micro-organisms; iron and arsenic toxicity.
- Water degradation in terms of arsenic toxicity, loss of flora and fauna in aquatic environment, drying up of rivers and other water sources.
- Loss of biodiversity.

Since Nayakrishi's humble beginning in 1984, more varieties of fish and a wide variety of uncultivated plants are now available in rural villages. Nayakrishi farmers choose mixed cropping and crop rotation over monoculture which has contributed to improving the genetic base of crops and other plants. Poultry birds and livestock have increased contributing to food sovereignty of the people. Planting of indigenous plant species in the Nayakrishi villages is added attraction to butter flies, birds, other biotypes and pollinators. Today, the general perception among farmers is that Nayakrishi is economically viable. The ecological condition is also improving, soil fertility is regaining, and biological base is enriched contributing to food sovereignty of the population for today and tomorrow (FAO, 2002).

Nayakrishi management is widely spread in Bangladesh. It coveres 15 districts and is strongly present in 41 upazila with the total of 115 unions. The total number of villages practicing Nayakrishi is 695 and the number of households who strictly follow the Rules of Nayakrishi is 1,70,000.

The objective of Nayakrishi management is to ensure food sovereignty through persuasion of ecological agriculture and maintenance of biodiversity. The goal is develop a farming system that embrasses ecosystem protection, ensuring various natural cycles of water, elements, nutrition, energy, evaluation and demonstrating the validity and authenticity of experimental knowledge.

There are ten rules which Nayakrishi farmers follow. These include:

- Nayakrishi Rule 1 - Absolutely there is no use of pesticides. Nayakrishi farmers do not use any form of pesticides or poison, organic or conventional.
- Nayakrishi Rule 2 - No use of chemical fertilizer and minimum external inputs. Nayakrishi farming practice rejects the use of artificial and/or chemical fertilizers.
- Nayakrishi Rule 3 - Copy the forest and produce biodiversity. Multi-cropping or mixed cropping, intercropping, crop rotating, agro-forestry and other familiar method are used in Nayakrish mirroring the diversity of the forest .
- Nayakrishi Rule 4 - Make the household self-reliant.
- Nayakrishi Rule 5 - Calculate total yield of the household, community and the ecosystem. Nayakrishi calculates total yield of a farming household coming from food, fuel-wood, fiber, and construction materials, medicine and other sources.

- Nayakrishi Rule 6 - All domesticated and semi-domesticated animals and birds are members of the farming households. Livestock, poultry and semi-domesticated birds are integral part of the faming household.
- Nayakrishi Rule 7 - Agriculture is also aquaculture. Aquatic bio-diversity, including fish species, is an integral part of agricultural practice.
- Nayakrishi Rule 8 - Seeds and genetic resources are the common resources of the community and must be conserved at the household and community level. Seeds and genetic resources should never get out of the hands of the farmers, particularly women.
- Nayakrishi Rule 9 - Water is wealth. Water is vital for flood plain ecosystem as well as rain-fed agriculture. Creative use of the water is pursued in rural planning of homestead and landscape.
- Nayakrishi Rule 10 - Stop the use of deep tube-wells and extraction of groundwater.

Conclusions

Nayakrishi is essentially an idea and practice of life-affirming activities. Nayakrishi is about agriculture, true, but not about agriculture understood in a very narrow sense, as a sector of production. Sustainable agriculture as a precondition to food sovereignty matching the diverse agrarian lifestyles is major contribution of Nayakrishi.

In terms of quantitative productivity, the gross return may appear less in Nayakrishi. But the net return is higher in Nayakrishi in most cases. The farmers also perceive an improvement in soil condition and a decline in environmental damage under Nayakarishi system . However, wide scale comparative studies of Nayakrishi (organic agriculture) with that of high input based modern agriculture focused on agro-ecological and socio-economic aspects will definitely help further extension of Nayakrishi .

Nayakrish (organic agriculture) including the persuasion of agriculture without the use of pesticides, chemical fertilizers; promotion of mixed cropping, making the household self reliant, conservation of ecosystem; production and maintenance of domestic birds and animals, maintenance of aquatic biodiversity including fishes; maintenance of seeds of indigenous crops and other plants, creative use of surface water but stop the extraction of underground water deserve extension at national, regional and global levels.

Bibliography

UBINIG (Policy Research for Development Alternative), 22/13 Khilijee Rood, Mohammadpur, Dhaka 1207, Bangladesh, Tel 880 2 8111465, Fax 880-2-8113065 & mail: ubinig @ siriusbb.com
UBINIG was originated in 1981. It inspired various ecological, social and cultural movements. Some of the movements are Nayakrishi Andolon, Nayakrishi seed Net work, Nabo Pran Andolon, Narigrantha Prabartona, Monday Meetings of Women, Organization of Community Birth Attendants, Network of Fishing communities and Network of Mango Germplasm Collectors. Nayakrishi Andolon is now a major ecological movement in Bangladesh. It involves over 170,000 farming families. It is based on biodiversity and ecological agriculture.

Bolivia (Food Access)

On the Way to an Ecological Country with Food Sovereignty: A Case Study of Bolivia

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Bolivia's geography is comprises a variety of agroecological climatic zones, a fact that has supported the livelihoods of millenarian cultures throughout the country's history. Presently, the country has high indicators of poverty and extreme poverty, occupying the 113th position in the UNDP development index and a high number of chronically malnourished people.

The AOPEB (Association of Organic Producers Organizations of Bolivia) an umbrella organization with 55 member organizations and more than 30.000 producers was founded in 1991. The AOPEB initiated its activities with 6 organizations. Now, AOPEB is a consolidated organization with a wide range of activities including the qualification method "Farmer to Farmer", business management, the use of the Information's Technologies and Communication, the producer's awareness process, as well as their families, national certification, and the participation in fairs at the regional and international level.

AOPEB participates actively in the search of a policy that guarantees "food security". For example, in 2005 the municipalities from Caranavi, Achocalla, and Yapacani declared "ecological municipalities free of gene modified crops (GMC)". The AOPEB is looking to develope local markets and has opened a network of 8 super stores which are called Ecological. These stores are distributed in the cities of La Paz, Cochabamba, Sucre and Santa Cruz and available organic products are commercialized from both affiliated and not affiliated organizations. Although ecological production was motivated initially by the benefits of exporting, the success of many projects has allowed thousands of families of producers increased their standard so living. Furthermore, AOPEB has worked to enhance public awareness towards the environment and has supported the development of sustainable agriculture on more than 1.000.000 hectares of land.

The current Bolivian government presents a perspective of great change in many aspects of the lives of Bolivian; the agricultural sector is included in this shift of thinking and constitutes a pivotal axis in this new policy. The president, government officials, key leaders of social organizations have consistently managed a debate in favour of organic agriculture, emphasizing the positive benefits for Bolivian's health, for a sustainable food security with sovereignty, the protection of the environment and the opportunity to gain access to markets in benefit of smallholder farmer's incomes. The AOPEB plays a key role in this process, formulating and actively accompanying the creation of a legal and normative framework, and maintaining an important presence in all the institutionalization of Bolivian organic agriculture.

In June 2006 the government presented the "National Plan of Development: Dignified, Sovereign, Productive and Democratic Bolivia, To Live Well". This plan incorporates elements of food security with sovereignty and emphasizes the importance of agroecological practices in creating solutions to many of the problems faced by poor Bolivian farmers. In addition, it promotes the development of ecological agriculture associated with the elimination of pesticides and reduction of the use of fertilizers, replacing them with organic products.

At the same time, the government has prioritized a process of land redistribution, affecting millions of hectares, which will be distributed to indigenous communities and peasants, prioritizing and supporting the ecological use of this land (Law 3545), as stated in the law passed in November 2006 the "Law of Communitarian Reconduccion of the Agrarian Reform" and in the same year passed the "Law of Regulation and Promotion of Organic Farming and Non Timber Forestry Products" making organic production part of State policy. In direct relation to food security policies an alternative certification system was established for the local market. It will be evaluated and controlled by the national competent authority which it guarantees its quality while making certification accessible to the Bolivian producers and consumers. The greatest challenge faced by Bolivia's organic agriculture sector is the development of local markets following the

policy of the present government, to consolidate an agro-ecologic alternative and get past the negative effects of the "green revolution" and of the conventional agriculture.

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Biography

- Roberto Ramirez, General Secretary of AOPEB, cafe producer from Los Yungas, many years active as leader.
- Luis Vildozo, researcher on organic farming, PhD candidate.

Bolivia (Food Utilization)

Micro Vegetable Gardens Project

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Micro Vegetable Gardens is a development project and a joint effort between the FAO, the Municipal Government of El Alto (GMEA) and Intervida Bolivia, towards the implementation of micro vegetable gardens in 5 areas from districts 2 and 8 of the municipality. The project works with 90 families who benefit from the "Improving Food Consumption" program which Intervida Bolivia runs in the city of El Alto. In El Alto, 4000 meters above sea level, this project is working to make food availabile though urban provisioning. The project was started in 2005 and will run until 2008. The vegetable gardens have hydroponic and organic crops, based on growing crops in nutrient solutions (water and organic fertilizers) without the use of pesticide for the crop control (Figure 1). The hydroponics crops use artificial medium (e.g., sand, gravel, vermiculite, rockwool, peat, coir, sawdust) to provide mechanical support and liquid hydroponics systems.

Figure 1 - Micro Vegetable Gardens

The objective of this program is to improve the nutritional levels of the families in the selected areas. Focused on children from their gestation to their early childhood, with the aim of developing their physical and intellectual capacities, the program works with families to help improve their living conditions. They also collaborate with the community to strengthen their organization, and with local (municipal) authorities to mobilize resources towards ensuring nutritional food security.

One goal of the project is to promote consumption of the nutritional produce grown in the micro vegetable gardens. Strategies of nutritional education were implemented, strengthening the dietary culture of the benefiting families. Information is made available to the community and these gardens are promoted as being not only nutritional, but also have the added value of being organic since they do not use chemical products. The aim is to safeguarde the health of the population and the environment.

In this area, access to land is a major limitation in supplying most of the non-staple foods that a family needs including roots and tubers, vegetables, legumes and herbs. Roots, tubers and legumes give energy, protein, fat, iron and vitamins. Green leafy vegetables and yellow have provided essential vitamins and minerals, particularly foliate, and vitamins A, E and C. Vegetables are a vital component of a healthy diet and should be eaten as part of every meal.

With the technical guidance of FAO, micro vegetable gardens have been established in these families' houses for the cultivation of produce, which is initially for their own consumption, but may also be sold in the future. As such, they contribute to both diversify their diet and generate income which permits them to obtain a higher level of family nutritional food security.

A baseline study was carried out in the intervention area in order to know the basic indicators in terms of availability, access and use of aliments, especially with regards to the benefiting families' produce. This enabled them to orientate the type of produce to be cultivated in the micro vegetable gardens, based on the nutritional deficiencies identified with the local population, as well for evaluating the progress and impact of the project and its activities during their execution.

Furthermore, Intervida Bolivia technicians underwent a training run by FAO, so that the technical transfer in the implementation and monitoring of the micro vegetable gardens could be assumed by Intervida Bolivia and GMEA following the culmination of FAO's project. At the same time, in this intervention area in Tiwanacu, Intervida Bolivia is investigating on the generation of bio-pesticides for the protection of hydroponic and organic crops, in order to strengthen ecological production. Micro vegetable gardens in El Alto have increased the nutritional level in the different districts where Intervida is working, as the crops produced are related to the nutritional deficiencies and with participation of all actors in the community. The micro gardens have given direct access to a diversity of nutritionally-rich foods, increased purchasing power from savings on food bills, income from sales of garden products, and fall-back food provision during seasonal lean periods.

Finally, the FAO, the GMEA and Intervida Bolivia are implementing commercialization strategies in order to achieve a sustainable economy through the micro vegetable gardens, generating income which will enable the beneficiaries to enrich their basic family basket. After 2008 Intervida Bolivia will continue this project, implementing more micro vegetable gardens in different areas in El Alto, Bolivia.

INWA (Intervida World Alliance) bases its intervention in Nutritional Food Security in three axes: Availability, Accessibility, and Consumption and Treatment. These axes coordinate between them to provide solutions for the physical, economic, social and the adequate access to the aliments needs (in terms of quantity, nutritional quality, security and cultural preference) for an active and healthy life for all family members, at all times, and without the risk of loss. In this way, it aims to achieve an adequate nutritional state.

Biography

Francisco Manuel Martínez Frutos
As INWA's Production sector responsible, I am working in various projects aimed at providing communities with the tools and knowledge required to advance in the development process. As such, community organizational capacity is strengthened by training leaders and offering training workshops. This community consolidation effort is undertaken for both rural and marginal-urban projects. I am dedicated to develop productive projects which respect the environment, thus guaranteeing sustainable use of natural resources. This division takes its root in ecological agriculture, creating pilot projects which implement various innovative techniques in this area. Crop diversification aims to improve families' dietary food supply and, at times, provides surplus crops which can be sold, without overworking and destroying the land. www.inwa.org

Brazil (Food Availability)

Organisations and Transitions of Horticultural Organic Producers in a Peri-urban Area of São Paulo (Brazil)

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Introduction

A few years after enacting the Organic Law (December 2003), Brazil is becoming a world leader in Organic Farming (OF), which covers a wide range of production and certification systems. Besides developing an export capability, there is also a growing demand for organic fresh vegetables in cities, especially in the south-eastern States. However, the ways small farmers adopt OF in "green belts" to meet urban demands for organics have not been investigated extensively. We explored this issue in the community of Ibiúna, located in a hilly area at about 100 km from three main cities of São Paulo (São Paulo, Sorocaba and Campinas). This case study shows how small farmers were organised or organise themselves to meet urban demands and develop OF, and analyse its further implication in terms of social benefits. The approach was based on interviews with farmers, technical and political officials, organic inspectors and leaders from various organic producer associations. It then served as a basis for additional case studies in São Paulo and other States, with the extension of agro-ecological initiatives (Brandenburg, 2002).

Results

Watersheds in Ibiúna not only provide irrigation water for vegetable growing but also contribute to human water supply. The region has a significant concentration of small-scale organic producers who have taken this option due to the economic crisis in conventional farming and other commercial activity. Most participants in the study were located in the same river basin, including approximately 90 small farms, 72 of which are organic.

We identified four distinct forms of social organization, collective and entrepreneurial, that express *a priori* different concepts about the market and organic farming (Bellon & Abreu, 2006). These organizational forms not only reflect different existing market relations but also illustrate the emergence of new economic relations among farmers and between farmers and consumers with new food purchasing priorities. Although these four basic forms of organisation dedicated to OF share some common objectives, namely in visual quality and "fair price" of products, differences appear in their magnitude and internal operation, their values and relations with consumers, their technical and environmental contents. They are combined in the same territory, but they have been following diverse evolution pathways (Table 1).

Development in Ibiúna, and the diversity of its organizational forms, result from a three steps process. Local Catholic Church initiative in the late 80's led to generate a strong link between many farmers from Ibiúna and citizens from poor communities of São Paulo, generating the first organisational model (Association in Table 1). Its further articulation with local AAO[2]'s activists and the creation of a specialized organic product selling enterprise in the middle 90's have been progressively driving farmers to others forms of organisation (C and O in Table 1). Finally, a disruptive evolution within Company (C), led to the creation of the most recent form of organisation (Group cooperative G in Table 1) in 2003, and is about to originate another associative form in 2007.

[2] *Organic Agriculture Association. Created in 1989 in Sao Paulo state, the AAO is now one of the most important actors in the Brazilian organic farming movement.*

Table 1: Classification of organizational forms encountered, in order of historical development (vertically)

Case type (year of origin)	Farmers in 2007	Production and certification	Marketing	Values
Association (A) of small farmers (late 80s)	50 farmers, including 2 organic farmers Interaction with city consumers	Food autonomy and diversity through box scheme No formal certification, but consumer-validation	Solidarity (pricing) and integration among farmers Food sovereignty communities	Fraternity Cooperation Congruence between principles and practices
Company (C) (mid 1990s)	57 organic farmers in the micro basin Hierarchical and technical relationships	Global land use planning Inputs and technical assistance Group certification	High visual quality City supermarkets Conversion stimulated by market demand	Economic realism Technological orientation High environment impact
Organic (O) association (mid 1990s)	15 scattered farmers Mutual exchange Strong leadership and market investment	Individual initiatives Exchange experience and information Farmer (Self?) certification	Marketing agility and efficiency Fairer prices for producers	Social justice, respect and liberalism
Group (G) cooperative (year 2003)	Mixture of 15 neighbouring organic plus 105 conventional farmers	Based on organic farmers experience Possible impact on conventional coop members	Outer-city supermarkets Secure markets and fair prices for producers and consumers	Timing Collective vision Regeneration Proximity

Except for the Company, the organizations investigated do not operate with an exclusive contract. Thus they allow farmers to spread risk by selling to cooperatives, associations, consumer's groups and restaurants. It is mostly this exclusivity clause that led farmers to quit the Company in 2003 and that is leading to a new disruption today. By organising themselves in small groups, these farmers are looking for more autonomy and pretend enter new markets, mostly direct sale or short pathways allowing them to add more value on their production. Self-organisation of the production (regularity, diversity) and cooperation is thus a new challenge for these farmers who until now have been under the guidance of the Company.

The on-going reorganisation of communities and networks is also related with a change in farmers' practices. Beyond a mere interpretation as OF as input substitution or market opportunities, such transitions could contribute to redesign more profitable and autonomous farming (Sylvander *et al*., 2006), and possibly new food systems or even "foodsheds". Driving forces in such changes in practices are not only economic but also linked with agronomic and environmental issues such as soil compaction, accumulation of phosphorus (Bellon *et al*., 2005). This justifies further monitoring and comparative analysis, based on extended networks of initiatives (Embrapa, 2006).

Discussion and conclusions

Small farmers created collective entities and experienced new social and agricultural practices, sustaining both on their needs and those of consumers. They ensure a steady quality food supply both for their household and different social groups. Increase and stability of incomes not only provided for the farmer's family basic needs but also strongly improved their livelihoods and allowed many of them to increase farm's capitals. The various forms of organizations demonstrate the vitality of Ibiúna's OF. Both organic products supply and consumption increase. However, competition on the organic market is increasing, leading to new challenges for small farmers. High innovation capability for both production and marketing are more and more required, as well as cooperation abilities.

After a first "social including" step, with shared benefits for all farmers, the risk that OF in Ibiúna excludes part of the farmers in its further development is high. This is due to reductions in price paid to farmers and increased competition among organizations when they address the same market. Improving farmer rationalization and supporting agriculture-related forms of social practices are still needed. These phenomena are increasingly recognized as important mechanisms for rural development in a global economy. Social equity is also at stake for consumers, since many of them cannot afford to pay high prices. Transitions among production models also open a new space to redefine the role of family-farms in rural development and their relationships with the market and with urban consumers, feeding a new ecological ethics and social autonomy.

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Biography

Graduated from "Institut National Agronomique" Paris-Grignon (1980)
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China (Food Access)

The Development of Organic Agriculture: A Case from Yunnan Province of China

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Introduction

Yunnan, located in southwest of China is known as "kingdoms of animals and plants" and is one of the 18 hot spots of biodiversity conservation in the world. Its biodiversity accounts for more than 50% of China. Meanwhile, 94% of the provincial land is mountainous which is less polluted than other regions in China. Furthermore, its landscapes and ecological environment types are diverse in tropical, subtropical, temperate and cold climates, and these can provide appropriate habitats for different animals and plants. In addition, there are 51 nationalities in Yunnan with abundant indigenous knowledge about traditional agriculture. Thus, promoting organic agriculture (OA) is beneficial to the environment, biodiversity, cultural diversity and human health in Yunnan province.

In Yunnan, OA began at the mid-1990s. In the last decade, OA developed very fast, but the development of OA in Yunnan still lags far behind other advanced regions like Beijing and Shanghai. We interviewed OA producers (companies and farmers) and consumers, did surveys of markets in 2005 to explore the development of OA in Yunnan.

Results

The current situation of OA

Wihin the province of Yunnan in 2005, there were 20 certified organic companies involved with 50 organic products grown over an area of 500,000 hectares. Major organic crops include tea, vegetables and fruits etc. The organic certification services are provided mainly by Organic Food Development Centre of China, Organic Tea Research and Development Centre, ECOCERT EU, BCS Germany and so on.

The development model of OA

The survey shows that all practices of the organic farming in Yunnan are taken over by companies in cooperation with farmers, which is called "company + farmers + base" in China. This model is advocated and supported by the government, because it can solve the problem of investment, consequently it can promote the rapid development of organic agriculture. However the model itself has some disadvantages in aspects of sustainable development. Firstly, farmers are driven by benefits from companies and lack self-required participation and creativity based on knowing problems of conventional agriculture. In this situation, relation between farmers and companies are very often not stable. Farmers often secretly sell their products to market when the market demand is high. Likely, companies fire farmers or give up the organic farming practices when companies don't get profits. Secondly, the influence of model is very limited because of its limited geographic farming area.

Farmer organizations

As known, plow land which most of farmers have is around 1/15 hectare in China and most plow land is connected. It is impossible for individual household to carry out organic management. Meanwhile, the ability of individual farmers for resisting market risks is limited. Thus, effective farmer organizations are very

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important to help farmers with organic farming and connecting the markets. At present, Chinese farmers are organized by administrative villages consisting of natural villages. Its leadership is now called "villager committee". Owing to many complicated reasons, this leadership is not very effective in community management and advancing OA. Our survey showed that only 38.3% of the farmers in the rural communities participated in the important decisions and 61.7% of the farmers never or seldom participated. Actually the proportion of the farmers who had not participated in the important decisions exceeded the percentage above. It indicated that the important decisions were made by leaders and then announced to the villagers.

Use of pesticides and fertilizer

Although Yunnan is less polluted compared with advanced regions of China, chemicals are also increasingly used in agriculture and are posing threats to the organically managed land. In the last ten years, pesticide use has increased 2.5 times in Yunnan (Kuang *et al.*, 2005). Although pesticides are mostly used in the low lands and around cities, it is spreading to mountainous regions. Similarly the quantity of fertilizer utilization increased more than 82.4 times by that of 1990 in Yunnan (Wang *et al*. 2002). Increases of pesticide and chemical fertilizer are big challenges for organic agriculture in Yunnan.

Organic certification

Currently, organic certification services are mainly used for organic companies targeting international and national markets. Farmers are not willing to pay or can't afford high cost of certification. This indicated that the scope of organic certification is very limited. Organic certification is a significant obstacle to the development of OA in Yunnan.

Organic market and consumption

In Yunnan, there were just 50 organic products in 2005. Major organic crops include tea, vegetables and fruits. These products can not meet different demands of consumers. Meanwhile, investigation shows organic consumption is very low in Yunnan which means that organic producers' incentives are not achieved because their expected benefits are not be satisfied. Reasons for low consumption of organic foods have been attributed to the following:

- Few people know what organic food is. Consumer surveys indicate that 16.8% of the consumers knew organic food, 83.2% of the consumers didn't know organic food;
- Organic food is costly. The price of organic vegetable is 2-3 times than conventional vegetables; and
- Consumers do not trust organic certification labels

Agriculture extension system

Conventional agriculture extension system (CAES) is established extension service that promotes mainly conventional agricultural techniques and knowledge. In most situations, CAES promotes the use of chemicals in agriculture very effectively, but does not promote the techniques of OA.

Conclusions

It is recommended that Governments develop appropriate policies for widespread adoption of organic agriculture by millions of individual farmer households. Specifically, Governments should encourage farmers to establish effective organizations to promote organic agriculture. Furthermore, they should support the development of alternatives to chemical pest control and chemical fertilizers. Meanwhile, local NGOs and all sectors should facilitate farmers to reduce chemicals use in farming practice. Actions should be taken to increase consumers' awareness of organic consumption. Based on the information above, we concluded the influence of OA is very limited, and there is much work to do for the development of OA in Yunnan.

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Colombia (Food Availability)

Procesos de Transformación Social y Productiva en Trujillo, Colombia

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Introducción

Entre abril de 2005 y abril de 2006, se desarrolló un proyecto de fortalecimiento agroecológico de 120 fincas de pequeños agricultores productores, especialmente fruticultores, y el fortalecimiento empresarial de una planta de procesamiento local de frutas, con el auspicio de la Corporación Autónoma del Valle – CVC, la Alcaldía de Trujillo, varias asociaciones de productores y transformadoras de frutas y la Fundación San Isidro Labrador, en Trujillo, un municipio situado a 116 kilómetros de Cali, capital del departamento del Valle del Cauca, Colombia; caracterizado por ser regado por los ríos Cauca, Cáceres, Cuencas, Culebras, Medio Pañuelo y Frío, entre otros de menor corriente; con todos los climas y pisos térmicos que han facilitado el desarrollo de las actividades ganaderas, forestales y agrícolas; destacándose los cultivos de café, plátano, caña panelera, yuca, maíz, fríjol, lulo, mora, granadilla y tomate de árbol, y enriquecida por la activa presencia de comunidades campesinas e indígenas. Este proyecto buscó:

- Organizaciones comunitarias fortalecidas, generando alianzas estratégicas entre ellas y vinculadas a la producción orgánica como opción social, productiva y económica.
- Proyectos de coautoria implementados y que sirvan de modelo para los productores.
- Una empresa comunitaria transformando y comercializando productos con valor agregado para mercado local, nacional e internacional.
- Valor agregado: fincas certificadas ecológicamente y grupos asociativos organizados.
- Con estos retos planteados, la Fundacion San Isidro Labrador con la orientación de Conexión Ecológica, estructuraron una estrategia de acompañamiento social, técnico y empresarial que implicaba el desarrollo de talleres multi – temáticos, desarrollo de mini – proyectos comunitarios (construcción de plantas de abonos orgánicos), visitas individuales e intercambio entre productores, entre otras.

Resultados

Desde sus inicios, el proyecto comenzó a arrojar resultados claves para el futuro y sostenibilidad del proyecto. Entre ellos tenemos:

- Vinculación de 122 familias campesinas a procesos de conversión en agricultura orgánica sin desconocer que algunos de ellas ya habían incorporado, por su propia cuenta, el enfoque agroecológico. Esto facilitó el acceso al posterior proceso de certificación de 92 pequeñas fincas que, voluntariamente, se comprometieron con el cumplimiento de normas, incluyendo el periodo de conversión. Las otras fincas (30) continúan en el proyecto implementando prácticas agrícolas orgánicas paulatinamente conforme a las capacidades y lógica de cada agricultor o agricultora.
- Construcción de 10 plantas comunitarias para la producción de insumos orgánicos, sólidos y líquidos. Estas plantas, hoy por hoy, son de propiedad y administración directa por la comunidad.
- Estructuración y puesta en marcha de un sistema de control interno comunitario con la participación directa y activa de 8 representantes de cada zona de trabajo así como de la propia comunidad en el desarrollo y comprensión de las normas internas, entre otros.
- Desarrollo de guías básicas sobre agricultura orgánica, elaboración de insumos orgánicos y procesamiento de alimentos orgánicos.
- Conformación de un Comité de Integración Comunitaria para el análisis de las propuestas de articulación entre las asociaciones y apertura de mercados locales – nacionales – internacionales, entre otros.
- Adquisición de nuevos equipos y mejoramiento de equipos disponibles para facilitar y fortalecer el procesamiento local de frutas y verduras con énfasis a la producción de jugos, mermeladas, compotas, pulpas y conservas. Esta planta, hasta la fecha, no se había puesto en marcha desde su adecuación hace más de 5 años.

- De las 92 fincas que se involucraron en un proceso de certificación, 50 alcanzaron la certificación ecológica como unidades productivas (no sólo un producto específico) produciendo mora, café, flores exóticas, banano tradicional, plátano, maíz, fríjol y pitahaya. Otras 42 fincas se encuentran en diferentes tiempos de conversión.
- Apertura de nuevos mercados, aun para los productos frescos y transformados en conversión (considerados convencionales), a nivel local, regional, nacional e internacional. En este sentido, la Fundación San Isidro ha apoyado el proceso impulsando el ingreso a mercados institucionales, en tiendas locales y con contactos internacionales; convirtiéndose en una de las experiencias pilotos en comercio de jugos ya que en Colombia esto ha sido negocio de un solo grupo económico. Este resultado aun esta por alcanzar su mejor nivel debido a la serie de dificultades económicas (capital de trabajo) que debió enfrentar la asociación responsable del procesamiento.

Conclusiones

Aunque el proyecto finalizó en el primer semestre de 2006, la primera fase del proyecto se encuentra en proceso de consolidación. Esto ha incluido la apertura de mercados institucionales para abastecer las bebidas de los escolares de bajos recursos económicos y el procesamiento y comercialización de un primer contenedor convencional. A todo esto se le suma una segunda fase que se ha preparado y esta pendiente de obtener la financiación externa necesaria puesto que se pretende continuar fortaleciendo y aumentando la base social y productiva, la gestión empresarial de las organizaciones y la consolidación de la propuesta agroecológica como alternativa social, productiva y económica viable.

El proyecto está revolucionando el pensamiento productivo y económico de la región sin embargo, las lecciones aprendidas nos enseñan que la actual producción no es suficiente y diversa por lo cual la próxima fase deberá incluir mayor énfasis en la diversificación de la producción. Además y aunque se ha incursionado en el desarrollo de mercados locales, se debe continuar fortaleciendo la capacidad empresarial de las organizaciones, entre otras acciones.

Biografía

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Dominican Republic (Food Access)

The Contribution of Organic Agriculture to Economic Development - the Case of the Dominican Republic

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Introduction

This study analyses the opportunities offered to a low income developing country by improving access to the market for organic produce within the European Union. The example of the Dominican Republic is utilised to demonstrate the potential represented by an increment in organic agricultural production as well as the associated impacts on several social, economical and environmental aspects.

A brief introduction to the existing EU market for organic products deriving from developing countries is given and followed by a more complete overview of the organic sector in the Dominican Republic. The recent increase in organic agriculture production in the country is examined, together with the structure of the production chain, including the important role played by farmers' cooperatives and associations. Farmers' associations allow small producers to access the markets of several European countries thereby improving access to price premiums through the establishment of vertical coordination agreements stipulated, in many cases, directly with supermarket retailers and importers.

Three traditionally grown crops of the Dominican Republic were evaluated: bananas, coffee and cocoa. These represent the main agricultural commodities in terms of agricultural exports and occupy a variety of agro-ecological areas. Bananas are grown mainly on irrigated lowlands in the south-west and northern regions of the country, coffee occupies mountain areas while cocoa is grown primarily on hill zones.

Natural resources and climate have conferred a comparative advantage on the Dominican Republic in producing agricultural commodities which are differentiated by their organic method of production and, on account of that, enjoy an increasingly strong market in the EU and other high income countries. The objective of this work was to evaluate if international trade of these main products has effectively benefited the country's economy and the income of its smaller farmers, thereby contributing to food security. Furthermore, this work sought to determine what, if any, were the adverse effects of trade (e.g. enclave development or reduction in the production and availability of staple food crops).

Results

Bananas have always been an important crop within the Dominican Republic and total production has not changed significantly in recent decades. Local consumption accounted for almost the production until the end of the 1980s' when exports began. What has been extremely interesting to observe is the relationship between the impressive increase in export volumes and values and the share of the exported goods certified as organic (see Table 1). The "organic" property of exported bananas allows differentiation from the conventional products, as well as a competitive advantage, in terms of quality, over other exporting countries enjoying lower costs of production. These features, together with EU preferential market access, permitted the countries' organic banana sector to flourish and the country to become the leading producer and exporter of organic bananas.

Coffee is another interesting crop analysed in the paper and it has been taken into consideration due to the particularly complex evolution of its market. In fact, the Dominican Republic experienced a dramatic decline in coffee exports due to the combination of several factors: restriction of the country's quotas in the International Coffee Agreement (ICA), a price fall on World markets and increased competition originating from increased global coffee production. While exports of conventional coffee drastically declined, those of organic coffee began to rise. Processing at the local level has also increased, leading to exports of roasted

organic coffee, hence allowing the exporting country to benefit from a significant increase in the share of the end product's value.

Table 1. Export volumes and values of selected organic products for Dominican Republic, 2002-2006.

Year	Organic Product	Export Volume (Kg)	% Export Volume Organic/Total	Export Value FOB (US$)	% Export Value Organic/Total
	Bananas	65608884	57.2	22072971	62.3
	Cocoa beans	5691005	14.5	10558115	18
	Green coffee	174800	6.9	351726	9
2002	Roasted grinded coffee	20163	4.9	79960	5.8
	Bananas	60090742	47.4	19501362	57.4
	Cocoa beans	3832363	9.9	7491996	11.6
	Green coffee	119437	3.4	233353	3.6
2003	Roasted grinded coffee	5096	2	31590	5
	Bananas	47157426	46.2	12255512	56
	Cocoa beans	3197642	9.3	4646944	10.2
	Green coffee	75770	3.4	155912	4.1
2004	Roasted grinded coffee	16710	9.5	61286	10
	Bananas	62814014	37.6	23328633	51.5
	Cocoa beans	1675478	7.6	2872199	9
	Green coffee	42441	2	115861	2.4
2005	Roasted grinded coffee	14900	5.3	29605	2.7
	Bananas	86283096	42.3	25830620	47.4
	Cocoa beans	3981643	16.4	7819250	20.9
	Green coffee	81015	3.2	198454	3.4
2006	Roasted grinded coffee	6565	1.4	23490	1.7

(Source: modified from CEI-RD data, 2007)

Cocoa, another important traditional product grown in the Dominican Republic, is also considered in the paper. The country is the world leading producer and exporter of organic cocoa with over 70% of the global volume of this particular good produced in 2005 (SEEPD, 2006). The farmers' cooperative, CONACADO, has played a fundamental role in organising organic certification procedures, as well as constituting the channel for access of small farmers' production to EU market.

Plantations for organic production, particularly of coffee and cocoa, play an extremely important role for the conservation of forested areas since they are perennial crops which are generally grown as part of a complex agro-forestry system. Such methods of cultivation contribute to the maintenance of adequate soil protection on plantations which would otherwise be subject to erosion. They are also important for the preservation of specific animal and plant habitats, in contrasting the greenhouse phenomenon and hence global warming, as well as for the completion of the natural water cycle, an essential factor for reliable rainfall.

Given the importance of the tourist industry for the economy of the Dominican Republic, agricultural production which encourages the preservation of biodiversity is an added incentive for encouraging organic production. The creation of an eco-tourist activity related to the organic sector is bringing benefits which are extremely important for the development of local rural communities. The establishment and maintenance of organic crops such as cocoa, coffee and banana, require intense use of hand labour, as mechanisation is still not available for the majority of farm operations. In this way, the ongoing trend of urbanisation is, to some extent, limited, as the movement from rural to metropolitan areas is reduced by the availability of local employment opportunities.

Systems of certification currently recognised in the EU for organic imports are also documented in the study, as well as those policies created in order to favour economic progress in developing countries. In particular,

the EU import regime for bananas is analysed from the Dominican Republic's (and hence the ACP countries) point of view, with an eye on possible further moves towards trade liberalisation in WTO.

Conclusions

Although difficulties were encountered in obtaining appropriate data on organic trade flows from the Dominican Republic and in dealing with the wide discrepancies existing between different published records, the success of the Dominican organic sector is evident. This accomplishment, however, is highly dependent on tariff preference for ACP countries which could erode as arbitration procedures in WTO continue to apply. Exports from the Dominican Republic are likely to face stronger competition especially from other ACP countries enjoying lower production costs. Hence, the differentiation of the agricultural product as "organic" remains the main competitive advantage.

The study clearly demonstrates the close inter-relationship existing between EU policies for trade, development assistance and organic produce in their effects on the growth of a developing country. Moreover, the multiple benefits that organic agriculture and the deriving activities bring to several environmental, social and economical aspects, greatly contributes to improved food security and food access.

The present elevated cost of organic certification procedures is another possible constraint faced by the Dominican Republic and other developing countries wishing to access the European market. The possible EU organic certification recognition in the country could also lead to further market expansion through improved access for small farmers.

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Biography

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Ethiopia (Food Access)

Food Security, Livelihoods and Options for Organic Agriculture in Ethiopia

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Introduction

Organic farming is the original farming system of Ethiopian farming communities, who developed numerous biophysical methods to cope with the problems of losses from agricultural systems. However, due to various wars, destruction of local institutions and land tenure issues, these systems became fragile and - exacerbated by population growth and subsequent extension of agricultural land - ecosystems became degraded (Tewolde 2006).

To compensate for declining soil fertility, the Ethiopian government, supported by various international organizations, promoted the Green Revolution for Africa based on chemicals and hybrid seeds. For examples, through the Sasakawa Global 2000 project and the Millennium projects funded among others by Monsanto (Cabral et al. 2006). Also Gates and Rockefeller foundations are supporting conventional initiatives based on external inputs and GMOs.

However, these approaches do not tackle some of the original problems with failing or destructed traditional institutions, and up to now, only 20% of Ethiopian farmers use external inputs like chemical fertilizers. Previous experience has shown that chemical fertilizers led to delinces in yields in dry areas and drought seasons. Moreover, since fertilizers were given on a credit basis, after the liberalization of the fertilizer markets, in drought years, farmers were unable to pay them back and thus became indebted. In very serious cases, farmers were driven into famine and destitution.

On the other hand, NGOs and the Environmental Protection Agency (EPA) of Ethiopia started to promote organic agriculture based on traditional systems to maintain agrobiodiversity, combined with elaborate nutrient management by composting and zero grazing. The result was that not only yields were comparable to fertilized plots under average conditions and even higher under dry conditions, but also an increase of economic and ecological security within farm families and farming communities.

Results

Biophysical results such as higher yields and greater resilience of organic farming systems, soon became evident and explanable by the maintenance of traditional agrobiodiversity. Organic management practices resulted in improved nutrient status and water holding capacity of soils due to addition of compost which serves as a buffer during drought periods (Hailu & Sue 2006). Socioeconomic considerations regarding farmers' decision making and access to food and the means for food production are the major questions for promoting organic agriculture in a wider range.

Amartya Sen demonstrated that it is not the quantity of food produced in an area that determines if there is a famine or not, but the means to access this food. Analysis of the 1984 famine in Wollo indicated that on a national basis there was enough food available in Ethiopia (Dreze and Sen 1991). In this context, a capability approach was developed, which - beside the capability to produce food - was extended to many other ecosystem services, for instance the capability to provide oneself with access to water, traditional medicine, etc. (Millennium Ecosystem Assessment 2006). Capabilities are closely connected to values given to ecosystem services and to entitlements, which guarantee access to ecosystem services through institutions (Leach et al. 1991).

In an similar way, these approaches were used to analyse farmers' capabilities and choices in regard to organic or conventinal agriculture on the basis of about 400 farmer interviews in Northern Ethiopia. In general, conventional agriculture with all its physical and institutional implications, contradicts the value

system of most Ethiopian farmers. The local saying is that fertilizer "corrupts" the soil. Therefore, readiness to adopt composting was high.

Wealth ranking showed that it was the richest farmers who used chemical fertilizers. Poorer farmers opted for compost. Yield increase, however, was equal or higher from composted lands. This demonstrated that it was not the use of fertilizer which made the rich farmers rich, but that they had to be rich before to be able to buy the fertilizer, which was provided on credit base. Most poor farmers opted for composting in the first place, since it allowed them to restore soil fertility without forcing them to overcome an initial economic threshold for investment into chemical inputs. Later on also wealthier farmers joined the organic agriculture initiative, still now, however, many farmers use a combination of the two. Poorer farmers prefer compost because it provides nutrients and organic matter, it improves the soil structure and water holding capacities of soils, which makes soils more resistant under drought conditions and reduces the vulnerability and riskiness of agricultural systems.

Organic material for composting is frequently the litter taken from communal forests. Forests are protected with bylaws that have been agreed upon by communities. Therefore, this system improves both soil fertility and crop yields in addition to preserving the natural environment around farms. Forest conservation also helps to improve the water quality within the area as well as promoting biodiversity.

Since it is mostly conventional seeds that respond best to fertilizers, chemical agriculture also interferes to the seed reproduction system of farmers, who in general prefer to reproduce their own seeds. Farmers see seed saving as a means to promote food sovereignty. By saving seeds they are more self sufficient in terms of selecting particular varieties that are adapted to local areas and and weather conditions. Independence from fertilizer markets is another reason that farmers prefer composting over the use of conventional fertilizers (Hailu & Sue 2006).

One of the major constraints in the promotion of organic agriculture within Ethiopia is the financial burdons associated with certification costs required to access international markets. Although organic agriculture is widely practiced there are currently no organic "cash crops" produced for international markets.

Conclusion

Under the present conditions, organic agriculture is preferable to chemical agriculture in Ethiopia, since it decreases vulnerability and riskiness of agriculture especially for the poorest people living under dry conditions. It is also preferred by poor people since the economic threshold for investment is lower than for chemical agriculture, and access to inputs into soil fertility is considered as more secure, since it is connected to a lesser degree to markets and institutions beyond their control.

Organic material comes from the forest ecosystem that is controlled by the community, therefore by securing the necessary organic material, the community also cares for the ecosystems they live upon. Further work is needed to improve access to organic markets since present financial barriers for licencing can hardly be overcome. This is the most important constraint for further promotion of organic agriculture within in Ethiopia.

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Biography

Ingrid Hartmann, Ph.D., born 27/12/1957 in Stadthagen, Germany, M.Sc. in International Agriculture from Technical University Berlin, Ph.D. in Soil Science from University in Hohenheim, Senior Researcher at Humboldt University, long-term field research and consultancies for national and international institutions in Ethiopia especially on agriculture and deforestation issues, contributed to the Millennium assessment.

European Union (Food Access)

Organic Food Market Development in Central and Eastern European New Member States of European Union

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Introduction

The total area under organic production in Central and Eastern European new member states of the European Union (CEE NMS) increased from 320 thousand ha in 2000 to 670 thousand ha in 2004 and represented 1.85% of the utilized arable land in 2004 (Zakowska-Biemans, Hrabalova 2006). Despite the significant growth of organically managed land in CEE NMS the organic markets in these countries are at the very early stage of development. To identify factors that have impact on development of organic markets in these countries there was the research carried out within the 5th European Union Research and Technical Development Programme project "Further Development of Organic Farming Policy in Europe, with Particular Emphasis on EU Enlargement". The research was divided into two stages consisting of literature review on consumer behaviour and market developments conducted in 2003 and an organic market expert survey in 8 CEE NMS with the use of a semi structured questionnaire in the years 2004-2005.

Results

The results of the research show that there are still many barriers to overcome, related to both supply as well as demand for organic produce, in order to develop markets for organic products in CEE NMS. The national market experts stressed that despite growing production, a small proportion of total organic food production in CEE NMS ends up in organic domestic markets. The export (international trade) orientation still plays a very important role in CEE NMS and particularly in Czech Republic, Hungary and Poland. The low supply of organic products hampers the development of organic processing and sale channels. As a result, the assortment of domestic organic products and the availability of organic food are very poor.

Another issue that appears to be a crucial factor towards further development of organic food markets in CEE NMS is the structure of sale channels and the price level of organic products. Direct sale remains the important sale channel for organic products and the share of general food shops, and especially supermarket chains, is currently low. However, fast growth of the share of this organic food sales channel in CEE NMS is expected due to trends observed in the development of food sales channels in CEE NMS as well as the growing supply of organic food. An exception among the researched countries is Czech Republic where general food shops currently make up the most important sales point for organic foods, while direct sales play a supplementary role. The future of organic food sales in the CEE NMS appears to hinge on supermarkets and the extent to which they stock organic foods on their shelves. Supermarkets will likely continue to gain market share at the expense of organic food shops, given the consumer trend toward one-stop shopping.

The price premium for organic food in CEE NMS are still high due to low supply, high distribution costs and relatively high gross margins. Research of CEE NMS consumers shows that besides the positive connotations on organic food they tend to criticize the availability and price level of organic products. Zanoli et al (2004) speculated that the barrier is not the absolute price level but rather the perceived "opportunity cost" for consumers, which includes other transaction costs due to limited availability, inappropriate price-performance ratio, lack of pricing transparency, and other psychological factors such as the persistence in memory of prices for organic products. Lowering the prices of organic food in CEE NMS will not enlarge the market if there is no coherent long term strategy to communicate various attributes associated with organic food and organic farming. Despite the lack of research on preferences among CEE NMS consumers, one can assume that the existing assortment of organic food does not meet consumer expectations and the lack of efforts to promote organic farming and organic foods results, among other things, in low consumption of organic food. Even though most CEE NMS have nation-wide logos for organic food, which

is a prerequisite for the organic food market to develop, these logos are not recognized by consumers due to lack of well targeted promotion. These factors, in addition to the unsatisfactory assortment, limited availability and high prices, are deemed as the primary barriers to develop the demand for organic food in CEE NMS.

Conclusions

Limited availability and high prices could be considered a barrier related to the undeveloped nature of organic markets in CEE NMS. Further development of the organic sector in CEE NMS will support overcoming these supply-related barriers to organic food demand growth but communication with consumers remains one of the key issues to ensure further development of organic consumption in CEE NMS. It is necessary to communicate various aspects that affect the prices of organic products, particularly those related to organic standards, to show the benefits of organic food consumption. Differentiation of sale channels and development of processing are crucial to stimulate the demand for organic food in CEE NMS.

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Biography

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Germany (Food Access)

Institutional Framework and Acceptance of the Organic Certification System

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Introduction

In Europe the reliability of organic agriculture is secured by a special EU law, which was introduced in 1992 (EEC No. 2092/91). The main part of the EU regulation is a third party certification system to control the whole organic supply chain. Currently the structure and the accomplishments of this scheme are critically discussed. On a national level, the introduction of a German "organic production law" ("Ökolandbaugesetz"; June 17, 2005) has reformed some important aspects of the system, however, it did not simplify the system. In contrast its excessive bureaucratic requirements were openly criticized.

On the other side, the Agricultural Council agreed on a proposal of the European Commission for a new regulation on organic production and labelling of organic products (COM(2005)0671 final; December 19, 2006). The new regulation aims to integrate organic certification deeper in national control plans and to have a stronger link to the state-run food and feed control regulation (882/2004). Certification procedures by private bodies should be supervised more strictly. In general, the regulation can be interpreted as a step towards a more state-controlled system.

All in all, the institutional framework of the certification scheme is a crucial factor for the further success of organic market. The following paper tries to contribute to this aspect taking the viewpoint of the enterprises which are supervised. In a farmer survey the experiences and attitudes of organic farmers are revealed. A better understanding of farmers' attitudes is necessary to increase acceptance and to guarantee the confidence of the consumers in the organic certification in the long run.

Methods

In July 2005, 126 organic farmers were questioned via an online survey. The sample included larger sized farms (81.5 ha per farm) than the average in Germany. The majority of the farmers (60%) were members of the main German organic association (Bioland). Overall, the sample is a "convenience sample" and does not fulfill all the criteria of representativeness. It includes more "future-oriented" and bigger farms than the average in Germany. However, these farms might be decisive for future developments as larger farms gain more importance due to the structural changes in German agriculture.

Our theoretical foundations are primarily based on the Technology Acceptance Model (TAM) developed by Davis (1989). It is aimed at explaining and predicting the acceptance and use of information systems. To capture the latent variables of this model, different measurement scales were used that had partly been tested in a previous survey about the attitudes towards the QS (QS Qualität und Sicherheit GmbH) system in the German meat sector in 2002 (Jahn and Spiller, 2005).

Results

The results show on the one hand that 41.1 % of the farmers were satisfied with the system and 91.2 % thought that the system is important. On the other hand only 36.5 % agree with the statement that the certification system is motivating. These results indicate that, compared to other certification systems in the food sector (e. g. EurepGAP, QS or International Food Standard (IFS)), the organic system is highly accepted. It, however, is not motivating for the farmers. We used three regression models to get a deeper look into this controversial situation (Table 1).

Interpreting the results of the model 1, the farmers' overall satisfaction with organic certification is higher if they perceive an increased usefulness of the system. Perceived effectiveness considerations are less

important for the evaluation of organic certification than the bureaucratic costs. These results highlight the importance of a good cost/benefit ratio. The lower this ratio, the lower is the satisfaction of the organic farmers with the system. The analysis of the perceived necessity (model 2) showed that the most important factor is the perceived effectiveness of the organic certification system. Only a system which is credible will be able to convince the farmers of its necessity. A negative influence on motivation is associated with the bureaucratic burden involved in the documentation and formalisation procedures (model 3). Two factors could reduce this: better usefulness and increased effectiveness of the system.

Table 1: Results of the regression analysis

	Dependent Variable		
Independent Variable	**Model 1** **Overall satisfaction**	**Model 2** **Perceived necessity**	**Model 3** **Motivation**
Perceived(bureaucratic) costs	-0.307*** (-4.587)	-0.206* (-2.526)	-0.288*** (-4.105)
Perceived effectiveness	0.411*** (3.607)	0.283*** (3.482)	0.261*** (3.729)
Perceived usefulness	0.549*** (8.197)	0.272** (3.340)	0.502*** (7.165)
	adj. R^2 = 0.440 F = 33.747***	adj. R^2 = 0.178 F = 9.979***	adj. R^2 = 0.391 F = 27.491***
*** = p < 0.001. ** = p < 0.01 * = p < 0.05; first value = beta value; second value = t-value			

Source: Authors' calculation

The second topic of our survey deals with the preferred institutional framework, i. e. whether the farmers favour a private or a state-run certification system. Only 8.73 % of the farmers agree that the government should be responsible for the organic certification system. This is a clear statement towards the continuative private governance of the system.

Conclusions

Our research shows that although the majority of the farmers accept the organic certification system, they are not convinced of its cost/usefulness relationship. Especially, the perceived bureaucratic burden of organic certification decreases its acceptance. A higher conviction and motivation are necessary to ensure farmers` diligence in the implementation of the guidelines. Such changes should be accompanied by a proper communication of the costs and benefits incurred in organic certification. The organic producers interviewed evaluated the future development towards more governmental influence and control rather critical. They favour a privately run certification system as an institutional framework. Hence, the enforcement of the new EU regulations, which are aimed at strengthening the influence of public authorities in the scheme, must expected to face opposition.

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Biography

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Germany

Organic Farming and Food Security in Eastern Germany

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Introduction

Within Germany, the importance of organic agriculture has been increasing; however, its adoption varies between regions. Organic agriculture is seen as a way to address rural development issues and high unemployment rates in Eastern Germany. The objective of this work was to gain insight into the regional and local importance of organic farming and then to compare this information with the regional characteristics, problems and chances. The goal was to further evaluate, especially for Eastern Germany, how organic agriculture can contribute to regional sustainable development.

About 14,000 agricultural holdings are under total or partial organic management and the amount of farmland in use was analyzed through country and farm level survey in 1999 and 2005. Additional data was obtained from the German Agricultural Structure Census and a literature review. The investigation calculated the share of organic farms and organic land area as a percent of the total farm land at a county level. Results were presented in a German county map with the help of the Geographical Information System (GIS).

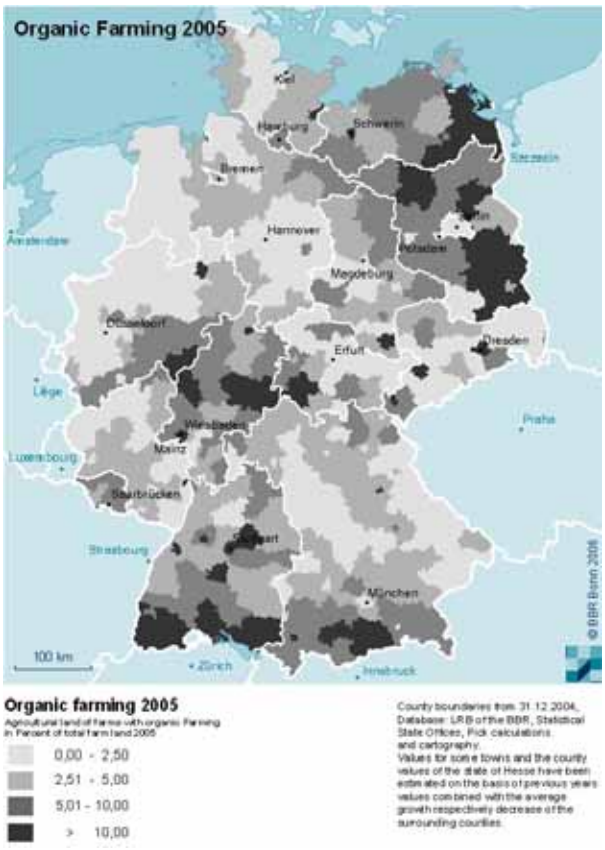
Results

Organic farming in Germany is, as Figure 1 shows, especially important in the temperate north eastern Federal States of Brandenburg (BB) and Mecklenburg-Western Pomerania (MP) and in the southern high mountain regions of Germany as well as in some low mountain range areas like in the State of Hesse. MP has the highest percentage of organic farms and BB has the highest percentage of organically farmed land compared with the other German federal states.

Organic farms in BB deliver most of their produce to about 30 organic supermarkets and almost 90 organic processors in Berlin and the surroundings (BIOwelt 2007). By doing so, the organic sector develops rural as well as rural-urban networks and markets which promots rural income earning and livelihoods through increased access to new market opportunities. Close to MP's beautiful lake landscapes and BB's Biosphere Reserves organic farms are rural non-farm tourism enterprises in addition to environmental services such as nature conservation sites alongside farms. A mixture of conservation sites and farms helps to protect and increase biodiversity which enhances soil and flood protection as well as contributing to sustainable food security. (Mäder et al. 2002 and Nölting 2005)

In contrast to having the highest percent of organically managed land, the State of BB also has the greatest number of hectares designated for growing genetically engineered corn in 2007. Regional actors fear the region's organic image might get lost to some kind of stronghold of the biotech Industry which could in return weaken the strongly growing organic sector within that State. In that aspect, some organic farmers within BB and MP, as well as in many other German States, have decided together with their conventional colleagues to designate so called ge-free regions through voluntary self-commitment. By doing so, farmers maintain their independence from industry patents on plants and follow the will of the German and European Consumers, who by a vast majority prefer natural and organic foods. Moreover, ge-free regions promote self-reliance in terms of food, social emancipation and community control on agriculture and its food systems. Furthermore, ge-free regions promote local biodiversity and participatory seed and breeding systems that are reducing the risk of increasing resistance of pests and diseases by not using ge-plants. Also the official integrated rural development concept of the north eastern BB region of Barnim (Landkreis Barnim 2005) recognizes in some of its proposed sustainable rural development measures ge-free farming as a marketing strategy (Pick 2007).

Figure 1 – Organic farming within Germany 2005



Conclusions

The promotion of organic farming as an important socially, environmentally and economically sound rural and urban development strategy should be intensified rather than being cut as it seems to be the case here and there on German national and federal state level as well as in the legal framework the European Union is setting. This is especially important as long as commodity prices do not reflect the real social, environmental and economic costs by leaving out external production and processing costs. Besides promoting farm and regional organic development projects, this also includes the importance for sufficient funding of organic farming research on local, state, country and international levels.

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Germany

The Contribution of Organic Agriculture to Rural Development - Case studies in Eastern Germany

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Introduction

Many rural areas in Europe are confronted with enormous challenges due to the ongoing transformation of the agricultural sector and the loss of economic importance and jobs in this sector. As a consequence, the role of agriculture and its further development in the context of rural areas has been discussed intensely in the European Union. New strategies for rural development have focussed on multifunctional agriculture and heterogeneous actor-networks (Ploeg et al. 2002; Bryden & Hart 2004). Against this background, organic agriculture is discussed as being an important development path for rural areas because it produces healthy food through sustainble agriculture methods, generates income and integrates with various other economic, environmental and socio-cultural activities in rural areas (Pugliese 2001).

This paper discusses the potential roles organic agriculture can play in strategies for sustainable rural development. It focuses on rural areas in the federal states of Brandenburg and Mecklenburg-Western Pomerania in eastern Germany. Both regions are confronted with similar, severe problems such as high unemployment rates, migration of young people and a continuous loss of economic and social infrastructure.

The quantitative and qualitative results of two research projects are presented. The "Regional Wealth Reconsidered"[3] project analysed the societal contributions made by the organic sector in Brandenburg. A total of one third of the organic farms in the region (n=207) responded to a quantitative survey made in 2004. The "The Turn-Around in German Agrarian Policy: New Forms of Food Consumption?"[4] project identified different types of organic farms in Mecklenburg-Western Pomerania, depending on their structure and motives for producing organic food, based on 35 qualitative interviews with farmers in 2004.

Results

German reunification has caused a drastic transformation of the East German agricultural sector within a very short period of time. Since 1990, the number of employees in the agricultural sector of north-eastern Germany has been reduced by 80 percent. However, at the same time, organic agriculture has been developing successfully. At present, almost 10 percent of the agricultural area in this region is cultivated organically. In comparison to western Germany, a new type of organic farm has developed, which is characterised by a greater average size (164 ha, in comparison to 31 ha in western Germany) with more specialised production. In addition, the products are often not sold solely within the region, but all over Germany.

The quantitative survey for Brandenburg shows that enterprises in the organic sector can play an important role in rural development. Some data illustrates this potential including:

- 36 % of the farms have stable trading relations in the region and thus contribute to regional added value. A significant number of the farms are also engaged in processing or trading food themselves, providing tourism facilities or doing landscape cultivation.
- 39 % of the farms are active members of non-governmental organisations or regional networks (e.g. LEADER). Over half of the farms support these organisations with funding or material help. Involvement in these organisations or networks often results in joint regional marketing, tourism or environmental protection projects.
- Half of the farms undertake communicative measures such as providing information to the public via flyers or websites, holding open days, or participating in regional festivities. With these activities,

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they contribute toward spreading knowledge about healthy food and environmentally sound agriculture.
- More than 60 % of the farms are active in preserving biotopes and species by planting hedges, installing wetlands etc. With these activities, they contribute towards a diverse landscape.

However, the organic sector has grown rapidly and is no longer homogeneous. Based on a qualitative analysis, five different types of organic farms can be distinguished in Mecklenburg-Western Pomerania. While the "idealists" have turned to organic farming as part of a holistic lifestyle, the main motive of the "pragmatists" was to save the existence of the farm during the transformation process. Other types identified were "the marketing strategists", "the minimalists" and "the experimentalists" according to differences in their structures, motives, and the extent to which they were embedded into the surrounding region. These types of farms can contribute in different ways towards regional development. Idealists, for example, are often engaged in direct marketing and therefore have close contact with consumers. Because of their own convictions, they are very motivated to spread information about healthy food and organic agriculture. The pragmatists, who were often managers of former collective farms, have chosen organic agriculture because it seemed to be a realistic option for restructuring the farm. As a result of their former positions, they feel very responsible for the region and the unemployed and are very active in regional networks and associations, without any idealistic limitations.

Conclusion

The results of the two projects show that the organic sector has the broad potential to support sustainable rural development, even in rural areas under heavy pressure. Because of their specific orientation – the environmentally sound production of high quality food – they link up easily with other economic, social and ecological activities. Due to this multifunctional, diversified approach, many organic farmers are inclined to be involved in networks, in the diffusion of information, and in additional ecological measures. They also have interests in common with other regional actors concerning regional marketing, landscape protection or eco-tourism projects. The integration of organic farms into rural development strategies in the EU seems therefore to give rise to synergies. Last but not least, the organic sector represents a development path that is sustainable at a global level, because it provides a vision of environmentally friendly agriculture and healthy nutrition in industrialised countries which is not detrimental to other regions (Halberg et al. 2006).

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India (Food Access)

Off Season Organic Vegetables: A Potential Source of Household Food Security

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Introduction

Agriculture production within India had increased after 1960 onwards but stagnated by the year 2000. The dependency of farmers on the purchase of improved varieties of seeds and chemical inputs led to rural debt. The increase in resistance power of many insects and pests further led to complete crop failure in states like Maharastra, Punjab and Andhra Pradesh. Poor farmers are getting trapped in vicious cycles of debt trap and many farmers, unable to repay these loans, are drinking chemical pesticides for family suicides (Nagarajan 2006).

Agricultural approaches emphasizing technological packages have generally required resources to which most of the hill farmers have no access. Conventional technology is expensive and nonaffordable by rural farmers. Sustainability is increasingly seen as a key element in agricultural development. Sustainable production is threatened by a range of, often inter-related, environmental hazards frequently resulting from previous development efforts. These include soil erosion, soil depletion, salination, depletion of ground water resources, deforestation, desertification and resistance to pest and diseases. Due to low production and a decrease in market prices for crops, farmers are forced to sell their animals to repay their loans which were intitally taken to purchase chemical fertilizers. A request for financial support was submitted to Department of Bio-Technology under Ministry of Science and Technology, Government of India and was accepted. The project was called "*To involve women and SC/ST farmers through demonstration and extension activities for production of off- season vegetables under organic agriculture*".

The project was started in April 2005 for a period of two years within District Champawat of Uttrakhand State in India. The cluster of SC/ST villages (i.e Khuna Bhora, Khuna Ballai, Balai, Chaura, Rajpura, Koflang, Funger, Maneshwer, Kamela, Durga sethi, Punethi and Shaktipur) were located at 5000 to 7000 feet about sea level with mild cold weather throughout the year was selected. Two hundred women farmers of 10 Self Help Groups attended the Organic Agriculture training workshops. The following include a description of the main topics were covered during the training.

Principles and guidelines for organic agriculture and animal production
Animal disease calendar, feed /fodder availability calendar, bio- resources flow and economic resources flow, cropping calendar, annual farm work or labour calendar and development of model for future organic farming. Composting, vermicomposting, bio-fertilizers like Trichoderma, Azetobector, phospho solubilizers, bio-insecticides (i.e. *Beauveria* and Pheromone traps) and other modern bio technologies important for adopting organic agriculture such as the use of hail nets and poly tunnels.

Training in progress

Demonstration on vermicompost

Results

Kumaon region of Uttrakhand state in India has a rich heritage of agricultural traditions that are suitable for designing organic production systems. Sophisticated crop rotation or mixed cropping patterns facilitate the management of pests, diseases and nutrient recycling. It is strong in high quality production of certain crops like off-season vegetables, tea, spices, rice and herbs. Compared to input costs, labor is relatively cheap in this region, thus favoring the conversion to less input-dependent, but more labor-intensive production systems.

The animals are usually kept around the homestead. Livestock production is an integral component of the farming system. Every household keeps some livestock. Important livestock include cows, buffalos, goats, sheep, pigs, donkeys and poultry. These animals are kept for food, cash or draught power. Cows provide the household with milk and milk products. Oxen are valuable for land preparation whereas small ruminants are additional source of income and meat. The cow dung collected from the animals is generally used for fuel and a limited amount applied to vegetable crops. Farmers see the availability of improved organic seeds as a constraint, only few farmers can afford good quality seeds because of their higher price. The availability of vegetables and forage seeds is a great constraint for crop diversification. There is lack of information regarding organic technologies in the area. Potato blight, wheat smut and Khaira are some of the common diseases found in the crops grown in the area. Many modern agricultural practices which progressively degrade these resources cannot be sustained in the long term. Through this organic project, farmers were trained to use biotechnologies like bio-fertilizers, bio-pesticides, vermicomposting and nadep compost. The SHGs were clubbed into federation and election of board members and registration of cooperative society namely " Shri Maneshwar Grameen Swayat Shakarita Ltd. Champawat" was completed.

Table 1: The cropping and labour calendar of in project area

	April	May	June	July	Aug	Sept
Vegetable crops grown	Garlic	Chilli, brinjal and ladyfinger	Ladyfinger	Peas and Tomato	Potato And cauliflower	Potato And cauliflower
Farm activity	Sowing potato	Harvesting Wheat	Sowing Madua, Soya bean	Sowing Beans and other Pulses	Weeding in Wheat and Maize	Weeding in fields

	Oct	Nov	Dec	Jan	Feb	March
Crops grown	Cucumber,Pumpkin, Bottlegroud, Brinjal and Banana	Madua, Paddy harvesting	Carrot and Radish	Spinach	Spinach	Fenugreek, Garlic, Coriander
Farm activity	Harvesting Soyabean and other pulses	Cutting grass for fodder and sowing of Wheat	Cutting wood for winter	Cutting wood for winter	Sowing of Potato	Spreading Farm Yard Manure (FYM) in fields

After training, farmers started organic off-season vegetables in their respective farms. The organic produce was consumed by the farmers themselves and was also sold locally through the cooperative in Champawat market. The middlemen were eliminated in this process and the consumers got fresh organic vegetables at lower price and the farmers received high prices for organic produce.

Conclusions

The cultivation of off-season vegetables through organic agriculture technologies benefited almost all the farmers. The entrepreneurship on organic off-season vegetables certainly helped for the livelihood of rural poor farmers. The adoption of these organic agriculture technologies contributed significantly to household

food security and increased income of farm family leading to welfare of rural masses in the Hills of Uttarakhand state in India.

Table 2: The price difference for organic and conventional vegetables

Name of vegetables	Price of conventional vegetable when sold to middlemen before the project (in Rs)	Price of organic vegetable when sold through cooperative in the project (in Rs)
Tomato	3 – 5 / Kg	12-15/kg
Cauliflower	5- 7/ kg	14-18/kg
Cabbage	4-6 /Kg	14-16 /kg
Radish	1-2 /Kg	5-7 /Kg
Beans	3-5 /Kg	15-18/kg
Peas	4-6 /Kg	15-18/Kg
Lady Finger	3- 4/Kg	10-12/Kg

However the challenge is how to increase yields with maximum use of biological inputs such as integrated pest management and fertilizer nitrogen fixed in the soil by bacteria. Vegetables are perishable items, they have very short self life thus it requires ready market or food preservation and processing facility at local level which is not present at most of the places. The state government should provide organic inputs at subsidized rates to the organic cooperatives.

The farmers are not aware with the scientific as well as systematic approach for organic agriculture management of farm. So, the first and foremost approach is to make them accustomed with such up to date techno-economic feasible programmes on organic agriculture development. For this massive extension works and support from state government for capacity building of local NGO's are needed.

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Biography

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Working in Uttrakhand State in India for last fifteen years to ensure rural development and shape environment friendly life styles through public opinion and lobbying with decision makers. Committed to provide services for production, processing and marketing, which stimulate environment friendly and economically sound technologies that pays better prices to producers.

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Actively associated with community development programmes focusing on rural sector, gender, and education. Development of booklets for rural women, participated in many national and international seminars and published several articles on women of Uttrakhand and rural development issues.

India (Food Access)

Organic vis -a -vis Conventional Livestock Production Potential in India

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Introduction

The organic land in India is approximately 150 790 hectares spread over 1 547 farms constituting 0.1% of total agricultural land (Willer and Yussefi, 2007). India exported 35 organic products worth US$ 21 Million during 2004- 05 (Gouri, 2006), but these products did not have any item of animal origin except honey. The Indian authorities managed to acquire both United State Department of Agriculture (USDA) equivalence for the National Organic Programme (NOP) and the European Union (EU) third country listing in 2006 which indicates significant progress India has made regarding organic farming (Wai, 2007). Indian agriculture is characterized by small scale (<2ha), subsistence farming operations under low input low output production systems, where, livestock are essentially integrated with crop farming. Thus, alongside organic crop production, the prospects for organic livestock production are bright though yet to be explored (Chander & Mukherjee, 2005).

Under an on-going research project (2005-08) at Indian Veterinary Research Institute, information is being collected by the authors using interview schedule containing 40 questions from farmers across different agro-climatic zones for the type of existing farming operations including level of input use in crops as well as livestock production to determine the most appropriate areas and types of farmers to begin organic livestock operations. The data are being collected through *Krishi Vigyan Kendra* (KVK-Farm Science Centres) under the control of Indian Council of Agricultural Research (ICAR).

Results

The information so far received from 2220 farmers through 37 KVKs located in the states of Rajasthan, Gujarat, Punjab, Orissa, Madhya Pradesh, Chattisgarh, falling in different agro-climatic zones reveal that the level of input use is almost negligible especially in case of livestock; antibiotics, anti-helmintics, and other market purchased inputs are not in much use in dryland areas of India. Out of 2220 farmers, there were 61.62% marginal farmers (<1ha). Only 96.78% of the marginal farmers were having the irrigation facility, which discourage the high use of chemical input in such condition. Most of the farmers surveyed (95%) were not aware about the NPK status in their soil. Since the area of survey had mixed farming system, almost all the farmers were keeping livestock, 100% of them were applying compost/FYM in their land, while a few (3.7%) have recently started applying vermi compost also. Extent of chemical fertilizer(NPK) use per hectare (ha)by all the respondents were below the all India average of 90.12 Kg/ha.(http://agricoop.nic.in/statistics2003/chap15.htm#chap156b). It was further less for marginal and small (1-2 ha) land holders. The expenditure on chemical fertilizer and chemical plant protectants was almost negligible. 21.66 % of the farmers were not using any chemical fertilizer and 57.02% farmers were incurring less than INR 500 (US$11) on chemical fertilizers, whereas, 75.58 % of the farmers were not applying any chemical plant proctectants. Most of the farmers surveyed were using local crop varieties and raising native breed of cattle, buffalo, sheep, goat and poultry. Livestock were mainly raised on crop residues and grazing with little external inputs from market. A majority of farmers (87.38%) reported that they don't spend any amount on veterinary medicines for their animal and rest of them were incurring expenditure ranging from INR100 (US$ 2) to INR 2000 (US$45) only. Most of the respondent farmers (71.44%) had heard about organic farming and some were willing to convert their farm to organic. The respondents expressed in affirmative that chemical based farming was bad.

Conclusion

India is rapidly moving ahead with its organic production programme, wherein, Non-Government Organizations, private sector and government agencies are actively promoting organic farming though organic livestock production *per se* has not yet taken of in India. The growing realization that high dependence on mono cropping and chemicals is non sustainable has led to renewed interest in livestock as a sustainable resource especially in rain-fed areas. In rain-fed areas, livestock mostly local ones is mainstay of millions of Indian small scale farmers, where, crops often fail but livestock sustain the life of poor farmers. This study indicates that there is comparative advantage for Indian farmers in switching over to organic livestock farming vis-a vis input intensive livestock production especially in dryland areas like the states of Rajasthan, parts of Gujarat, Madhya Pradesh, Orissa and the states in North Eastern region. In such areas, locally available resources are used mostly by the majority of small farmers making the farming more or less 'Organic', not by choice but by the default.

Owing to extremely small size of land holdings, the farmers often find it difficult to buy inputs like pesticides, chemical fertilizers, weedicides, hybrid seeds, allopathic veterinary medicines, antibiotics etc. Moreover, it has been observed that when farmers depend on market for purchase of inputs like expensive chemical plant protectants, fertilizers, veterinary medicines and improved feeds required more in case of cash crops and high yielding improved breeds, they do so by taking loans from moneylenders or banks which they find hard to repay, leading to crisis like committing suicides. Under the circumstances, the prospects for organic livestock farming appear to be bright in comparison to intensive livestock production especially in dryland areas of India.

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India (Indonesia and the Philippines)

Sustainable Agriculture as Potential Tool for Poverty Reduction in Asia

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Introduction

This paper is a documentation of a development project of Asia-Japan Partnership Network for Poverty Reduction's (AJPN) called *Enhancing Capacities on Sustainable Agriculture towards Poverty Reduction* implemented from April 2004 to March 2006. The goal of the project was to reduce poverty by enabling rural communities to use sustainable farming technologies. The project covered six farming communities in India, Indonesia, and the Philippines. It trained a total of 520 farmers with 428 farmers adopting various forms of sustainable farming practices. In India, the sites are situated in Kaimur, Bihar and Pulicherla Mandal, Chitoor District, Andra Pradesh. The Bihar site is located in a mountain and the project partners planted pigeon pea, wheat and tomato while in Andhra Pradesh the site is semi-arid lowland producing vegetables. The two sites in Indonesia are both humid upland located in Banjarnegara, Central Java and Kulon Progo, Jogjakarta producing cassava, rice, corn, lima bean and zallaca fruit. In the Philippines, one site is situated in irrigated lowland in Valencia, Bukidnon with rice as the major crop. The other site is in President Quirino, Sultan Kudarat. It is non-irrigated lowland area planted to sugar cane. Site activities were identified following a site resource development planning activity, making the process highly demand-driven. To provide a framework for the six sites, 10 common activities were implemented.

Results

A survey was conducted to assess project impact. Four indicators guided the quantitative documentation of the project experience: yield, production cost, labor inputs, and product selling price.

With sustainable agriculture, yield increases over time. Selected crops in four project sites have shown significant increases in yield. Rice, the staple food and the common crop among the project sites, responded favorably to sustainable farming technologies. Rice yield per hectare increased significantly from 7% to 10% in three of four project sites under organic management. The main and common intervention was the use of organic fertilizers and reduction in the use of chemicals for pest control. In the case of Bukidnon, infestation caused a slight decrease in production, yet the harvest remained at par with conventional rice harvests in the area. The other major crops in India, such as wheat, pea and tomato, also showed significant increases in yield. The farmers attributed this performance, especially of pea and tomatoes, to the use of greater amounts of organic fertilizers and new seed varieties.

Table 1. Yield per hectare of rice and other crops before and during the project

	Yield per hectare (kg)			
Crop	Before the project	During the project	% Difference	project Site
Rice	6,124.60	6,591.18	7.08%	Bihar
	4,551.06	4,932.46	8.38%	Banjarnegara
	2,105.42	2,330.34	10.70%	Jogyakarta
	4,063.95	4,049.00	(0.37%)	Bukidnon
Wheat	3,115.57	3,470.44	10.23%	Bihar
Pigeon Pea	803.70	1,274.96	58.64%	Bihar
Tomato	14,822.22	20,034.13	35.16%	Bihar
Cassava	13,989.39	14,029.05	0.28%	Jogyakarta
Corn	3,122.73	4,131.48	32.30%	Jogyakarta
Lima Bean	825.00	858.33	4.04%	Jogyakarta

Production cost increased following the shift to sustainable agriculture. The project hypothesized that production costs would be drastically cut down following the shift to sustainable agriculture. The project, based on initial results, recorded the opposite effect. In rice, most of the project sites reported higher production costs during the project, except for Bukidnon, which incurred 17% lower production costs. The rest spent 12% to 23% more on production with the shift to sustainable agriculture.

Table 2. Production cost of rice in selected sites before and during the project

	Production cost* per hectare		
project site	Before the project	During the project	% Difference
Parmalpur	17,294.08	21,285.42	23.08%
Banjarnegara	2,465,788.46	2,916,288.46	18.27%
Jogjakarta	237,342.11	267,526.32	12.7%
Bukidnon	12,090.51	10,028.53	-17.05%

* in local currencies

The increase in production cost was particularly attributed to the use of organic fertilizers. Specific reasons cited include:

- Most farmer beneficiaries are still learning how to make use of local resources as organic fertilizers.
- Farmers who prepared their own organic fertilizers spent more, as they had to pay people to collect local materials.
- Bigger volumes of organic fertilizer are required to meet the nutrient requirements of degraded farmlands.

Organic products can command higher prices but require appropriate marketing strategies

Only three of the six project sites had made a deliberate attempt to market their products. The marketing of muscovado sugar produced in Sultan Kudarat and of organic rice from Bukidnon, Philippines are the more notable examples of such efforts. The other crops, which had also been produced without chemicals, had not been marketed as such and are currently priced no differently from conventional food items. The experience of farmers in Sultan Kudarat showed that upgrading product quality and establishing better market linkages have a positive effect on price. Initial investments in muscovado processing justified the price increase, and yielded a net return on investment of 15.3%.

Conclusions

Sustainable agriculture as a tool for poverty reduction

The project has demonstrated the potential of sustainable agriculture in raising farm productivity. The premium prices for organic products had also contributed significantly to increasing farm incomes. But while sustainable agriculture requires less external input, it requires time and resources to enhance farmers' capacities. It is knowledge intensive.

Engaging the market

The increasing demand for organic products favors the mainstreaming of sustainable agriculture. However, engaging the market imposes strict requirements on producers, specifically in regard to volume, regularity of supply, consistency in product quality, and packaging. This presents a major challenge to small and marginal farmers who cultivate small parcels of land to consolidate their products and reduce transaction costs.

Sharing the benefits of sustainable agriculture

It has been stressed that economic growth alone will be insufficient to achieve the goal of halving poverty. Thus, equal emphasis should be given to creating conditions under which the rural poor can increase their share of benefits in increased farm productivity.

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India (Food Access)

Organic Farming Offering Opportunity of Income Security among Small Farmers of India: A Country Wide Study

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Introduction

Small farmers of India across several agroecological zones are today searching for farming alternatives to diversify and improve their income security. In this context organic farming is emerging as a promising option for small and marginal farmers of India inhabiting rain fed areas, arid zones and hilly and mountain areas (Partap, 2006; Partap et al 2006). Already Indian farmers have taken the organic movement further by expanding the area up to 500,000 hectares (Partap, 2006). The study investigated the 'cost of organic cultivation' in different agroecological zones of India. Twenty-six villages across the country were selected in such a manner that they fairly represented different farming systems in different agro ecological zones. A sample of 376 farmers was randomly selected of which 199 were organic farmers and 177 were farmers practicing conventional farming. Methodology included a structured questionnaire, personal interviews and group interactions for gathering data and qualitative information.

Results

The study demonstrated that improving income security was a key motivating factor behind adoption of organic farming by small farmers. Highlights of the survey findings are;

- The main motive of farmers is income security. They try to reduce the costs and increase net returns from crops. The comparative cost benefit analysis of organic and conventional farming indicates that organic farming offers more economic security than conventional farming..
- Crop farming in hilly areas is a negative proposition. However, in the hills almost all the crops grown conventionally are resulting in net loss to farmers. The net profits to organic farmers are higher but the difference is not very significant and varies between 2-20%.
- Organic farming resulted in 10-80% reduction in health related expenditure.
- 20-85% farmers reported increase in on-farm fodder supply as a result of organic farming. Up to 50% farmers reported better animal health due to organic fodder.
- The cost of production of coconut is about 20% higher and net profits 355 lower for conventional farmers. In fact, the cost of production is invariably higher for conventional producers by 15-23 % and net profits lower by 4-21% in all other crops.
- The cost of production of apples using conventional ways is 21 % higher as compared to organic apples.
- The costs and returns for plantation crops indicate cost of production was lower by 4-31% for conventional farmers and net profits higher by 5-37%.
- The study revealed that turning to organic farming is wiser step of farmers so as to increase farm profitability and income security in rain fed and irrigated areas.
- The cost of production of cotton is 60% higher for conventional farmers.Conventional cotton farmers incur a loss of about Rs.9800 per hectare whereas the organic cotton producers get a net income of about Rs. 8000 per hectare.
- The net return of conventional farmers by producing soybean was also 103% lower as compared to organic farmers.
- The conventional farmers of medicinal and aromatic plants farming system and vegetable farming systems appear to be better placed in terms of productivity, cost of cultivation and farm profits. The net returns were significantly higher in case of tea (74%) and potato (24%), almost same for medicinal and aromatic plants (-0.58%) and lower in case of cabbage (-10.42%).
- Under irrigated mixed farming system the productivity of coconut is 5%, banana 3% and sugar cane 6% lower on conventional farms. The productivity of paddy is 40 % higher on conventional farms.

- The productivity of food and cash crops was lower on conventional farms in case of pearl millets (-10.71%), castor (-4.34%), cumin (-8.00%) and brown mustard (-1.64%).
- The productivity of medicinal and aromatic plants was 0.85% higher on conventional farms but the market and overall economic returns were promising for organic produce.
- The productivity of potato and cabbage was 14.28 and 19.23% higher on conventional farms in the initial years, until the soil fertility could build up.
- Farm productivity may decline by 40% with 30% excess rain fall under plantation cash crop system, the decline being as high as 70% on conventional farms. With 30% decline in rainfall the productivity may decline up to 60% on organic farms and 80% on conventional farms.
- In rain fed areas organic crops were vulnerable to productivity losses up to 30% with deficient rainfall of 50%. With 30% excess rainfall the loss may be 20 and 30% respectively on organic and conventional farms.

Conclusions

The study reveals that organic farming is spreading fast to many agro-ecological zones of India, most notably to rain fed areas, hills and arid zones. Small farmers are showing preference for organic farming practices because it reduces their cost of cultivation, in several cases bringing it down to little cash input costs; provides more employment to members of the farming families, specially those who are engaged in commercial cultivation of organic cash crops; and the better prices organic produce fetches. The declines in productivity or no effect on yields is over turned by better prices farmers get for their organic produce (Partap 2006).

The study provides enough evidence to counter the arguments that organic farming is not as productive and may bring food and income security among farmers. The results confirm that it is not so. The yields may be lower or same but the reduced cost of cultivation and better pricing will always make organic farming a better choice. Yield is not always lower, once the soil health is improved the cost of cultivation and farm operations further declines and farmers are able to save income.

Another study on India's organic market potential revealed that the demand for organic products may be too huge for still meager supplies. The estimates are that in 2006 there was a potential organic market worth Indian Rs 23000 million as against actual market supplies of about Rs 500 million. That means good news for Indian organic farmers. Increasing demand for organic products will support continuing better prices and therefore an alternative new opportunity for the farm families to improve their income security. More and more farmers in India are now diversifying their farming practices to earn more money so as to make family livelihoods secure. It indicates that they care more for alternatives which help them reduce cost of farming operations and provide them better income from sales of the produce and for this purpose organic farming remains a better choice..

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India (Food Access)

Registered Organic Farmers in Uttarakhand state of India: A profile

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Introduction

Organic farming has been an area of priority attention during the five year plan (2002-07) of India and it is likely to be an area of attention during the future plan (2007-12). Agencies in the private sector, NGOs and government bodies are actively promoting organic agriculture in the country resulting in a surge in export of organic agricultural products from India (21 million US$ during 2004-05). Encouraged by the favorable policy environment at the level of Central government, the state governments too are encouraged to create policies to promote organic farming. In this regard,, states in mountainous regions are particularly active as is evident from the fact that three states namely Uttarakhand, Sikkim and Mizoram have already declared themselves as organic states. These states have taken a number of initiatives to give a formal shape and a push to organic farming activities by gearing up the personnel and resources towards organic farming development. Uttrakhand state being the first state to declare itself an organic state has become almost a model state as far as organic agriculture is concerned. The authors conducted a survey of 180 registered farmers in Uttarakhand state during 2006-07.

Uttarakhand state (77^{o} 34' and 81^{o} 02'E longitude and 28^{o} 43' to 31^{o} 27' latitude) has 4000 organic farmers who are registered with Uttarakhand Organic Commodity Board (UOCB). These farmers are engaged in organic production of Basmati rice, *Rajma(*Kidney bean*)*, spices like turmeric, red chillies which are in good export demand along with wheat, soybean, finger millet (*Madua)*, *jower* and vegetables like cabbage, green peas which have local demand and high premium prices. The authors as a part of the doctoral dissertation of the first author conducted a random survey of 180 organic farmers drawn from 18 villages spread over three districts out of 13 districts in the state. An attempt was made to document the profile of the organic farmers and their response to organic farming.

Results

The average age of the organic farmer in the study area was 42.4 years and majority (68.34 %) belongs to higher castes. Around 75.56 percent of respondents have primary education and above. Majority (62.78 %) of registered organic farmers were with medium level of farming experience i.e. between 11 to 35 years, whereas, the average experience in organic farming was only 3.8 years. The average land holding of farmers was 0.98 hectares, whereas, the average land converted to organic farming was 0.343 hectares accounting to 35 percent of land under conversion. All the farmers were with mixed farming, whereas, 64.65 percent of the farmers would like to continue in the same enterprise in the future also. However, 18.33 percent of the respondents and 8.89 percent of the respondents would like to go for specialized organic dairy enterprise and goat farming enterprises, respectively along with continuation of their mixed farming enterprise. Most (82.78%) of the farmers kept cattle in their farm followed by buffalo (73.00%) and goat (49.00%). Nearly 87 percent of the farmers kept more than one species; whereas, 47.22 percent of the farmers maintain 3 or more species which is indicating diversity of their farms (one of the pre-requisites of organic farming).

The majority (63.89%) of the registered organic farmers were in traditional farming before taking up organic farming, whereas, 19.44 percent of the farmers partly converted to conventional farming followed by 16.67 percent farmers in conventional farming. All the farmers received training on the importance of organic farming and on compost making technologies like vermi compost, Vermi wash, B.D compost and CPP (Cow Pit Pat) etc., along with crop rotation practices which is much emphasized in organic agriculture to enhance and protect the soil fertility. Around 61.67 percent of farmers with medium level of innovativeness followed by 23.33 percent of farmers with high innovativeness, indicating that the farmers will be more innovative and readily accept the agriculture systems which are compatible with their agro-ecological regions and also with culture, beliefs and values. The highest ranked farming goals (88.33 %) were continuation of their

traditional farming practices along with added technology of organic production systems and also to have reliable and stable income through organic farming. However, production of tasty and safe products (57.22 %) and for a sustainable and friendly farming (55.00 %) were the most widely present goals among the most. The World Bank supported Diversified Agriculture Support project (DASP) and Uttarakhand Organic Commodity Board (UOCB) have motivated most (89.44 %) of the farmers to convert to organic farming, whereas, influence of neighbor farmers was up to the extent of 60.55 percent. Among the farm related factors, sustainability of farm resources (81.66 %) and satisfaction with the values of organic farming (87.22 %) as personal factor led the farmers to convert to organic farming. Stable and reliable income (77.22 %) followed by price premiums (72.77 %) were among the economic factors in motivating the farmers as observed by other workers (Duram, 1999 and Maurer, 1997) as well.

Conclusion

The Uttarakhand state is moving systematically towards organic farming development with full government support. UOCB could facilitate sale of certified organic products worth Indian Rupees (INR) 198.3 Lakhs (4,63,746 US$) during 2003-06 (Shah, 2006). The registered farmers are currently motivated mainly due to the expectation of price premiums followed by other reasons. The state targets for certification of more than one hundred thousand farmers over similar number of hectares by the year 2010. The experiences gained by the state in its farmers may be of potential importance to the states, regions and farmers willing to switch over to organic farming in future. The authors found the case worth replicating in other parts of the world.

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India (Food Availability)

LEISA – A Step Towards Organic Farming in Semi Arid Regions

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Introduction

In the Deccan Plateau, South India, shrinking farm holdings, vegetation loss, soil erosion and ground water depletion are rendering ecosystems fragile resulting in negative repercussions on farms and agriculture. The Plateau is a semi arid rain-shadow region, where the land use patterns, especially in the case of dry farming, is making food security increasingly elusive.

Agriulture Man and the Environment Foundation (AMEF) is a development oriented NGO that seeks to address dry farming issues by promoting Low External Input Sustainable Agriculture (LEISA), as a step towards organic agriculture. LEISA promotion is aimed at improving livelihoods of resource poor families and restoring ecological balances. Presently, AMEF works with 5000 farmers, involving 43 associates, including NGOs and CBOs, in 11 districts of three states of Andhra Pradesh, Karnataka and Tamil Nadu. In helping farmers generate locally appropriate 'alternative farming practices', it focuses on five major tasks:

- On-farm rainwater management;
- Upgrading soil productivity;
- Modified cropping systems;
- Improving environmental support;
- Combining income generation activities.

Participatory approaches, like Farmer Field School (FFS) and Participatory Technology Development (PTD), are adopted for empowering farmers in the journey towards organic farming. In the year 2006, over 190 season-long FFS events in LEISA were conducted covering 13 different crops involving over 3500 farmers. This paper presents the experiences of AMEF- FAO partnership project 'Promoting Livelihood Improvements in Dryland Farming on the Deccan Plateau' since 2005.

Outcome 1: Better natural resource managment with alternative farming practices

Conservation of natural resources like rainwater and soil was achieved through sets of combination of practices like summer ploughing, ploughing across the slope; building soil fertility through organic means like FYM, vermicomposting; suitable crop combinations and production practices. Intercropping with pigeon pea and green gram has broken the system of cash crop monocropping. Trap crops like Marigold and okra have helped with managing pest populations. Seed treatment with biologicals has resulted in reduction in pesticide use and cost. The adoption of more sustainable farming practices has led to improved yields and net returns for farmers (Table 1).

Table .1 Change (%) in crop yields, cultivation costs and returns (INR/ Acre) as compared to farmer practice (Control)

Crop	Location	Yield Increase (%)	Cost Reduction (Rs)	Increased Net Returns (Rs)
Tomato	Dharmapuri	-	13065	5315 ($121)
Cotton	Raichur	20%	449	1751 ($40)
Cotton	Mahbubnagar	11%	1720	3620 ($82)
Paddy	Mahbubnagar	11%	397	1923 ($44)
Maize	Mahbubnagar	19.6%	87	1489 ($34)

Outcome 2: On-farm resource recycling

Resource-constrained farmers are recycling farm resources and converting crop residues into organic manure instead of burning them. Farmers are raising multipurpose trees, generating additional plant biomass, improving crop diversity and income. Composting and vermicomposting methods have become quite popular with about 2700 farmers. Besides applying it on the farm, some farmers are generating incomes by selling vermicompost. For instance, in Chandranna, a small farmer earned a lakh of rupees from the sale of earthworms and vermicompost in three years.

Outcome 3: Improved food security

Towards improving food security, food crops are being included with cash crops. In Bellary, about 50 farmers have grown finger millet as strip crop in groundnut. Besides getting Rs. 5507/ac, from groundnuts, the family got 125 kg finger millet for consumption. Also, more than 400 women have taken up kitchen gardening, improving the nutritional security.

Outcome 4: Scaling up through participatory learning processes

Addressing dry farming issues require a holistic approach – be it technology or methodology. With this in mind, a Training of Facilitators (ToF) in FFS was designed to prepare facilitators and to reach as many farmers as possible. The features of ToF were, (a) broad-based curriculum beyond IPM, (b) Practice FFSs by participants applying their learnings with the farmers. AMEF, in the year 2006, has conducted two ToF events in Dharmapuri, Tamil Nadu and Bijapur, Karnataka. In Dharmapuri, 32 Community Resource Persons (CRPs) were trained in the event. FFSs in 43 villages involved about 900 farmers across Dharmapuri and Krishnagiri districts of Tamil Nadu**,** of which 799 (90%) women. Some of the practices adopted as a result of the training are listed in Table 2. The trained CRPs would now work for over 2300 household groups, formed by MYRADA, covering about 40,000 families, promoting LEISA through FFS approach.

Table. 2. Adoption of alternative practices by farmers of Practice FFS in Dharmapuri

Alternative practice	No. of farmers
Biological seed treatment	560
Kitchen gardening	498
Intercrops	442
Sowing across the slope	330
Azolla production	265
Use of good quality seeds	226

The key to success was the holistic approach – systematically combining aspects like water management, soil fertility improvement and crop management and developing appropriate training content for specific crops and locations. However, the FFS approach has its own limitations. It is time, cost and staff intensive, apart from the difficulty in preparing a large pool of skilled facilitators requiring adequate funding.

Conclusions

Sustainable dry farming is possible only when the scarce natural resources soil, water and crop biodiversity are properly managed. Recognising farmers as the end-users of the natural resources, AMEF has worked towards building their capacities through participatory learning processes in proper conservation and utilisation of natural resources on and around the farms.

Addressing the widely prevalent monocropping practices was one of the major interventions. In the process, inclusion and revival of small millets (foxtail millet and finger millet) and pulses (green gram, cowpea), has enhanced the food security status.

After two years of project intervention in promoting systematics of SA, ecofarming bases of practising farmers are serving as training grounds and replicable models. AMEF strongly believes that farmer capacity building in LEISA through participatory approaches is the most effective way to address dry farming problems. Programmes based on alternative approaches which are innovative and empowering need to be sustained for visible impacts on a large scale.

Biography

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India (Food Availability)

Organic Agriculture Production – A Case Study of Karnal District of Haryana State of India

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The "inherent and latent effects" of intensive agriculture leading to higher crop production at the cost of lowering of water table, poor soil health and environmental degradation had called for the attention of the scientists, policy makers and the producers all over the world to look for newer strategies to attain organic agriculture. The Haryana State of Northern India has contributed significantly to increased crop production through "Green Revolution" but the "ill-effects" of the intensive farming have called for newer agricultural technologies. In the recent past, organic agriculture has been advocated and publicized among the farmers in the district by the extension agencies, which has shown positive impacts. The findings have been presented and discussed in this paper.

Karnal district has loamy to silt clay loam soils, good quality underground water and moderate (500-700 mm) rainfall and has temperate and irrigated land conditions. In 2005, the district had 434 villages spread over an area of 2, 46,026 hectares having 84,982 farm families. Out of the total geographical area 1, 94,900 hectares was net cultivated, 93,200 hectares was net irrigated and 3,50,820 hectares was copped area having cropping intensity of 180 percent.

In the identified seven types of farming systems, cultivation of rice and wheat are the dominated crops which were grown in an area of 41.93 and 44.17 percent respectively in the district. This district is known for production of 'Basmati' rice, which has international market. Among the other crops sugarcane, 'bajra', barley, gram, other pulses, rapeseeds – mustard, fruits and vegetables were grown in 3.56, 0.26, 0.03, 0.08, 0.21, 0.24 and 8.23 percent of the total cropped area respectively in the district.

As per FAO/WHO Codex Alimentarius Commission, 1999, "organic agriculture is accomplished by using, where possible, agronomic, biological, and mechanical methods, as opposed to using synthetic materials, to fulfill any specific function within the farming system". Accordingly, in this district even prior to 1999, the scientists and the farmers were "aware" of these issues and they looked for alternative approaches and means for sustainable agricultural production. The concept of "organic farming in a strict sense" has been promoted in this district since 2002 and a few farmers have adopted the total package of practices in production of some crops "organically" so that the produce is considered for "certification and labeling".

In the context of organic agriculture and food stability, the majority of the farmers have adopted crop management practices such as crop rotations, green manuring, recycling of crops residues, efficient water management and efficient crop combinations so to ensure farm produce of sufficient quantity and quality for human and livestock consumption.

Paddy and wheat are the major crops grown in this district. A decade ago the farmers started growing two crops of paddy which were grown in the months April-October that had lowered the water table alarmingly. To conserve the water resources that were intensively used in growing two paddy crops during 'Kharif' season, the farmers have been advised in the past three years to grow only one crop. Now in place of one crop of paddy the farmers grow Sesbania aculeate which is used as green manure. Studies have indicated that farmers have now adopted growing summer pulses and vegetables in place of early paddy crop where by less water is used for irrigation and soil health is maintained. Normally, in crop rotation farmers preferred growing leguminous crop(s) over others.

Within the last five year, wheat production using promoted zero tillage technology has been adopted by 35% of the farmers in the district which has reduced cultivation costs by up to US$50 per hectare. This method also conserves water. In 2005 there were 1,060 zero till machines in the district. The cultivation of mustard,

lentil and gram during the winter seasons has shown positive results towards saving water and less use of chemical fertilizers. All these crops use less water resources and in turn, the pulses enrich the soil health. Micro analysis of this district indicated that majority of the farmers were “aware” of the resource conservation issues of organic agriculture.

Farmers having land holding up to four hectares practice mixed farming of crop and dairy husbandry. These are regarded as more sustainable and organic in nature as both types were found to be complimentary and supplementary to each other and had symbiotic relationship. The extension approaches used for promoting “organic farming” could bring diversification in cropping systems in which the resource conservation issues of sustainable agriculture are ingrained.

Since 2003, vast majority of the farm families in the district have adopted making vermi-compost using earth worms and dung obtained from their dairy animals. The use of vermi compost has reduced the utilization of the synthetic fertilizers. Among all farming systems, organic farming is gaining wide attention among farmers of different categories in the district. In a cluster of villages within one developmental block of the district more than 100 farm families have adopted the technology of vermi-compost making and its use in organic crop production. In village Sultanpur a farmer has successfully grown “organic paddy” whereas, in village Daha Jagir a farmer could successfully grow “organic wheat”. Organic agriculture would result in crop yield increase over the current averages as found in wheat production in a sample plot. Conversion of conventional to organic farming requires precision and the study indicated that the domestic food production would not suffer.

In the district organic farming is understood as a form of agriculture in which only organic inputs for the supply of nutrients and management of pests and diseases are used and farmers are following this concept and using the appropriate technologies and methodologies. They look for their produce be “certified” and “labelled” for premium prices for which neither the laboratories for certification nor the markets for assured sales are available. Farmer-driven organic agriculture is well practiced in the district but service-driven organic agriculture need be promoted so that the farmers and the society are benefited in the years to come.

Biography

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Experience: I did B.Sc (Biology), M.Sc. (Social Anthropology), M.A (Rural Sociology) and Ph.D. in (Agricultural Extension). Having 26 years of research, extension and teaching experiences, I worked in six research projects and guided two M.Sc. students. I have published 39 papers including articles, three book chapters, co-authored a book and organized 58 training programmes in dairy farming and sustainable agriculture. Major research areas are sustainable farming system studies, training need assessment and impact analysis. I visited Hannah Dairy Research Institute, Scotland and Wageningen Agricultural University, Netherlands. Acted as chairman in a session in ESDev-2005 International Conference held at Abbotabad in Pakistan and attended Cheese Art-2006 conference in Ragusa, Italy.

India

Organic Rice Yield Twice National Average: Case of an Indian Farmer's Success Story

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This is a case of a success story of a small farmer's large scale organic experimentation resulting in rice yields twice the national average in first year of conversion against powerful currents of subsidized high external chemical input agriculture. The success story makes a strong case for organic farming assuring food availability and access. This experience was scaled up to reach thousands of farmers with a combination of extension methods involving mass media, field day and demonstrations.

Intervention for Organic Development

Pandit Jawaharlal Nehru College of Agriculture and Research Institute (PAJANCOA & RI) at Karaikal in India arranged for Orientation and Training Programme on Indigenous Farming (in September 2006) for farmers of Karaikal in collaboration with Gandhigram University and supported by the COMPAS Network of the Netherlands. Farmers were trained on organic farming by learned faculty and role model organic farmers identified by faculty of agriculture, Gandhigram University.

The Organic Transition

Some of the trained small farm holders were motivated and with technical support of the faculty in PAJANCOA & RI took up organic rice production in the ensuing 'samba' (Aug-Jan) season in more than 10 acres at Melaoduthurai village in Karaikal, India despite quite favourable environment supporting high external and chemical input agriculture in the form of various subsidies to synthetic chemical fertilizers and pesticides. Five farmers, Mr.M.Govindarajou, Mr.R.Rajendiran, Mr.P.Sundararajan, Mr.R.Ganapathy Pillai and Mr.N.Balasubramanian of Melaoduthurai village organically cultivated *White Ponni*, a locally preferred traditional rice variety and ADT 38, a modern rice variety released by Tamil Nadu Agricultural University. Notably, Mr.M.Govindarajou converted his entire five acre farm (3 acres of ADT 38 and 2 acres of *White Ponni*) to organic cultivation this year after the COMPAS training. He rendered extension and technical advisory service to other farmers with facilitation by faculty in PAJANCOA & RI.

Field Day for Harvest Ceremony of Organic Rice Crop

PAJANCOA & RI in collaboration with organic farmers of Melaoduthurai village organized a field day on organic farmer, Mr.M.Govindarajou's field to celebrate the success of his first organic rice crop as a Harvest Ceremony (on 12.01.2007) for greater awareness of farmers at large. More than thirty organic farmers from various communes of Karaikal participated and witnessed the harvest, yield and economics of organic rice production. Farmers were surprised to see the successful rice harvest without a gram of chemical fertilizer and a drop of chemical pesticide which was a new experience to the chemical input driven farmers. The actual grain yield realized after completion of harvest of the three acres of ADT 38 was two tons per acre.

Cost of Successful Organic Rice Cultivation

The farmer's cost of organic rice production was INR 7876 per acre. The conservative estimation of the value of his organic rice yield (2.20 tons per acre) from one acre was INR 12,834.50 (at a rate of INR 350 per 60 kg Bag). Hence, the net profit for the farmer out of his organic rice production without even a gram of urea, super phosphate and potash and without a drop of chemical pesticide was INR 4,958.50 However, the farmer had invested about the same amount of money in organic farming as in chemical input agriculture of yester years [See Tables 1 and 2].

Learning Lessons of Success from the field

The farmer managed this yield even in his first year of organic conversion. This organic rice yield of 5.50 tons per hectare of the farmer was more than twice the national average rice yield of 2.6 tons per hectare. He concluded that this organic rice yield was about 36 percent higher than his average yields from external chemical input agriculture of yester years. Eventually the farmer also managed 220 percent additional profit in organic farming than his external chemical input agriculture of yester years. Moreover, participating farmers agreed that Mr.M.Govindarajou's yield was a great success since it was around 36 percent more than the average yield that many other farmers also manage through chemical inputs.

Success Story: an Eye Opener

Mr.M.Govindarajou's initiative is a good case of large size experiment of a small scale Indian farmer. The success story of the farmer is an eye opener for other farmers of Karaikal. Moreover, the success story has disproved many myths leveled against organic farming. There was no drastic drop in the yield during the so called transition period from chemical agriculture to organic farming as claimed by some quarters. In this case there wasn't a transition period where yield lags. Instead, the farmer recorded good yield in the first year of organic conversion itself higher than the yield from his chemical input agriculture of previous years. Secondly, the farmer also accrued additional profit even without premium price in organic farming. Thirdly, concerns that insects may completely devastate the crop without chemical pesticides were alleviated.

Scaling up for Organic Development

Swimming upstream with organic farming without state support against the powerful currents of subsidized high external chemical input agriculture required strategic extension for large scale awareness and conviction. The harvest ceremony of organic rice attracted the attention of the mass media. The event was covered and broadcasted by the national television, the *Doordarshan*, in regional language. The success story of organic farming was also in news for few days in the local commercial television channel, the KL-TV. The national radio broad casting service, the *All India Radio*, also broadcasted the interview with the farmer and the faculty on more than an occasion. The national English daily, *The Hindu*, reported the success of organic rice harvest. In addition, local dailies, *Dhinathanthi*, *Dhinamani*, and *Dinakaran* have also reported the event in local language. Such dissemination of the demonstration and field day by the media reached thousands of farmers of the region, proving a best bet intervention strategy to promote organic farming.

Conclusion

The case of small farmer's success story confirms that organic farming has a promise for the future's food security (availability & access) and for farmers' and nation's economy as well since the farmer recorded 36 percent higher yield and 220 percent additional profit from first year of conversion to organic rice production than his external chemical input agriculture of yester years, which is well demonstrated, agreed upon with consensus and disseminated for the benefit of farmers at large, against the conditions supporting high external input agriculture.

Biography

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Table: 1. Mr.M.Govindarajou's Average Cost of Cultivation and Economics for One Acre of Rice in External Chemical Input Agriculture of previos years

Sl. No	Heads of Expenditure	Cost in INR
1	Cow dung manure (customary flat rate)	700
2	Chemical Fertilizers (customary flat rate)	1200
3	Chemical Pesticides (customary flat rate)	200
4	Spreading Cow dung manure on the field	60
5	Labour charges for spraying pesticides	120
6	Fertilizer Application	300
7	Cost of Seed	500
8	Labour charges for Puddling	500
9	Labour charges for Trimming & Plastering Bunds	300
10	Labour charges for Pulling Seedlings from Nursery	1200
11	Labour charges for Transplanting	1000
12	Labour charges for Weeding	275
13	Labour charges for Harvest	1500
14	Total Cost of Cultivation **(A)**	**7855**
	ECONOMICS	
1	Average actual yield in external chemical input farming of yester years: [Average weight of one paddy bag in chemical input farming of yester years for the farmer will be 52 kg as per traditional measure of yield]	**31 Bags per ac.** ***or*** **1612 kg** ***or*** **1.612** ***tons per ac***
2	Value of the Yield: 26.87 bags @INR.350/ 60 kg bag **(B)**	**9404.50**
3	**Net Profit (B – A)**	**1549.50**

Table: 2. Mr.M.Govindarajou's Cost of Cultivation and Economics for One Acre of Organic Rice

Sl. No	Heads of Expenditure	Cost in INR
1	Cow dung Manure as basal application (3 loads / ac @ Rs.400 / load)	1280
2	Sheep penning for 7 days	466
3	Vermicompost (3 bags/ac @Rs185/bag)	555
4	Spreading Cow dung manure on the field	60
5	Labour charges for Spraying of indigenously made organic liquid fertilizers	240
6	Cost of Seed	500
7	Labour charges for Puddling	500
8	Labour charges for Trimming & Plastering Bunds	300
9	Labour charges for Pulling Seedlings from Nursery	1200
10	Labour charges for Transplanting	1000
11	Labour charges for Weeding	275
12	Labour charges for Harvest	1500
13	Total Cost of Cultivation **(A)**	**7876**
	ECONOMICS	
1	Actual Yield in organic rice cultivation [Average weight of one bag of organic paddy of this year for the farmer was 55 kg]	**40 Bags per ac.** ***or*** **2200 kg** ***or*** **2.20 tons per ac**
2	Value of the Yield: 36.67 bags @INR 350/ 60 kg bag **(B)**	**12,834.50**
3	**Net Profit (B – A)**	**4958.50**

India (Food Availability)

The Market Potential For Organic Foods In India

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Introduction

When we talk about organic agriculture and sustainability, we refer not only to the ecological sustainability but also the economic (and social) sustainability. Economic sustainability of farmers is provided by good markets for their organic produces. In India, once the farmer is ensured of better returns from organic farming, large number of them will adopt this and they will also work towards good productivity because higher production gives higher returns.
Therefore to properly understand the markets for organic foods in India, ICCOA commissioned a study across all the major metro cities and it covered all regions in India-North, East, South and West. The study was designed for multiple objectives, viz.

- To find the consumers perception about organic foods and what categories of products they prefer the most as organic.
- To analyze the trends for demand of organic foods in different regions in India, and therefore to study demand patterns across the country.
- To arrive at the potential size of organic food market in India in each major city and then to extrapolate it for the entire country.
- Study consumer behaviour, awareness and usage, price sensitivity etc to arrive at some conclusions about retailing formats, how to mainstream organics in India, etc.

Results

The study was conducted in the top metros of the market, covering SEC A and SEC B segments of the consumers, which comprise about 5.3 % of the households. Survey of over 3600 consumers among the target group was concluded in four regions of the country. The estimated market potential estimate is given below where the survey was conducted.

Table 1: Potential Estimated* For Organic Foods in Top 8 Metros In India (at Retail Level 2005/6 Prices - Considering Organic Premium 10-20%)

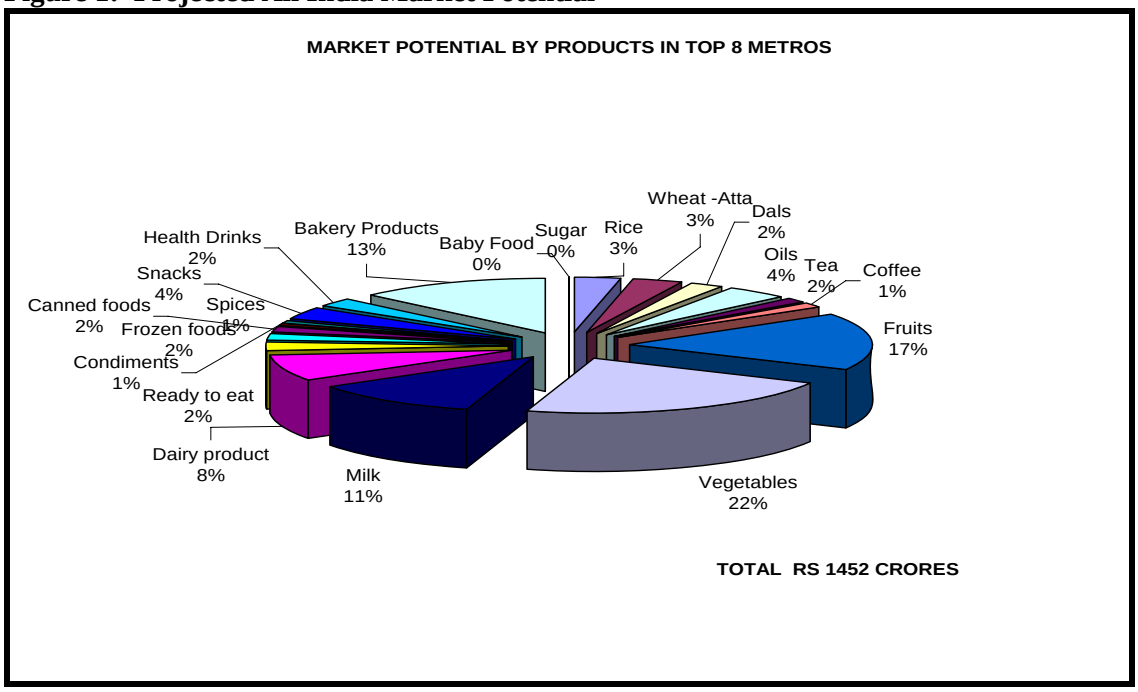
STUDY MARKETS	In Rupees Million *(Figures Rounded Off)*	
	Accessible * * Potential	Market Potential
Chennai	840	1500
Hyderabad	330	740
Bangalore	690	1280
Mumbai	1480	5860
Ahmedabad	300	780
Pune	280	580
Delhi	1120	2230
Calcutta	570	1540
TOP 8 METROS	5620	14520

*Based on our primary survey ** Thru Modern retail format

The market study estimates the accessible market potential for organic foods in 2006 in the top 8 metros of the country at Rs 562 crores taking into account current purchase patterns of consumer in modern retail

format. It is hypothesized that for some time to come Organic foods will cater to the up market customer through these formats or dedicated organic retail stores. The overall market potential is estimated to be around Rs.1452 crores, the availability will however be a function of distribution-retail penetration and making the product available to the customer. Another finding is the consumer's preference for different categories of organic food. Across all cities and regions, the most preferred food was fresh vegetables followed by fruits as organic. The next is milk & diary products. The figure below illustrates the 20 different food categories in the size of demand and preference by consumers.

Figure 1: Projected All India Market Potential



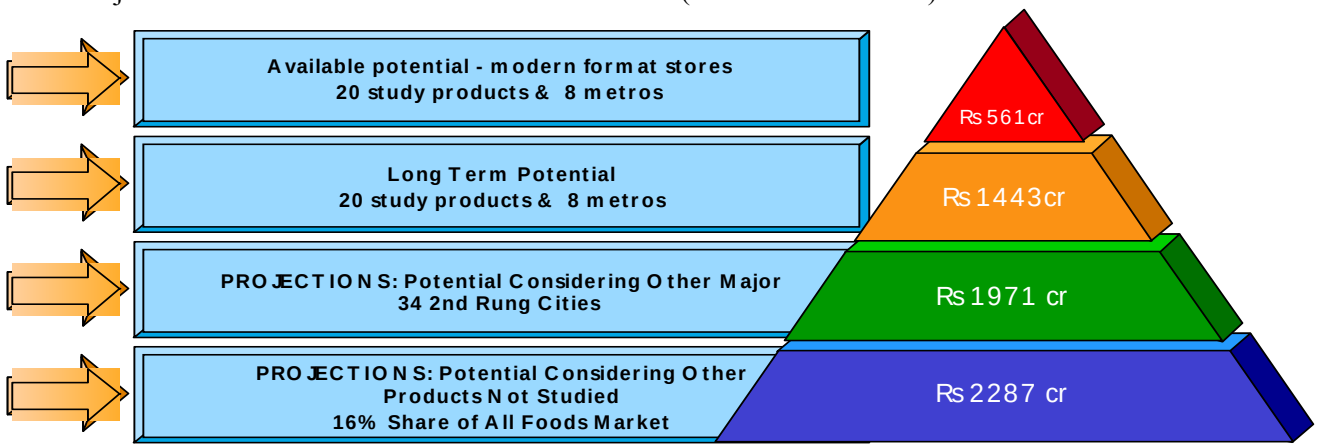
The top 8 Metros of the country are said to contribute over 90% sales of most of the up market products in the country, so the coverage of these markets will take care of a large part of the country's market potential. Organic food is currently considered a premium product and is sold at a premium price ranging from 5 % to as high as 45-60 % in some products.

The study of consumer perceptions, awareness and usage, price sensitivity etc has brought out the demand-pull perspective of Indian organic market growth. Like several distributors, processors and retailers are experiencing considerable difficulty in sourcing enough certified produce to satisfy buyers. To ensure regular supplies, some of the organic retail chains are even sponsoring organic conversion, setting up ICS and certification of groups of producers. It shows that organic agribusiness in India has just started to grow, especially in domestic marketing.

This study has also helped understand both the push and pull factors so as to create an environment that supports the growth of India organic agribusiness. The typical organic consumer is urban, educated, could be from a middle or high-income household and afford to choose and demand quality in food (SEC A and SEC B segments). The study also involved projecting the market value for the entire organic food market in the country, after accounting for the other important markets/Tier-II cities, and taking all the categories of food into account (other than the 20 categories studied).

Figure 2: The Market Study estimates Overall Indian Market Potential For All categories of Organic Food

Projected at Rs 23000 Million for India in 2005-06.(1 Crore= 10 Million)



Conclusions

The nation wide survey of consumers also showed that there is an environment of distrust in the quality of food available to the Indian urban consumer. So today they have a compelling reason and also reasonable affordability to buy organic food ingredients, if it was easily available. Thus, supply, rather than the demand is the larger issue today, even though on a quick note one also hears complaints of non-availability of markets. Such limitations will remain until enough volumes are produced to enable trade and retail marketing in organic products as a profitable business. In domestic organic market for food, the general assumption is that most consumers are positively inclined towards organic foods and that the major barriers to their increased consumption of organics are perceived to be the price and availability.

The notion that a certified organic product will draw trust of the consumer and sell by itself, especially in the Indian market conditions, will be wrong. The experience of the EU and other organic markets indicates that one of the characteristics common to many successful organic marketers was the considerable effort they put into organizing their supply chain. Solving the supply side issues involves more than simply expanding production or putting more products on the shelf. The focus of organic shopkeepers/retailers would be on securing supplies of consistent quality and quantity across a diverse product range. Strategies to achieve this include supporting the conversion to organic production, to encourage the pooling of produce from small farmers into larger consignments and arrange supplies from different regions of the country.

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Biography

Manoj Kumar Menon is Executive Director at the International Competence Centre for Organic Agriculture, Bangalore, India (ICCOA, www.iccoa.org). He is a graduate in Agricultural sciences and post graduate in business management (MBA), with specialization in marketing. He has worked in various agricultural and horticultural projects across various regions in India in a wide range of crops, including field crops, plantations, spices, mushrooms, floriculture etc. He later specialized in marketing of agri-inputs and in market development functions. Earlier as the Manager (Market Development) at ICCOA, he headed the market related functions in organic projects, communication strategy and market linkages. He was also the Manager of India's first trade fair on organic agribusiness, called "India Organic trade fairs", organized very successfully in Bangalore, India in 2005 and 2006.

India (Food Stability)

Nutrient dynamics during the sustainable agricultural practices in warm humid tropics of South India

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Introduction

Kanyakumari district (77^0 7' – 77^0 35' E and 80 5' – 8^0 35' N), a part of Western Ghats occupies an area of about 1672 sq km and is inhabited by 11,37,181 people. Topographically, the district may be broadly classified as coastal, middle and mountainous regions. The ecosystem type is warm humid tropical climate and the rainfall varies from 103 to 310 cm with mean minimum and maximum temperatures of 23.2 and 34.5^o C. The agricultural land of middle region popularly known as "Yeala or Vayal" (Paddy fields) is one of the most important fertile agricultural landscapes, on which they depend for food security. The farmers were adopting organic ways of agriculture, which they have practicing for centuries. In these agroecological systems, a closer interaction of the components such as crop, livestock and forestry, crop rotation, recycling and optimized use of local resources can enhance productivity. The region witnessed the penetration of green revolution in the mid 1970^s. With in 15 – 20 years, the soil status has deteriorated putting a heavy load on the pockets of the farming community. During the end of last century, they could understand the problems of declining soil fertility, moisture retention capacity and soil compaction. Today the farmers more than 100 villagers in the middle region have shed chemical based farming and adopt organic ways of farming.

The biomass of trees and weeds are used as a mulch material and is a potential, but unexploited source of nutrient inputs in organic agriculture. Every year, significant fractions of nutrients are added to the soils in agroecosystems by organic mulching. The fast rate of degradation of organic mulches helps to meet the plant nutrient uptake requirements of annual crops and stabilizing the low nutrient marginal lands in to fertile lands. Intrusive studies have been carried out worldwide on the biomass dynamics, but those pertaining to the popular trees wherein ample quantities of biomass are available, are very low. Therefore a field experiment was attempted in an irrigated vegetable agroecosystem to assess the decomposition characteristics of commonly used organic mulches (two multipurpose trees (*Albizia procera* (Roxb.) Benth, *Senna siamea* (Lamarck) Irwin et Barneby) and a fast growing perennial invasive weed (*Chromolaena odorata* (L.) King & H.E. Robins.), to evaluate the nutrient release pattern and to asses changes in the available macronutrient status of the vegetable agroecosystem.

Results

The initial compositions of biomass and time taken for degradation (95 percent weight loss) were varied markedly among the species (Table 1). The dry matter disappearance was to the tune of 12 – 17 percent during the initial months. The time taken for 50 and 95 percent degradation of biomass were comparatively longer for *Albizia procera* than the other species. The degradation of all the three species biomass was completed within six months. *Chromolena odorata* recorded the highest degradation rate followed by *Senna siamea* and *Albizia procera*. The variation in degradation rates may be attributed to the litter quality, favorable microenvironment and the faster activity of soil microorganisms (George and Kumar, 1998).

The macronutrient content in the biomass varied significantly between the species. In general nitrogen and phosphorus were released towards the end of the degradation and potassium release was continuous. Berg *et al*. (1992) indicated that in early stages of degradation concentration of nitrogen and phosphorus tend to accumulate while the potassium declined. The decrease notices is ascribed to the loss of soluble forms of nitrogen and phosphorus initiating the degradation process, and latter microbial immobilization led to the accumulation in the residual biomass and the same were latter mineralized for reuse in soil (Jamaludheen *et*

al. 1999). Potassium being a non-structural element is liable to losses therefore this accounted for its decline in the residual biomass of all species.

Table 1: Initial biomass composition of different species

Species	Cellulose (% DW)	Lignin (% DW)	Total C (% DW)	Total N (% DW)	Total P (% DW)	Total K (% DW)	Time taken for 95 % degradation
Albizia procera	34.2	13.5	38.8	1.03	0.08	0.42	5.9 months
Senna siamea	38.5	15.4	37.1	1.25	0.13	0.61	5.1 months
Chromolena odorata	41.3	14.5	35.6	0.91	0.06	0.31	4.3 months

The soil organisms did not vary significantly among the species but it differed among the degradation period. The earthworm population increased significantly during the middle of degradation period. According to Tian *et al.* (2000) higher earthworm population are related to higher biomass in soil, lower soil temperature and higher soil moisture. The present investigation was carried out in irrigated vegetable ecosystem, here the addition of organic mulches coupled with adequate moisture throughout the crop season favorable for higher earthworm population. The number of fungi and bacteria per gram of soil was high during the degradation period. After the significant increase a decline was noted towards the end of the degradation period. The higher microbial population revealed that fungi and bacteria to be the active floral decomposers of the biomass. Mary and Shankaran (1991) have attributed the rapid increase in the number of microbes to the availability of large amount of nutrients and early decomposable constituents such as cellulose. In the latter stages the lignin contents are high and there is apparently a lack of energy source for microbial growth there fore recorded the least microbial population.

The changes in the soil organic matter content and NPK status with degradation of biomass revealed significant variation among the species for nutrient addition. The annual biomass addition of these three species through mulching process is 2.5 t ha $^{-1}$. Therefore the actual nutrient accretions annually through biomass degradation taking in to account the biomass fraction, the nutrient release will be 31.25, 3.25 and 15.25 kg NPK ha^{-1} in *Senna siamea*, 25.75, 2.0 and 10.5 kg NPK ha $^{-1}$ in *Albizia procera* and 22.75, 1.5 and 7.25 kg NPK ha^{-1} in *Chromolena odorata.*

Conclusion

The input substitutions in farmers of Kanyakumari district have positive effect on improvement in organic matter content and available NPK status of the agroecosystem soil. This provides good starting point to optimizing the use of internal sources of nutrients and reducing the need for external addition of chemical fertilizers. In addition to this gives self sufficiency to the rural community through stabilizes the nutrient status of the soil and thereby increasing the yield potential of crops and protects the environment from degradation. However, the less availability of biomass and high labour requirement create fear of continuous use of such practices. Therefore, importance was given to the regeneration of their traditional agricultural knowledge, integrated farming system strategies, locally available natural resources and environmental conditions that can be affected by agricultural practices, are needed in the future.

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Biography

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Indonesia

Ecological Agriculture in the Highlands of Java, Indonesia: Preliminary Step Towards Organic Agriculture

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The highlands of West Java, Indonesia have long been the central producers of vegetables in the country. Its cultivation employs high levels of pesticides, *i.e*. the frequency of pesticide application in potato is 20 applications/season, cabbage 15 applications /season, and chili between 20-25 applications/season. Due to environmental and health concerns, the Department of Plant Protection, IPB developed an action research program, in which ecologically-based agriculture management was combined with traditional farmers' practices to counter the main pests and diseases of the crops. Together with farmers, we initiated a collaborative effort whose main objectives are to develop ecological management of the major pests and diseases of potato, cabbage and chili. In the first year, we are concentrating our effort on ecological management rather than pure organic agriculture per se. The approach we used is a preliminary approach toward organic agriculture, whereby the uses of pesticides are eliminated. The method used is participatory *technology development,* in which the technology developed came from the experiences of the university together with experiences of the farmers. In the first year (2005), pest management practices were developed in potato and cabbage in Bandung West Java in collaboration with the Association of Indonesian IPM farmers (IPPHTI) Pangalengan, West Java. In the second year, the technologies were tested in the highlands of Tegal, Central Java in collaboration with the Local Agency for Agriculture And Forestry (Dinas Pertanian Perkebunan dan Kehutanan Kabupaten Tegal) and local farmers. In total there were 30 farmers in the first year and 50 farmers in the second year who are actively involved in this project. Dissemination of the technologies has been distributed to 150 farmers in Pengalengan, West Java and 300 farmers in Tegal, Central Java.

An ecologically-based technology was developed to overcome the club root disease of cabbages. These technologies are a combination of technologies which come from local farmers, and from 'IPM plus' farmers who have been experimenting on the various pests and diseases of cabbage. The first technology is the organic agriculture, or the 'IPM plus' technology, which involves media solarization for 3 weeks and the use of a trap crop, *Brassica kaber* (wild crucifer) to control the cabbage head worm, *Crocidolomia binotalis*. In this treatment, no chemical fertilizers nor chemical pesticides were used. As a comparison, we also conducted two other experiments, one that involves seedling selections and limited pesticide application with standard chemical fertilizer application (coined as the second technology/approach or 'IPM'technology) and the third approach uses 'conventional' practices, i.e. consisting of calendar-based spraying of fungicide and insecticide application/week. The results of the study showed that club root incidence was 8.56, 7.25, and 11.5 % consecutively for organic agriculture, 'IPM' technology and conventional methods, respectively. Percentages of plants with cabbage worm damage at 9 weeks after transplanting was lowest in organic plots, i.e. there was a very low incidence of *Crocidolomia binotalis*, of about 5%, while the highest presence of cabbage worm incidence was using the 'IPM' technology (the second approach or seedling only selection and limited pesticides application). Conventional plots had also a low incidence of 5 % damages due to insecticide treatment. Plant productivity was measured as fresh weight of crops; their weights were 1.2, 1.3 and 1.4 kg/cabbage head respectively for the organic, the 'IPM' and the conventional technology. The number of pesticide applications was nil (0) for organic method, compared to 3 times and 10 times for the IPM and conventional methods. This result showed that organic agriculture that omits the use of chemical fertilizers and used alternative technologies to combat pests and diseases can produce quality product and compete with conventional technologies. Using of IPM technologies, where IPM is practiced in its very early form, has reduced pesticide applications to 50% with a slight yield reduction (7%). In organic agriculture, even though it provided a slightly lower productivity (14.2% decrease in weight), there was a drastic reduction in pesticide and chemical fertilizer use (100 % reduction).

Another project conducted in the first year was focused on controlling the main disease of potato, the late blight disease caused by *Phytophthora infestans*. In this project, fertilizers used was a combination of partial chemical and compost. Three technologies were tested to overcome late blight disease of potato. The first method was the use of PGPR (Plant Growth Promoting Rhizobacteria), which is a combination of *Bacillus polymixa* B25 and *Pseudomonas fluorescens* Pf 1. The second technology used integrated pest management (IPM) and involved a combination of plastic mulch, bamboo sticks to erect potato plants, and PGPR as above. In this treatment, the use of fungicides was still practiced but with very limited application (only applied when there is a high relative humidity and presence of active lesions). As a comparison, the third technology used was a conventional method whereby calendar-based spraying of fungicide with 5 day intervals was used, without bamboo and plastic mulch. Based on the results, the use of PGPR alone was not able to control late blight disease. However, the combination of using mulch and bamboo sticks provided a very effective control of late blight and bacterial wilt and in addition, significantly suppressed thrips infestation (1.75 thrips/leaflet compared to 11.5 thrips/leaflet on treatments using conventional methods). The productivity of the crop using the IPM technology was the highest of all treatments, with 110 kg/100 m2 (or 11 tons/hectare), compared to 93 kg/100 m2 (or 9.3 tons/hectare) using conventional methods, and 30 kg/100 m² (3 tons/ha) on PGPR treatment. Total fungicide application on the IPM plot was 3 times, compared to 16 applications on conventional plots, whereas PGPR plots did not receive any fungicide application. There was a reduction in the expenditure for disease control, from Rp 4 million/ha/season for pesticide and labour for application in the conventional system, compared to 3.2 million/ha/season spent for pesticide and mulch procurement in the IPM system. Based on the price of potato, i.e. Rp 3200/kg, the total revenue increased from 25.76 million/ha using the conventional method to 32.75 million/ha using the IPM approach. The results showed a net benefit of Rp 6.99 million/ha due to IPM application on potato.

In 2006, IPM technology for cabbage that was previously developed in West Java, was tested for cabbage and chili in Tegal, Central Java. Solarization of nursery media, and in combination with PGPR treatment, were used. These techniques effectively controlled club root (*Plasmodiophora brassicae*). Club root incidence was 12.0, 5.8 and 3.9 respectively for conventional methods, nursery media solarization and solarization plus PGPR treatment respectively. After finishing the experiment in the second year, more farmers in the surrounding area applied PGPR, i.e they are being used on 38.5 ha in various cultivated plants such as chili, tomato, strawberry, chinese cabbage and cabbage.

A key lesson learned from these two projects is that organic agriculture has to be combined with IPM technologies for pest control purposes. Alternative uses of technology other than pesticides can successfully suppress pest and diseases of vegetables. PGPR is an important factor that strengthen the root systems of the plants. PGPR is ensuring that healthy plants can be more resistant to pest and disease attack. Another important lesson learned is that through ecological agriculture, the concept of organic agriculture are more readily embraced by farmers.

Indonesia (Food Availability)

Organic Agroforestry for Soil Conservation and Food Availability in Timor, East Nusa Tenggara, Indonesia

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Introduction

Timor Tengah Utara (TTU) district is located in the semi-arid island of Timor, East Nusa Tenggara Province, Indonesia. The area has limited rainfall and arable land, aggaravated by slash and burn agricultural practices that reduce soil fertility, and cause erosion and sedimentation of rivers. As a result, the province faces annual food supply vulnerability during the dry season.

Yayasan Mitra Tani Mandiri (YMTM) and Yayasan An Feot Ana (YAFA) developed, for the past ten years, organic agrosilvopastoral programs with communities to address this problem. With support from Third World Network (TWN) and Vredeseilanden Indonesia office (VECO-Indonesia), a one year study was conducted in 2005-2006 to document the impact of the program in three villages: Manumean (Biboki Utara sub-district), Noepesu (Miomaffo Barat sub-district) and Sunsea (Miomaffo Timur sub-district). Ten families were surveyed from each village, five practicing agrosilvopastoral methods, other five practicing conventional agriculture.

The objective was to observe the difference in food availability and family income due to intervention of agrosilvopastoral method. The documentation applied participatory research approach, with focus group discussions, semi-structured interviews and field visits.

Results

The organic agrosilvopastoral intervention has led to higher crop productivity, food availability and income of farming families as shown in Tables 1, 2 and 3. Each family may have different crop combinations so there is difference in income between families in the agrosilvopastoral system.

Table 1 Average yield of selected food crops (Kg/Ha/family/Year).

No	*Food Crops*	*Village*					
		Manumean		*Noepesu*		*Sunsea*	
		ASP	*CF*	*ASP*	*CF*	*ASP*	*CF*
1	Corn	78.44	12.18	48.86	36.91	23.43	18.88
2	Dry/wet rice	85.77	15.78	0	21.79	26.64	23.40
3	Ground nut	81.54	4.13	0	0	28.59	11.58
4	Kidney bean	0	0	36.36	18.28	0	0
5	Green bean	32.31	7.67	0	0	0	0
6	*Tali* bean	0	0	2.23	3.37	1.61	1.85
7	Potato	0	0	38.45	5.09	0	0
	Total	**278.06**	**39.76**	**125.90**	**85.44**	**80.27**	**55.71**

Source: primary data analysis
ASP = Agrosilvopastoral system; CF = Slash and burn conventional system
Note: Noepesu is not suitable for dry land rice farming due to high rainfall. Rice is planted in a different location from the garden and therefore is not been measured.

Corn and rice are not sold in the markets. Both conventional and agrosilvopastoral farmers keep part of the harvest for seeds, traditional rituals, and donations to the church. Agrosilvopastoral farmers had about 65-118 kg more corn, and aside from Noepesu, had 28-54 kg more rice for family consumption (Table 2).

Many conventional farmers face food shortage during November-February, since the food is consumed during the dry season. In the past, agrosilvopastoral farmers also faced similar shortages. Now,

agrosilvopastoral farmers have enough food reserves and income to buy food while conventional farming families with limited income have to look for wild tuber crops for food or work as construction labour in the cities. The larger supply of vegetable crops also provides more nutrients to the agrosilvopastoral families, who also have enough money to take their children to the public health centre.

Table 2. Average food availability (Kg/family/year).

Crop	***Usage & Availability***	**Village**					
		Manumean		***Noepesu***		***Sunsea***	
		ASP	***CF***	***ASP***	***CF***	***ASP***	***CF***
Corn	Average production	260	133	215	107	216	151
	Seed reserve	30	30	20	30	30	30
	Other use	10	10	0	0	0	0
	Average availability	220	93	195	77	186	121
Rice	Average production	260	172	0	63	246	187
	Seed reserve	25	25	0	20	30	25
	Other use	0	10	0	0	0	0
	Average availability	235	137	0	43	216	162

Source: primary data analysis
ASP = Agrosilvopastoral system; CF = Conventional farming

Table 3. Average income (Rp./family/year) from selling farm.

No	***Products***	**Village**					
		Manumean		***Noepesu***		***Sunsea***	
		ASP	***CF***	**ASP**	***CF***	**ASP**	***CF***
1	Food crops	1,763,000	473,000	1,966,000	486,400	1,298,000	463,000
2	Perennial crops	2,230,320	518,840	3,824,200	718,400	798,600	168,320
3	Vegetables	1,054,600	149,000	4,089,600	708,800	476,600	132,000
4	Livestock	4,528,000	1,390,000	5,990,000	1,878,000	3,027,000	1,397,000
	Total	**9,575,920**	**2,530,840**	**15,869,800**	**3,791,600**	**5,600,200**	**2,160,320**

Source: primary data analysis
ASP = Agrosilvopastoral system;CF = Conventional farming;1 US$ = about Rp. 9,000

Both agrosilvopastoral and conventional farmers select and save about 20-30 kg of rice and corn and 10-20 kg of beans for seeds. Agrosilvopastoral farmers have about Rp. 3-12 million more income (Table 3). Several factors lead to the success of the agrosilvopastoral intervention. First it is an integrated system involving soil and water conservation, planting perennial crops and vegetable crops, and livestock rearing, and the existing food crop cultivation. Soil and water conservation measures by making terraces strengthened by trees and burying organic matter into the soil, makes it possible to trap groundwater, provide fodder for livestock, and for farmers to shift from slash and burn practices to permanent cultivation system.Secondly, the diversity of crops and livestock provide for a steady income, fodder and manure. An organic agrosilvopastoral garden can contain up to 20 crops in a single land area; they rear 1-4 goats and cows compared to an average of only one livestock by conventional farmers. Third, the technology used is simple and can be practiced independently by farmers such as creating terraces with trees, making compost from livestock and garden waste, and organic pesticides using local plants. Finally farmers are encouraged to develop their own knowledge system about land characteristics, seasonal variation and water availability. Thus they are able to plan their gardens carefully using their self developed seasonal calendar.

Conclusion

The organic agrosilvopastoral system is based on crop diversity, soil conservation and knowledge about the land and the crops. In this way, agrosilvopastoral farmers harvest products all year round, making sure food is always available. In addition, the agrosilvopastoral system provides ecological and social benefits.

Permanent gardens have increased soil fertility and prevented erosion. The increase in tree cover helps to protect against wind erosion. Having been introduced to more diverse crops, farmers began to develop a local variety of the root crop *iles-iles* (maerato) as a food reserve. The three villages have become a learning centre for farmers and agricultural extension workers from East Nusa Tenggara and Timor Leste who want to learn and practice agrosilvopastoral farming. Farmers have also developed seed exchange mechanisms as a tool to encourage slash and burn farmers to shift to agrosilvopastoral systems.

References

This study is based on documentation by YMTM and YAFA staff.

Biography

YMTM and YAFA are NGOs in Timor, East Nusa Tenggara, Indonesia that aims facilitate farmers' independence, welfare and justice through the agrosilvopastoral system based on community empowerment and environmental conservation. The agrosilvopastoral program is supported by VECO Indonesia and World Neighbours.

TWN is an international organization in Penang, Malaysia, whose aim is to promote awareness and activities, especially in the Third World, that would help bring about a more equitable, just and environmentally sustainable world.

Indonesia

The Organic and Diverse Non-rice Food System of Giyombong Village, Indonesia

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Introduction

Giyombong village, is a remote hilly area in Central Java, Indonesia. The village consists of about 286 families (1,359 people) who eat *leye*, food made from cassava, as their main staple food. Villagers practice a sustainable and organic, diversified food production system, with cassava as the main crop. They plant four varieties of cassava, locally known as *Palengka, Randu, Lanteng* and *tela pait or Jawa Ireng*. These are planted all over their lands, intercropped with a rotation of dry land paddy (*gogo* rice) in the rainy season, or vegetables and other root crops such as sweet potato, ginger and taro in other seasons, or with coffee. They also plant fruit trees, trees for fodder, fuel wood and housing, and keep fish and poultry. The crop rotation is managed in such a way that there is always a harvest at every season, and any time a family needs food or money. A field documentation was conducted for two weeks in November 2005 to learn about the food production and utilisation system at Giyombong. Hopefully the lessons learnt can be adapted in other areas. The method applied was semi-structured interviews and field observation.

Results

Leye is made from the *Jawa Ireng* cassava roots. The roots are processed into flour, made into a dough-like mixture, and then shaped into small grains like rice. The *leye* grains are half dried in the sun or on top of the cooking fire after which they are steamed and then eaten. If *leye* is to be kept for reserve food supply, the grains are fully dried again, and can be stored for up to one year. Roots from 3-4 cassava plants are sufficient to make *leye* for a family, per day. Roots are harvested when the plants are 1-2 years old, and villagers make sure they replant the stems for the next season. Other cassava varieties are fried or made into snacks, chips and crackers. Families normally eat *leye* for two to three days consecutively and then eat rice for one day. Rice is served only to guests or hired help, and during festivals and parties. Each family has a barn, in which they store dried *gogo* rice, corn and *leye*, and sometimes cassava crackers. Villagers often barter *leye* with *gogo* rice, depending on their needs.

Eating *leye* began during the colonial era as a strategy to survive the forced cultivation policy of the Dutch, which forced each family to plant crops for export on 2/3 of their lands for the benefit of the colonial rulers. In Giyombong, farmers made sure they had enough to eat by cultivating rice, cassava and vegetable crops on the limited land. They found that cassava made into *leye* is a rich source of carbohydrate and can be stored as a guarantee against harvest failure. This continued after Independence, until today, with no adverse effects on nutrition. The local mid-wife who provided health care from 1997-2000 said she has never encountered a case of below-five children or adults suffering from malnutrition. In the district health care centre there is no record of child malnutrition in Giyombong.

Villagers have two other sources of income. First is making sugar from the sugar palm trees, cultivated by about 60 families. Palm sugar is sold in the village or the market. The mature fruits, *kolang kaling* are also sold. When the tree no longer bears fruit, the trunk is sold or used to make agricultural tools. Secondly, almost everyone at Giyombong works as a pine resin extractor in the plantations owned by the State Forest Corporation, Perhutani.

Several factors have led to food supply stability at Giyombong. First is the diverse, integrated and organic agriculture that provides food, economic asset and environmental services. In addition to cassava and *gogo* rice, 14 varieties of banana are planted in the village, together with other fruits such as guava, papaya, jackfruit and pineapple. They also plant crops for fodder such as Caliandra, a special rubber cassava (locally known as *karet*) whose leaves are eaten by the livestock, two types of grass and a few other trees. The fodder trees also control erosion in steep areas and are a source of fuel wood. In turn, the goats produce

manure, mixed with dead leaves called *lemen.* People first use *lemen* to fertilize their fields, and then sell the extras. Each family has at least five goats, which are their most valuable assets. Chemical fertilizers and pesticides are used only to plant cabbage, which is sold and not locally consumed. Now they rarely plant cabbage as the production cost is too high.

Second, the community has a specific food culture: the *leye* technology and the fact that *gogo* rice is kept in the barn and not sold. Despite the difficulty in making *leye* and the introduction of cheap white (polished) rice, most villagers have continued making and eating it. Some farmers feel that *leye* keeps their stomach full for a longer period. *Leye* can also be kept overnight, while cooked white rice gets spoilt when kept overnight.

Third, probably due to its remote location, the government's Green Revolution programs, which has spread almost to all areas in Java, did not reach this village. Thus the food culture, the rice barn, and the integrated organic production system are relatively intact.

Conclusions

Giyombong village illustrates that diversified, local food production systems are an important part of food security. This is not an isolated case, nor a new one. Communities in most parts of Indonesia had not been totally dependent on rice, even in the predominantly rice-eating communities of Java, Bali, Sumatera, Kalimantan and Sulawesi. People supplemented their diet with corn and/or root crops. In Eastern parts of Indonesia, people ate sago, root crops and corn, supplemented with rice. This food habit was lost or eroded when the government focused on rice as the one and only staple food. Food security is at stake when rice becomes the only staple food, but the Giyombong case can become a roadmap for community-based diverse food security systems.

Biography

Hira Jhamtani, is an associate of the Third World Network in Indonesia. She is involved in documentation of local sustainable agriculture systems in Java and East Nusa Tenggara, and is leading a policy study on food security in Indonesia.

Purnomosidi is a community organizer with Yayasan Pendidikan Rakyat Indonesia (YPRI—The Indonesian People Education Foundation), an alternative learning centre that facilitates empowerment of people. He is currently working at Giyombong to help strengthen the community food system.

Indonesdia

Wild Foods that Sustain Local Communities

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Introduction

Since the middle of 2005 until now, an experimental investigation has been done in two regions. First in Puntondo village, Takalar regency, South Sulawesi. There are 20 households involved in this coastline village. The ecosystem is semi-arid with rainfall starts from January until May every year. The main occupation is seaweed farmer and crop farmer, only few of them become fishermen. Major commodities are seaweed, rice and corn. In several point mangrove forests could still be found. Second village is Jatiarjo village, Pandaan regency, East Java. The village is in the foot of Arjuna mountain, with 40 farmers involved in this experiment. Lives in humid ecosystem with altitude of 1,000 m above the sea level, they have many kind of crop commodities i.e. rice, corn and vegetables. This village surrounded by pine forest and heterogeneous forest.

The objective of this research is to increase food security, preserve natural resources and traditional knowledge among local community. Indonesian now become very dependent on rice for their main food while they still have many plants that could be rice substitute around them. Therefore, through this experiment, people once again hope to be aware of their natural resources usefulness and take some benefit on underutilized plants.

Results

Indonesian before 1968 – the year when Green Revolution started in Indonesia – were intercrop farmer and part of them also applied agroforestry. After 1968, when Indonesia government wanted to make Indonesia became the first rice exporter country, the farmers forced to plant only major crops i.e. paddy rice and corn. But then, abundant harvest did not last forever, after 5 years the soil became poor because of too much chemical input.

The social impact caused by the government's program is people became very dependent on rice. There was conviction put by the government, people that still not yet consumed rice would be noticed as a poor and stupid people. Beside social impact, there were also culture impact, especially the food cultures. The local skill knowledge to recognized local plants around them dissapear whereas that skill is very important nowadays when rice getting more expensive for poor people. Today, people enjoy to buy instant food than processed their own food from raw material. This trend also appears in the rural area, where they actually still have natural resources waiting to use. An effort to restore the awareness on local plant and food, and ability to identify edible wild plants around them right now have been trying into these two areas.

Through interview with old generation in age of 50-80 years old in Puntondo village, collected data of 68 edible wild plants. And almost all of the plants are still exist around them, except the mangrove. Since the last 10 years, the mangrove vegetation dissapear because of the illegal logging. People used the mangrove to make it as a charcoal (Laksono et al, 2000). The dominant mangrove species growth are Avicennia sp and Bruguiera gymnorrhiza. According to one of the respondent, they used to processed Bruguiera gymnorrhiza (local name: tongke-tongke) fruit as one of their main dishes because of its high starch content. To processed it, first the fruit had to dipped in the water for one night to remove the tannin. After that, they would processed it as porridge. While the young leaves of “tongke-tongke” and “runu-runu” (Avicennia sp) eat as vegetable. Another main dishes they used to eat is breadfruit, they also processed it as a porridge. The condition change right now, they most likely hope for the donation from the government to get rice although the quality of the rice is very poor. Main reason they did not want to eat local food is the practical reason. To process local plants is very time consumed comparing to cook rice, although the fact showed, breadfruit and mangrove fruit had high nutrition value (Table 1).

Table 1. Nutritional Value of Some Plants (per 100 g substances)

Component	Rice[1]	Corn[1]	Breadfruit[2]	*Bruguiera gymnorrhiza*[2]
Water (g)	13.0	13.1	78.0	57.35
Protein (g)	6.8	8.7	1.3	2.85
Fat (g)	0.7	4.5	0.3	0.82
Carbohydrate (g)	78.9	72.4	28.2	37.61

1: Anonymous, 1981
2: Patria, 2005

The same problem happened in Jatiarjo village. From identification process recognized 88 edible wild plants around those people house, and would be much more in the rainy season. Interview done with 40 farmers to found out their daily food consumption pattern. 60% of them choose instant food as their main dishes because it is easy to get, cheap and practical. Their explanation raised some ironically feeling considered they have so many unused natural resources around them. Which they could processed it for healthy food without they have to spend money for it. One of them explained, she used to made snack from fruit cotton seed called "jenang", it is traditional snack with sweet taste and rubbery texture; or she used to made "rujak" from young cotton fruit, a certain kind of salad with peanut and brown sugar sauce.

Conclusions

Edible wild plants could be an alternative food for rural people and guarantee the food security system because these plants lives and available the whole year. Another advantage is people do not have to spend money to get it. Using these edible wild plants also return the local food culture.
The constraints that make this move difficult are the dissapear forest because of the illegal logging and the practical reason. Strategic moves have to be done quickly before this natural resources gone. Food education could be one of rational move, although it would take a long time. Food is the closest things in human life. Start from food issue, another problem could be solved, such as ecology and traditional knowledge problem. Soon as people realized how important natural resources around them for their daily life, immediately they would try the best to protect it. While they could not take any real advantage upon natural resources, they would not care about it. Also, through food education, people convinced, consuming edible wild plant would not make them as a second citizen, because from the scientific research those plants had higher nutritional value then cultivated crop, and healthier also because those plants grows without any chemical input (Scoones, 2005), it means people can have cheap organic foods through agroforestry system. Taking the forest into the farmland or home yard could also become the next strategic move. It means they could plant many kind of edible wild plants in their farmland or in their home yard beside planting major commodities like rice and corn.

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Biography

Hayu Dyah Patria graduated from Food Technology Department, Widya Mandala Surabaya Catholic University on 2005. Now become independent researcher focusing on edible wild plant research and its use

for rural community. For this research, she has a network with local NGO to ensure the sustainability of the program and to monitor the progress. They are Puntondo Environment Education Center for South Sulawesi area and Yayasan Kaliandra Sejati for East Java area. Before this research she has done organic agriculture research with Third World Network on 2006. From 2005 until now, together with Konphalindo, having a research on hybrid and GMO seeds, and since 2004, she also become a part time trainer for teacher and farmer focusing on sustainable education at Benih Matahari Organization.

Italy (Food Utilization)

Evaluation of Safety and Quality of Organic Durum Wheat from Experimental Fields in Italy

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Introduction

The world key highlights of human alimentation mainly include care about food quality, interest in natural products and the awareness of the relationship between food and health. Durum wheat is the best raw material for pasta and other traditional products and represents an important traditional crop for Mediterranean countries such as Italy. In this context, organic agriculture is of actual importance owing to the consumers pererences for organic products. Therefore, organic production of durum wheat needs to be investigated, especially in regards to quality and safety.

Fusarium mycotoxins, such as deoxynivalenol (DON), are the most important contaminants in the food chain and consequently are strictly related to human health and economy. The occurrence of mycotoxins in cereal foods produced by organic or convent method is a controversial issue. So far, it cannot be concluded that either type of farming leads to increased risk of mycotoxin contamination.

The aim of this study was to investigate the quality and safety of organic durum wheat (*Triticum durum*) grown in temperate and irrigated lands of Italy. The study was performed within the framework of the Italian National project "Cereal organic farming: agrotechnical and genetic approaches for yield and quality improvement of common and durum wheat and the valorization of their products" (BIOCER). Different durum wheat cultivars were grown with organic agro-techniques in several experimental fields located in North, Center and South Italy. The study was carried out over three one year seasons: 2003-2004, 2004-2005 and 2005-2006. A total of 630 kernel samples were collected and analysed. The DON occurrence in grains was considered and levels were assessed by both ELISA and HPLC methods. Quality traits, such as protein content, gluten quality and colour were also evaluated.

Results

DON levels measured with ELISA and HPLC methods showed high levels of correlation, and coefficients of correlation (*r*) were 0.9733, 0.8902 and 0.8920 in the three growing seasons. In the three years of the study, weather conditions were not conducive to high incidence of *Fusarium*, Head Blight and DON accumulation. Depending on the origin of the samples, season of growth and wheat cultivars there were different incidences of contamination and toxin levels. Most samples showed a negligible DON contamination (<500 µg/kg). For all the varieties DON levels were below the legal limit fixed for durum wheat kernels (1750 µg/kg). Incidence of contamination (%) and mean content of DON in positive samples were: 36% and 250 ng/g in the 2004 crop year; 19% and 120 ng/g in the 2005 crop year; and 21% and 90 ng/g in the 2006 crop year. DON levels up to 190, 340 and 480 ng/g were recorded in the 2004, 2005 and 2006 crop years, respectively. In general, samples collected in Northern and Central Italy showed incidence of contamination higher than those collected in Southern Italy.

Regarding crop quality, protein content seems to be a critical parameter in organic conditions. An average value of about 12.0% was recorded for the three years. Significative differences were detected among environments and genotypes, ranging from 10.4 and 13.2% in 2004, 10.5 and 13.3% in 2005, 11.2 and 14.0% for 2006.

Among the cultivars, Cappelli for protein content seems to be the variety more suitable for the organic conditions. However, low protein levels are generally associated with high levels of production. Gluten

quality, that represents the other important parameter related to the quality of final products, appears influenced by organic growing conditions but is mainly linked to plant genotype. Therefore, the choice of cultivars suitable for different agroclimatic conditions seems to be a key aspect of durum wheat in organic agriculture.

Conclusions

The results presented in this study are of interest for the choice both of the variety and the environment most suitable for the cultivation of organic durum wheat in Italy. Different climatic conditions and genotype characteristics play a determinant role on the growth of toxigenic fungi and the subsequent possible accumulation of DON in organic wheat kernels. In the three years of the study, low incidence of contamination and DON levels were assessed. In many samples, the DON content was below the limit of detection and values only rarely exceeded 500 µg/kg. No wheat sample was found noncompliant to the maximum permitted level for DON. In conclusion, this study documents the low potential for DON contamination in organic durum wheat produced in Italy also confirming the influence of the environmental and genetic factors on quality characteristics in the organic farming.

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Biography

Institute of Sciences of Food Production of the Italian National Research Council (ISPA-CNR).
The main focus of ISPA is to develop research projects which will improve the quality and safety of agri-food production, using technologies with minimal environmental impact. ISPA's action is in line with the national and European research policy and is carried out using a multidisciplinary approach based on competencies in various disciplines (chemistry, toxicology, microbiology, biotechnology, veterinary science, agronomy, biology and plant pathology). These skills are available within its six Institutes and Research Centres located throughout Italy. ISPA's institutional research duties are as follows: -improving the sensory and nutritional quality of foods; - developing innovative processes for making the primary and secondary products of agri-food interest identifying risk factors for food safety; - achieving safer products by monitoring and removing potentially toxic components.

Italy (Food Availability)

Durum Wheat-legume Temporary Intercrop - The Effects on Weed Control, Nitrogen Supply and Wheat Quality

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Introduction

Nitrogen fertilization and weed control are the major challenges in organic production of several field crops (Hansen, 2000). These aspects become crucial for organic winter grown cereals in Mediterranean areas where low temperatures and high autumn-spring rainfall cause low mineral nitrogen availability in the soil rooting layer and the high crop density is an obstacle to mechanical weed control. Intercropping (Vandermeer, 1989) could be an important tool for improving the efficiency of cropping systems (Pristeri, 2006). Intercropping cereals and legumes for grain or fodder production is widely adopted thanks to the complementariety of species in using nitrogen and other resources (Jensen, 1996), and has been demostrated to improve yield stability and volounteer plants smothering (Hauggaard-Nielsen, 2006).

On the contrary, the use of intercrops with the exclusive aim of enhancing nitrogen supply for the companion cereal represents a very uncommon practice. In this particular form of intercropping, called "temporary intercropping" (Vandermeer, 1989), the legume is grown in the mixture only for part of the cereal growing cycle. The aim of this experiment was to evaluate the technical feasibility and the effect on weed control, N availability, grain yield and quality of a temporary intercropping between durum wheat and legume species in an organic system.

Experiment Description

Field experiments were carried out in 2004-2005 and 2005-2006 in three locations of the Italian peninsula: Perugia (42° 57'N), Roma (41° 57'N) and Foggia (41° 28'N). Those locations cover a wide range of the durum wheat production areas in the Mediterranean basin: from semi-arid, with mild winter and hot-dry conditions during grain filling (Foggia) to sub-humid with mild winter (Roma) to sub-continental with cold and wet winter (Perugia). In all locations experiments were carried out in deep clay-loam soils with low organic matter content. In a randomized split-plot design with 3 replicates, 3 durum wheat varieties (Cappelli, Duilio and Creso) were grown with 3 cropping techniques as subplots: i) no weeding (Control); ii) mechanical weeding (harrowing) at tillering (Weeded), and iii) temporary intercropping with field bean (Perugia and Roma) or common vetch (Foggia) (Intercrop). No N fertilizers were added.

Intercropping was carried out by sowing wheat in single large rows 0.45 m apart (Perugia) or in twin rows 0.15+0.45 m apart (Foggia and Roma) and the leguminous species in single rows in the middle of the 0.45m wheat interrow. In the other treatments wheat was sown in single rows 0.15 m apart. At the beginning of wheat shooting, legume biomass was incorporated by hoeing. Legumes nitrogen accumulation was measured only at Foggia and Perugia by sampling plants just before incorporation and analysing N content (Kjeldhal method). Weed density was determined at wheat harvest by counting weed plants in sample areas of 1 m^2 per plot. At harvest, grain yield, grain protein content (N%x5.7) and yellow berry percentage were determined. Data were subjected to analysis of variance. Since the interaction "variety × technique" was never significant, variety and technique means were compared by using a Fisher LSD at P=0.05.

Weed density at harvest was low in all locations (Table 1). Differences among treatments were generally little, but intercropping and harrowing sometimes caused a significant decrease of weed density. In 2005, intercropping was frequently more effective than harrowing, while in 2006 harrowing resulted more effective at Roma. Although weed control was excellent for hoeing and good for harrowing, the weed density at the

end of the crop cycle was just slightly lower than in the unweeded control. This was mainly due to late weed emergence promoted by superficial soil movement caused by mechanical operations.

Table 1: Weed density at harvest (n. m^{-2}) in 2005 and 2006.

	Perugia		Roma		Foggia	
	2005	2006	2005	2006	2005	2006
Varieties						
Cappelli	15,1 a	39,0 a	11,8 a	20,4 a	32,0 a	31,3 b
Creso	19,4 a	32,0 a	10,9 a	17,6 a	33,7 a	37,4 a
Duilio	15,8 a	46,0 a	10,0 a	18,1 a	32,1 a	39,7 a
Techniques						
Intercrop	3,0 b	32,0 a	6,1 b	20,5 a	15,6 c	38,2 a
Control	23,8 a	53,0 a	14,1 a	24,1 a	48,2 a	35,7 a
Weeded	23,4 a	32,0 a	12,4 a	11,5 b	34,0 b	34,6 a
Mean	16,8	39,0	10,9	18,7	32,6	36,1

Means fallowed by the same letter are not statistically different at P= 0.05

Legumes above-ground biomass incorporation supplied a relevant amount of organic N to the soil, namely 62 and 76 kg N/ha at Foggia; 51 and 47 kg N/ha at Perugia, in 2005 and 2006 respectively. Since the competition between companion species for soil mineral nitrogen pool was limited to early growing stage, the most part of N accumulated by legumes is to be considered as derived from atmosphere. Moreover, observed values probably underestimate the actual N supply because they do not take into account N accumulated in roots and exudates.

Yield was low and variable with location and year, while differences among treatments were small (Table 2). Yield in intercropping never differed from other treatments at Foggia, was always higher in Perugia while it was lower in 2005 at Roma.

Table 2: Grain yield (t/ha) at standard humidity as affected by varieties and cropping systems.

	Perugia		Roma		Foggia	
	2005	2006	2005	2006	2005	2006
Varieties						
Cappelli	1,59 b	1,61 b	1,75 c	1,68 b	1,64 b	1,93 c
Creso	1,90 a	2,27 a	2,36 b	2,39 a	2,38 a	2,86 b
Duilio	1,97 a	2,35 a	3,16 a	2,55 a	2,61 a	3,04 a
Techniques						
Intercrop	1,97 a	2,30 a	1,46 c	2,18 ab	2,15 a	2,49 a
Control	1,85 ab	1,97 b	2,76 b	2,39 a	2,22 a	2,72 a
Weeded	1,65 b	1,96 b	3,04 a	2,07 b	2,26 a	2,62 a
Mean	1,82	2,08	2,4	2,2	2,2	2,6

Means fallowed by the same letter are not statistically different at P= 0.05.

Despite the moderate effect on yield, grain protein content was increased by intercrop in any location and year, excepted in Roma in 2006, and was clearly related to additional N supply to the system allowed by legumes biomass incorporation (Table 3). The effect of cropping tecniques was even more remarkable on yellow berry percentage, that showed a drastic reduction in intercrop treatment as compared to both control and weeded treatments (Table 3). In particular, it should be emphysized that intercropping at Perugia and Roma increased the protein concentration over the market requirement standards in all varieties.

The main advantage of temporary intercropping is certainly related to the direct effect of legumes nitrogen derived from atmosphere supplied to the system with biomass incorporation, although positive effects could derive also from some nitrogen transfer from the legumes roots before incorporation, the modification of wheat root development and from the improved efficiency on the use of resources other than N.

Table 3: Protein (N% x 5.7) and yellow berry (%) as affected by vtrys and cropping systems.
Means fallowed by the same letter are not statistically different at P= 0.05.

	Protein (N% x 5.7)						Yellow Berry (%)			
	Perugia		Roma		Foggia		Perugia		Foggia	
	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
Varieties										
Cappelli	14,4 a	12,1 a	13,4 a	13,1 a	15,7 a	17,0 a	10,4 c	9,4 b	2,1 c	1,9 c
Creso	13,2 b	9,5 b	12,3 b	11,9 b	12,8 b	13,1 b	25,0 b	38,9 a	22,2 b	20,8 b
Duilio	10,9 c	10,6 ab	12,2 b	10,7 c	12,7 b	12,9 b	53,8 a	36,8 a	23,4 a	23,4 a
Techniques										
Intercrop	13,9 a	11,5 a	14,7 a	12,3 a	14,6 a	14,8 a	16,0 b	14,1 b	13,0 c	12,6 b
Control	12,0 b	10,2 b	11,6 b	11,3 a	13,1 b	14,0 b	38,0 a	36,2 a	18,7 a	17,8 a
Weeded	12,6 b	10,6 b	11,5 b	12,0 a	13,4 b	14,2 b	35,2 a	34,8 a	16,1 b	15,8 a
Mean	12,8	10,8	12,6	11,9	13,7	14,3	29,7	28,4	15,9	15,4

Conclusions

Results indicate that temporary intercropping between wheat and leguminous species with legumes incorporation before wheat shooting can supply important amount of N to cereal and improve grain quality, without reducing yield. A further advantage is the excellent weed control effect. Therefore temporary intercropping appears an environmental soustainable technique for organic wheat production in mediterranean areas. Further research is needed to investigate and optimize the most suitable and feasible technique for any environmental and farming condition.

Acknowledgements

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Biographies

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Italy (Food Stability)

Energy Analysis of Organic and Conventional Farming Systems

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Introduction

Climate change is currently considered one of the main environmental problems. Intensive agriculture systems, based on high external input use, are estimated to contribute to over 20 % of gas emission. On the other hand agriculture suffers directly the effects of global warming especially in terms of higher frequency of extreme climatic events, desertification, salinity and erosions all having deep impact on yields. There is thus a close relationship between the capacity to secure food supplies to world population and the reduction of carbon emissions.

Environmentally sound farming systems appear to have crucial importance in counteracting climatic changes and in particular organic agriculture could represent a valuable opportunity to tackle such problem thanks to its holistic approach to agricultural activity, to food production and to soil, plant, animal and human health. Organic farming by reducing the external input (like synthetic fertilizers and pesticides) and encouraging the maintenance of soil fertility by use of animal or green manure, may decrease CO2 emission and non renewable energy use.

The MASCOT (Mediterranean Arable Systems Comparison Trial) long-term experiment started in 2001 at the Interdepartmental Centre for Agro-Environmental Research "Enrico Avanzi" (CIRAA) of Pisa University was started with the aim to compare organic and conventional management systems under different perspectives among which the energetic analysis plays a significant role. A five-year stockless arable crop rotation (sugar beet-winter wheat-sunflower-pigeon bean-durum wheat) was carried out under a conventional (CS) and an organic (OS) management system. In the OS, red clover (*Trifolium pratense*) was interseeded in winter and durum wheat and used as green manure for sunflower and sugarbeet (for detailed materials and methods see Bàrberi and Mazzoncini,2006; Mazzoncini et al., 2007). The energy analysis of CS and OS was performed on data collected during the first five year period of study (from 2001/02 to 2005/06). The energy equivalents are in accordance with Bonari et al. (1992). The mechanical energy inputs were computed using as conversion factors 44 MJ/kg for diesel fuel and 80 MJ/kg for lubricant oil. The output includes not only the crop and residues yield, but also (when present) the green manure biomass.

Results

Conventional farming systems consume a significantly higher amount of fossil energy than organic farming systems (table 1). The two systems show different values in terms of use of mechanical inputs however OS saves, on average, 34% of the energy used by the CS. Similar findings are reported by Pimentel et al., 2005. By examining the differences between the two systems it was found that tillage requires the 51% of the total energy used in OS in comparison to CS where tillage consumes the 27% of the required energy. That is mainly due to an intensive use of the equipment for a suitable seed bed preparation and mechanical weed control under OS and, in the same time, chemical external input reduction. On the other hand in CS, 41% of the energy consumption is linked to nitrogen fertilization. In this system the NPK fertilizers and the pesticides (fungicides, insecticides and herbicides) represent about 9 and 3.5 % of global energy inputs respectively. In some crops (data not showed) like pigeon bean, where fertilization rate in CS is lower, the differences in inputs use between the two systems are significantly reduced. In fact, the CS consumes only a 5% more input than the OS.

Table 2 - Energy balance of OS and CS crop rotations as five years average .

System	OS		CS	
	Mj ha^{-1}	*%*	Mj ha^{-1}	*%*
INPUT				
Primary tillage and seedbed preparation	36.495	*47.6*	28.826	*24.9*
Crop maintenance	2.873	*3.8*	1.912	*1.7*
Sowing *	17.189	*22.4*	15.867	*13.7*
Fertilization ☼ N PK	 9.391 3.900	 *12.3* *5.1*	 47.787 10.767	 *41.3* *9.3*
Pesticides ☼ herbicides fungicides insecticides	 = 359 230	 *0.5* *0.3*	 2.631 770 567	 *2.3* *0.7* *0.5*
Harvesting crop residues	6.157	*8.0*	6.157 446	*5.3* *0.4*
Total INPUT	76.593	*100*	115.729	*100*
OUTPUT				
crop yield	223.705	*37*	316.594	*44*
residues yield	286.815	*48*	409.473	*56*
green manure yield•	87.238	*15*	=	=
Total OUTPUT	597.759	*100*	726.067	*100*
OUTPUT/INPUT				
	7.8		6.3	

* including green manure sowing and seeds in organic farming system
☼ according to 2092/91 EU reg. on organic farming
• as dry matter

Whereas in sunflower mechanical inputs have the main weight on the input balance in OS (67%) and chemical inputs burden the CS balance for about the 68%. Similarly it occurs in sugarbeet where the energy required for the mechanical inputs in OS and the chemical inputs in CS represent about the 60% of the entire requested inputs. In cereals mechanical inputs consumption in OS is about the 45%, while chemical inputs affect CS for 55%. On the output side CS produces a higher amount of energy in terms of crops and residues yield (30% more), but the most part of this energy abandons the system. On the contrary, in OS only the crops yield energy leaves the system while the residues energy still remains disposable for the system. Moreover, the green manure biomass actually represents in OS a real positive energy supply put in the system furthering the subsequent crops and the ecosystem.

Conclusions

OS is conserves more energy thand CS even though it does not produce the same crop yields. Green manure assumes a key role in OS management and seems to make it able to better exploit non renewable resources as the output/input ratio evidences. Moreover, the increase in retention of soil carbon using green manure (Drinkwater et al., 1998) could give a significant aid to reduce the CO2 emissions, to maintain or increase soil fertility making organic farming systems more stable and able to ensure food availability in the long period.

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Biography

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Italy (Food Stability)

Agroecological Foundations of Organic Farming's Potential for Food Security and Stability

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Introduction

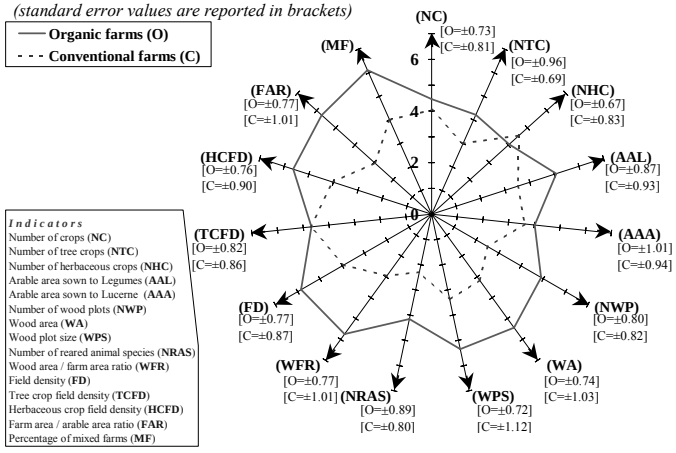
Theoretical approaches to organic farming emphasise that design and implementation of organic farming systems should comply with agroecological principles, recognising that behind the practice of organic farming there is the science of ecology and an understanding of sustainability (Tellarini and Caporali, 2000; Caporali, 2004). A major agroecological principle of prganic farming acknowledges that agriculture must be a human activity system with a site-specific imprinting in order to practically identify and promote a case of harmony-with-nature developmen*t.* Nature is creative and productive because due it biodiversity (Naeem and Shibin, 1997). Integration between different structural and functional components, with differentiated ecological niches or roles, is the key for maintaining productivity and sustainability at the ecosystem level. Conventional agriculture has completely betrayed these ecological principles of organisation, generating specialised agroecosystems where high productivity is maintained only through high external input of matter-energy from non-renewable resources. This model is an anti-ecological one and is unsustainable. The local context of agriculture is to be held as a hierarchic priority in designing and implementing farming and cropping systems that, as an outcome, create landscape systems.

Our survey concerns two regions in Central Italy, one in Northern Lazio and the other one in Southern Lazio, both under a Mediterranean climate where crop productivity is drought constrained in the summer. In the first ecoregion, 33 farms were involved (18 organic and 15 conventional), with an emphasis on indicators of cropping system biodiversity. In the second region, indicators of biodiversity in three "communes" (local administrative units) covering an area of around 24,000 ha were investigated at landscape level.

Results

Monitoring farms of different type - organic vs. conventional - through the use of appropriate indicators of biodiversity and sustainability at regional level in Central Italy (Caporali et al, 2003) has yielded results (Fig. 1) that confirm the expectations in agreement with the above mentioned theoretical approach to organic farming. Integration of biodiversity at the farm level is more likely to be achieved in organic farms than in conventional ones. Assessment of cropping system diversity within the cultivated fields is best expressed by the occurrence and spread of leguminous species at the farm level, especially of Lucerne, which is the most important forage crop in a Mediterranean environment. The occurrence of forage legumes is important for both biological diversity and sustainability, since they involve the occurrence of animal husbandry as an enterprise in the farm system and since they supply biologically fixed N to the succeeding crops. From our survey, a picture of a typical organic farm emerges, where the average farm size is around 54 ha with diversified land use shared between agricultural (81,3%) and wood area (18,7%) and with integration between crop and animal husbandry. The average crop field size is around 4 ha in organic farms, while around 8 ha in conventional ones. This means that more green margins are allowed to occur for biological colonisation. On the baseis of these and other findings (Mancinelli et al., 2007) there is strong evidence that organic farming can be very helpful in reducing the loss of naturalness while promoting biodiversity and ecosystem

Figure 1 - Webs of sustainability of organic and conventional farms in Central Italy
(standard error values are reported in brackets)



sustainability. From this perspective, organic agriculture can be considered as a renewable form of traditional agriculture in Central Italy that can reinforce both the balance of land-use patterns as a heritage of past agriculture and the demographic stability of local population. The analysis of the landscape structure in our survey shows that habitat fragmentation is a phenomenon more pronounced at lower levels of elevation, while natural habitat and ecological integrity is more preserved at higher elevation. In our case study, the traditional public ownership regime reveals itself as a powerful driver in maintaining the original habitat as woods in the more fragile steep zones, where the balance of the hydrologic cycle is the first condition to ensure land sustainability at catchment level.

Conclusions

Food security is a function of agriculture that holds together bio-physical and social aspects of production. Food is the terminal step of a process of production which involves also environmental health. Without environmental health, which maintains the natural base for production, there can be no agriculture and no food security. The first requirement for producing agriculture in a sustainable way is maintaining the organiser of the production process on the spot. A vital rural community and an ecological pattern of production are the two key aspects for ensuring continuity of production and therefore, food stability and sustainability both at local and global levels. Our research in Central Italy shows that historical land-use patterns are still alive on the territory and testify the capacity of human beings to develop a balanced relationship with their context of life at local level. Even if recent changes in society trends bring about more demographic pressure and more environmentally-aggressive technological fixes, tradition in land-use patterns transferred from generation to generation through culture, education, regulations and action at local levels, can help mitigate human impact and operate as a cultural buffer for ecosystem resilience. Organic Farming has potential for re-enforcing this valuable tradition.

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Biography

Fabio Caporali (Department of Crop Production, Tuscia University, Viterbo, Italy) is Full Professor of Agroecology. He has a long experience both in carrying out research and in coordinating research projects on environmentally friendly agriculture. At present, his main scientific activity is designing, performing and evaluating farming and cropping systems in the Mediterranean environment, with particular reference to the farmers' role in sustainable agriculture. He also worked with nitrogen input/output balances in organic mixed farming systems and with the introduction of self-reseeding legumes in crop rotations and in cover cropping systems. He is also interested in the process of developing indicators of sustainability at cropping system, farming system and landscape system level.

Malawi (Food Access)

Organic agriculture for food security in Malawi, at the Thondwe Village Polytechnic

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Introduction

The District of Zomba, in the southern part of Malawi, has the typical features of any rain-fed maize based farming system (Hall 2001). Rains are erratic, slopes are sometimes very steep, and soils are poor and unstructured. The average land holding is less than one hectare and land tenure follows customary traditions. Population increases has rendered shift cultivation impossible, and families are now bound to the small plots they manage. Intercropping and mixed cropping are practiced, with maize dominating as the staple food, accompanied by cassava, pigeon pea, and some vegetables. Some fruit trees such as mango, papaya, bananas, etc. complete the scene. Only a few families have goats, local pigs, chickens or ducks. Dairy cows are extremely rare. The most limiting factor is land scarcity, which does not allow for free-grazing; animals are kept inside corrals, and must be manually fed with grass, also rare. Vegetal and animal productivity are extremely low. Another dramatic feature is the unstoppable rate of deforestation, which takes place every single day, with continuous branch-cutting from the few trees left, culminating with the cutting down of the barren trunk. Massive deforestation, although controlled, continues in the higher plateau.

In the past, and unfortunately still today, the response of the authorities and of many donors has been the free distribution or sale at subsidized prices of the usual technological package, composed of improved maize hybrids seeds and fertilizers, which aims only to increase maize yields. This has occurred when rainfall has been regular, but in other cases it has even led to lower harvests and more hunger. Even in case of a bumper harvest, the other problems are not solved, because such a simplistic approach does not attack the long term problems: extreme fragility of soil structure, low soil biological fertility, topsoil erosion due to heavy rains, lack of fresh grass for animals, lack of proteins in the diet, etc.

Since 2006, at the Thondwe Village Polytechnic, we have been trying to introduce organic agriculture as a real alternative for the long term sustainability and also the improvement of agriculture, with the main aim of improving food security in the villages of the District. The Thondwe Village Polytechnic is managed within an existing co-operation between the Diocese of Perugia and Città della Pieve (Italy) and that of Zomba in Malawi and it is now supported by an on-going project, also co-financed by the Regional Government of Umbria (Italy), the NGO Amici del Malawi (Friends of Malawi), the Rotary Club Perugia East and the Faculty of Agriculture of Perugia.

The major components of this approach are a) a large-scale introduction of shrub and tree varieties into the existing agricultural system (agro-forestry) (Huxley 1999, ICRAF 2005, Mulinge 2005), b) improved composting made with three different methods, c) soil preparation following contour lines, d) incorporation of crop residues into soil, diffusion of vetiver grass on contour lines, for the control of erosion, e) improvement of animal nutrition (goats and cattle) with fresh branches of *leucenia* and similar leguminous trees, f) use of natural pesticides.

Results

As yet we do not have consolidated data covering hundreds of farmers, over several years, but the results shown by the few progressive farmers living in the area, who have already adopted this approach, several years ago, are astonishing. Farms look better, their animals are fatter and in better shape, the soil has different colour and texture, and all of their crops look better. We are trying to continue on this ecological path, not for the production of surpluses to be sold in foreign markets, but for the improvement of the producers' nutrition.

Conclusions

Agroforestry, according to our observations in the area and to information provided by a nearby station of the World Agro-forestry Centre – formerly ICRAF, is the real turning point and the founding stone for organic farming in this type of ecological systems, because it could allow the attainment of several goals:

- improved soil fertility through nitrogen fixation and increase of organic matter;
- soil protection against erosion;
- increased water capture and reduction of run-off;'
- production of foliage to be used as animal feed;
- bean production for human or animal consumption;
- firewood production for cooking and heating;
- production of extracts to be used for medicinal purposes;
- production of natural pesticides;
- creation of habitat for bees and consequent honey production; and,
- preventing cash-stripped families to advance money for external inputs, which are at times unreliable.

This does not only apply only to our Malawian experience, but to all places with similar soils and agro-ecosystems. It is astonishing to see that applied research in this field is so limited and that the resources devoted for the diffusion of such complex innovation are so limited. As a matter of fact, the local station of the WAC – ICRAF will be closed down and the entire burden of further diffusion of agro-forestry techniques will be inherited by NGOs.

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Biography

Fabio M. Santucci holds a degree in agriculture and is Associated Professor at the DSEEA- Section of Agricultural Economics, Faculty of Agriculture, Perugia, Italy. Since 1979 has been working in developing countries, mainly in the organization of research and extension / communication systems. Since 1989 has been researching the micro-economic and market aspects of organic farming. Has been / is advisor to associations and local governments in Italy. In 1996, co-founded the *Gruppo di Ricerca in Agricoltura Biologica in Italia*. In 2002/3 spent one year at the World Bank, for a research-action program in 10 rural development projects in Latin America.

Mediterranean Basin (Food Access)

Emerging approaches to organic agriculture development in the Mediterranean Basin: MAIB experience

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Organic agriculture is a relatively recent phenomenon in the Mediterranean area, presenting a wide range of experiences and stages of development across the region (Al Bitar, 2007). Private companies but also governments, civil society and international donors have all played an important role in its growth. They can be quite influential in determining organic agriculture's impact in terms of access to food as well.

Export-driven growth increasingly co-exists with sustainable development initiatives

Export-oriented growth of organic agriculture has been, and still is, an important priority for many governments in the Mediterranean region that value organic products primarily for its contribution to the national agro-food trade balance. Export-oriented growth is strongly boosted by some foreign and local private operators that often control the whole process from the production to the market and provide farmers all required inputs and services (including technical advice and certification). Benefits in terms of income increase and reduced risk in market access are mentioned by contracted farmers. At the same time, the need for adequate regulations to guarantee the fairness of relations should be emphasised (Engiz 2007) and accurate analysis of contract farming conditions and implications should also look at the extent to which "meaningful engagement of human knowledge and creativity on the part of farmers" (Sligh and Christmas, 2007) – reported as one of the most important advantage of organic systems – is actually fostered.

The ambition to penetrate export markets is often reported also in the increasing number of grassroots initiatives supported by local NGOs and/or foreign donors, involving local pioneers, intellectuals and academic, which, tend to promote the concept of organic agriculture in the broader framework of sustainable agriculture and rural development (SARD) and link it to poverty alleviation objectives. Many of such initiatives build on synergies between the adoption of organic agriculture principles and methods with other interests and activities, more frequently environment conservation, tourism, and local market development.

In line with the current debate on organic agriculture's contribution to the achievement of Millennium Development Goals, broader positive impact appears to be associated to these projects, ranging from the empowerment of rural women[5] to alternative employment opportunities for educated young people in rural areas with decreasing chances to make a living in the cities. Rural community development is also a highly valued advantage achieved through collective learning processes fostered by organic agriculture's principles and practices (e.g. participatory extension approaches, group certification and collective marketing initiatives)[6]. Acknowledgment of organic agriculture's potential for rural development is progressively found also at the national (and sometimes local) authorities level resulting in projects with a territorial perspective, supporting widespread conversion to organic in selected areas with higher unexplored potential (e.g. experiences in Morocco and Tunisia).

Interestingly, the scaling up of SARD initiatives built around organic agriculture concepts and practices, from the civil society to the institutional arena of discourse and action, may bear some relation to the achievement of a critical level of development of (and related interest in) the national organic sector. Aditionally, it is interesting to notice that the inclusion of sensibly designed organic agriculture support measures in rural development policies and strategies is increasingly advocated by practitioners, researchers and experts.
The shift from a sectoral approach to more integrated and territorial strategies for the development of organic agriculture is an emerging trend to be undoubtedly encouraged through cooperation among concerned

[5] For instance women's cooperatives producing organic argan oil in Morocco
[6] For instance Rapunzel's organic village project in Turkey; or SEKEM's activities in Egypt.

institutions and partnership between NGOs and governments. Yet, despite general agreement on the need to progress along this course of action, overall, communication and operational mechanisms for partnership still appear to be faulty, sometimes. Rarely is organic agriculture in many Southern and Eastern Mediterranean countries an entirely individual choice for small-holders that are more likely included in group- and/or area-based projects.

For many different reasons, individual initiatives are widespread in many Northern Mediterranean countries where the need to further support and develop collective and territorial strategies for the development of the sector is a timely issue closely related to national/local authorities' programming capacities but also to organic actors' ability to synergise and negotiate with other actors living and working in the same human, natural and institutional environment[7].

Organic agriculture and geographical indications: mutually reinforcing tools for the preservation and promotion of Mediterranean agricultural and food heritage

In the framework of the Euro-Mediterranean Partnership specific attention to the development of organic agriculture was firstly explicitly paid in the Conclusions of the 1st Euro-Mediterranean Ministerial Conference on Agriculture held in Venice in November 2003 emphasising the need to extend the Euro-Mediterranean cooperation in the field of sustainable rural development, organic farming and geographical indications. As a result, such issues were included as non-trade aspects in the Roadmap for Agriculture towards the Euro-Mediterranean Free Trade Area in 2010.

Organic agriculture and geographical indications are mentioned together again in the sustainable agriculture and rural development chapter of the Mediterranean Strategy of Sustainable Development (MSSD) approved in 2005 by the Mediterranean Commission on Sustainable Development in the framework of the UNEP – MAP initiative[8]. Potential and scope for multiple synergies between organic agriculture and geographical indications is more and more perceived by international donors, national governments, private operators and NGOs that appear to be increasingly interested in opportunities for skills development, capacity building and market penetration. In EU countries of the Mediterranean region protection of geographical indications sports a long standing tradition and mature initiatives whereas in Southern and Eastern Mediterranean countries it is in its early stages. But interesting advances both at the individual and the institutional level could be envisaged especially where experience in organic agriculture already exists to build on and attention to traditional products is being increasingly reported in the domestic market.

Need for systematic analysis and further experience exchange

The monitoring of organic agriculture's evolutionary trends is crucial for the sector intrinsic dynamism and the wide range of interests that seems to be able to capture. Equally fundamental is getting a deeper understanding of the actual and potential impact of organic agriculture on livelihoods improvement. Information about the latter remains sketchy in the Mediterranean region, which calls for a comprehensive and systematic analysis and efforts to go beyond the anecdotic dimension. Additionally, cooperation on institutional capacity building but also on people-to-people exchange of experiences are broadly perceived needs. Evidence of this emerged in a priority setting exercise carried out in the framework of the first meeting of the Mediterranean Organic Agriculture Network (MOAN), a recently launched initiative providing a regional platform for discussion and best practices sharing on relevant issues in Mediterranean organic agriculture[9].

[7] Such issues have been also addressed in the CADSES – Central Adriatic Danubian Sout-Eastern Space area by the SIMOCA project funded in the framework of Community Initiative INTERREG III B (2000-2006) CADSES . For further details please refer to "The SIMOCA Project MEMORANDUM on Organic Agriculture & Sustainable Rural Development in the CADSES area. Elements for a Trans-national Strategy" downloadable at: www.simoca.org.

[8] United Nations Environment Programme – Mediterranean Action Plan

[9] Firstly launched in 1999, the MOAN initiative has been recently reorganised and enlarged. For further information see: http://moan.iamb.it

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Biography

Patrizia Pugliese is an agronomist specialising in Farm Economics and Rural Planning. She holds a Ph.D in Policies for Sustainable Development and a MSc in Rural Resources and Countryside Management. She has more than 5-year experience on socio-economic, market and policy aspects of organic and sustainable agriculture and she is also dedicated to research and consultancy work on rural development issues including food security, poverty alleviation and gender policy. On such topics, mostly with a special focus on Mediterranean countries, she has been involved in post-graduate training activities, EU-funded research projects and international cooperation initiatives and is author of scientific contributions to books and reports and of articles published in national and international journals and magazines.

Mexico (Food Access)

Movimiento Agroecologico de Americal Latina y el Carible Maela

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Introduccion

En México, al suroeste, se encuentra Tapachula, Chiapas, región con 3000 Mm. de precipitación pluvial anual. Con bosques, selvas, y montañas, de 2 mil mts. de altura, tierra de las más ricas y antiguas del mundo en cuanto a suelos, biodiversidad, climas, sabiduría agrícola basada en el respeto y la veneración a la naturaleza.

La Red Maya de Organizaciones Orgánicas integrada por 2500 familias, con 4500 hectáreas de cultivos orgánicos, en 13 Municipios está compuesta por pequeños campesinos del Estado de Chiapas, genera más de 30,000 empleos permanentes en los pueblos indígenas donde enfrentamos condiciones de muy alta marginación, que afectan especialmente a mujeres, niños y ancianos.

Se trata de organizaciones, productoras orgánicas de café, cacao, chocolate, caña de azúcar, coco, plátano, mango, miel, chile, ganadería, pesca y ecoturismo, basados en la experiencia comunitaria local para resistir el deterioro ecológico, y la pobreza permanente, así como los desastres de incendios, erosión e inundaciones. Durante los últimos, 20 años estamos desafiando con éxito el fenómeno de la pobreza, marginación y erosión, produciendo nuestros alimentos e insumos, y atrayendo al país divisas con nuestras exportaciones, de modo hemos ayudado a posicionar esta región agroecológicamente.

Resultados

Allí se impulsa la construcción de un proyecto alternativo donde las comunidades indígenas y campesinas que producen bajo las reglas de certificación Orgánica y que incluyen además procesos agroindustriales derivados del café y cacao así como iniciativas de turismo ecológico y experiencias agro ecológicas avanzan en la reconstrucción y en el control ecológico y social de sus territorios.

Experiencias de sustentabilidad y autogestión muy valiosas, que como movimiento social actúa de manera combinada promoviendo actividades de auto-capacitación, tanto para la producción, como industrialización y comercialización directa de la producción, eliminando el intermediarismo. Los frutos de este esfuerzo se reflejan en la formación de una red de intercambio de información y conocimiento que surge, por una relación más justa entre las organizaciones y con la naturaleza.

Con estas acciones promueve la justicia social, la producción con conservación, la lucha contra la erosión de los suelos, la Autonomía Productiva base de toda Soberanía Alimentaria, las reivindicaciones culturales originales, el poder de lo local y lo pequeño, la descentralización de las decisiones, la humanización de la tecnología, la domesticación del mercado, el retorno de la espiritualidad, el manejo ecológico del territorio, la alimentación, la bio-salud mediante, la participación social. La Producción sustentable, está siendo comercializada en Mercados Orgánicos de México Europa, Estados Unidos.

Se busca hacer uso de los recursos alimenticios y la sabiduría local basada en relación con la tierra, cuidando a los árboles, desarrollando sistemas agroforestales que favorezcan el incremento de la materia orgánica en el suelo y con políticas de producción, post-cosecha, transformación y comercialización de orientadas en este sentido.

En la región hemos venido cultivando con sistemas diversificados de manejo agroecológico y certificación orgánica, así los desequilibrios climáticos como los huracanes, no provocan daño. Sin embargo en la región las parcelas que no son orgánicas, continuamente son afectadas por la erosión de los terrenos.

Dificultan el avance de estos procesos, las políticas públicas agropecuarias y forestales que favorecen la destrucción de los frágiles equilibrios naturales. Nos referimos a la tala de bosques y selvas; al fomento de la ganadería extensiva; al impulso de la agricultura industrializada con monocultivos, fertilizantes químicos, semillas transgénicas, pesticidas; al cambio en el uso de suelo, clasificando a los agricultores como "soyeros", "cafetaleros", "coqueros", "maiceros", "cacaoteros" Es decir la "revolución verde" aplicada en los accidentados terrenos de la Sierra, con grave desconocimiento y menosprecio de los sistemas indígenas mayas de manejo diversificado y sostenible de bosques, manglares y selvas como son la milpa diversificada, el cultivo de café bajo sombra asociado a árboles maderables y frutales, así como al ancestral cultivo diversificado de cacao entre otros muchos.

También somos responsables los agricultores que nos hemos prestado a la aplicación de dichas políticas olvidado nuestra tradición, cultivando la tierra bajo un sistema de agresión y violencia a nosotros mismos, a los ecosistemas que habitamos y a los consumidores. Y en general al sistema económico de producción que mantenemos basado únicamente en la obtención de dinero sin responsabilizarnos del daño ambiental que provocamos.

Debido a la desertificación y contaminación atmosférica en el mundo, la forma de llover ha cambiado a aguaceros de lluvia torrencial que en pocas horas hacen precipitar grandes cantidades de agua seguidas de prolongados periodos de sequía. Esto está sucediendo en todo el mundo mientras en otros lugares se presentan graves incendios y sequías.

Conclusiones

Derivado de las experiencias, como comunidad y familia, se requieren micro créditos para que puedan mejorar en la producción orgánica, como en la compra de herramientas, reparaciones de su vivienda, para materiales de sus terrenos y de sus animales de la granja como aves, cerdos, borregos.

La Red Maya forma parte del Movimiento Agroecológico de América Latina y el Caribe: MAELA que se define: "Somos un movimiento latinoamericano de 150 organizaciones sociales, en 20 países, que promueven la agroecología como una propuesta constitutiva de modelos de desarrollo alternativo, incluyente de la soberanía alimentaria, del uso, acceso y control de manera equitativa y sostenible de los recursos naturales y de la recuperación de los saberes locales; mediante la articulación de alianzas que posibiliten la gestión de conocimientos, la generación de capacidades y la incidencia política desde lo local, nacional, regional y continental."

Sin embargo la Agroecología cada vez más es enfocada como una propuesta de desarrollo integral y como un proyecto político para la construcción de una nueva sociedad. Ello requiere repensar los diseños institucionales necesarios para el cambio. Esta nueva sociedad no podrá ser creada con las viejas estructuras, ni con la indiferencia de gobiernos sin visión de sustentabilidad social.

Porque a los cultivadores de alimentos sanos nos preocupan las necesidades de nuestros pueblos y a la vez fortalecemos el cuidado amoroso a nuestra tierra, hemos de seguir trabajando por:
Realizar cambios de políticas públicas para mejorar las condiciones sociales de los grupos menos privilegiados, a la vez que fortalecer la capacidad de la sociedad civil para realizar incidencia política como Movimiento Agroecológico Latinoamericano,

Pacific Region (Food Availability)

Decline in Availability of Organic Food Products for Pacific Islands

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Introduction

The Pacific Islands Countries and Territories extend, over 19 million km^2, with combination of geographical and ecological characteristics ranging from hilly Islands to atolls. Awareness for organic agriculture is on the rise in the region as organic is being promoted by NGO's and public agencies. As Islanders become educated and health conscious, they search for organic products and face difficulty differentiating organic produce from those produced through conventional agriculture practices. When it comes to most of the local produce comprising the diet of Pacific Islanders, finding a label that says a particular local food product is organic is hard to find. Lack of affordable organic certification systems in the Islands is a major factor that is failing to provide organic guarantee to the consumers.

An FAO/SPC/WHO Pacific Islands food safety and quality consultation (2003) concluded that, social marketing using aggressive promotions of local foods is an essential requirement to initiate behaviour change for the vision of "healthy islands", but the concern is "how safe are local foods?" as the use of pesticides and chemical fertilizers are on rise in the Islands. Minimal third party certification systems and lack of internal control for major dietary agriculture produce affect growers who supply organic food products in the local markets.

Current Pacific Island Situation

Organic farming methods are not new to the Pacific Region. In the past few decades most of the food grown using island agricultural systems would have fully met organic agriculture and organic certification requirements. The practices have been inherited from one generation to the next for centuries. However, the situation in the region is changing fast. Use of conventional fertilizers and pesticides is quickly being adopted at the semi-subsistence and subsistence level. The Regional Conference for Asia and the Pacific 2001, one of the conferences of the International Fertilizer Industry Association, reported the use of fertilizer in root crops, fruits, and vegetable sectors in the Pacific Island Countries. Countries such as Fiji, Tonga, and Samoa have formulations and blends of fertilizers, specifically recommended for use in root crops, fruits and vegetables. Herbicides are making fast entry into local food production and supply chains. This assumption is based on the rapid increase in the reported usage of this product. In Fiji alone, reports indicate that the use of herbicides has increased from 86 metric tonnes in 2001 to 99.3 metric tonnes in 2003.

Furthermore, population pressure has had a significant impact on land use resulting in reduced traditional land area allocated per household affecting shifting cultivation where the fallow period has been reduced from 5 to 2 years and less than one year in the worst situations; causing decline in yields of staple crops grown using this systems. Inadequate systems in place for organic certification and subsequent premium prices for organic products leave farmers with little option but to use chemical inputs to increase cropping income. In addition, agriculture advisory services in the Islands are more production-oriented and almost all countries have pesticide and chemical fertilizer recommendations in most of their crop production advisory packages.

Local Pacific island producers are likely to lose organic integrity (Table.1), if no conscientious effort is carried out to minimize the use of chemicals and pesticides. Food categories affected are fruits, staples, vegetables and meat products. This is a major concern as root crops and vegetables make up the major dietary intakes of Pacific Islanders. If the trend continues in the next decade there will eventually be no organic food components available in diets of Pacific people

Table 1: Local Produce likely to Lose Organic Integrity[i]

Food Category	Near organic practice (only herbicides may be used to control weeds or clear land before planting	Fully conventional (Pesticides and fertilizers used)

Fruits	Lemons, Papaya, Guava, Mangoes	Watermelon ,Oranges (orchards produced), Pineapple
Staples	Coconut, Breadfruit, Banana Yams, Swamp taro, Pandanus fruit	Taro, Rice, Sweet potato, Maize, Peanut, Cassava
Vegetables	Taro leaf , Edible ferns ,Duruka (*Saccharum edule*)	Tomato, Lettuce, English Cabbage, Chinese cabbage, Beans, Egg plants (Aubergine), Cucumber, Okra, Bele (Aibika,), Chilli, Pumpkin, Cauliflower, Broccoli, French Bean (*Phaseolus Vulgaris)*
Food Category Live stock Products	Near organic practice	Food additive and medication used
Meat	Duck, Goat, Beef	Chicken, Pork
Dairy	-	Milk
Poultry	-	Egg

[1]Based on SPC extension consultations with farmers and market vendors from different Pacific Island Countries. The status of certain crops may differ from country to country, but in general the data presented indicate generic trends.

In almost all Pacific Island Countries there are organizations, agencies, and government bodies working in the area of organic agriculture, however, to date none of the countries have local market outlets selling certified organic food products. Realistically, producers who grow food under the organic category are on the losing side in terms of income from their products. These products are usually sold at the local market or exported, for example breadfruit and mangoes from semi-subsistence farm harvest without premium prize. There is also difficulty in quantifying these produce due to lack of proper certification and marketing systems. Almost all organic certification is dependent on external certifiers coming either from Australia, New Zealand or the EU. However, high cost of accreditation and other expenses does not allow certifying bodies to make certification cheaper for the Pacific Island Countries.

Conclusion

Organic food consumption is growing globally, thus there should be no exception for Pacific Island Countries. Organic labelling systems will offer a simple and uniform way for consumers to distinguish organic products against products from other sources. The local consumers will feel more confident in selecting certain produce and will be willing to pay for it. This will also help farmers and food processes to obtain a fair share of return of their produce. It is essential that countries start drawing up strategies and procedures for local establishment and accreditation of organic certifying agencies and programs. Organizations and farmers will require considerable support and/or incentives over the initial years if the system is to gain momentum and be maintained. Significant impact will require harnessing of resources and commitment of numerous stakeholders, both in private and public sectors. The issue of local organic food production and supply chains for the Pacific Island Countries is worth exploring with the main goal to gear Pacific Island farming to achieve sustainability and not deprive Pacific Island people from having access to organic food supplies.

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Philippines (Food Access)

Organic Agriculture and Landscape Change: The Case of the Ifugao Rice Terraces, Northern Philippines

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Introduction

This study was conducted in two barangays (basic political units in the Philippines) in the Northern part of the Cordillera mountain range, particularly in the province of Ifugao where rice terraces have been declared as UNESCO Heritage Site (National Statistics Office, 1999). The ecosystem setting is that of upland and highland with approximate elevations of 800 meters above sea level (masl) for Nagacadan, Kiangan and about 1200 masl for Bocos, Banaue in the said province. Rainfall is generally high.

The study covered 138 respondents (105 in the survey and about 33 key informants and individual in-depth interviews, most of them farmers) in the community where the farming system is more on crop production in the rice ponds (*payoh*) and swidden farms and communal forests being maintained.

The scope of investigation primarily centered on providing management (environmental) inputs to the developmental process; the 8 month study was done from April to November, 2001. The objective was to look into the over-all dynamics of land use changes and its apparent impact to the native ecological process in an indigenous community where organic agriculture is strongly being practiced. It made use of a combination of participatory social research and experimental as well as ecological methods to provide a holistic approach in the analysis.

Results

From the traditional use of the rice terraces, the following evolved in the Nagacadan area: vegetable gardens planted primarily to Baguio beans (*Phaseolus vulgaris*) or pechay (*Brassica chinensis*), terraced fields where high-yielding varieties of rice (HYVs) are cultivated, and abandoned rice fields. The area devoted to traditional rice, where organic agriculture is practiced, has diminished in recent years (about 63% of the original area). In contrast, in the Bocos area, massive crop diversification was generally non-existent, thus the practice of organic agriculture was more intensive (about 93% of the area).

A change in land utilization has impacted the native ecology of the landscape in the following way:

- Indigenous agricultural practices. Age-old practices were documented to be generally declining, although some were still very strongly practiced, such as the *pinkol* or *inagoh* system (decaying organic mounds in the rice pond fields and planted to ginger & onion);
- Soil fertility. A highly significant acidification has occurred in Nagacadan due to application of conventional fertilizer sources; in terms of the organic matter content, Bocos soils has significantly better levels (Gomez and Pacardo, 2005);
- Perceived insect pest occurrence. The introduction of HYVs of rice in Nagacadan has apparently brought new species of pest into the area. They were later identified as 'brown plant hoppers.' Moreover, the attendant introduction of modern practices associated with these lowland varieties (pesticide and fertilizer applications, decreased fallow period, etc.) has probably disturbed in a way the 'ecological balance' in the locality.
- Rice sufficiency of traditional rice varieties. It was estimated that the percentage of traditional rice sufficiency in Nagacadan and Bocos were 35.0% and 53.0%, respectively. This can be translated as supply for 4.2 and 6.4 months, respectively. In the in-depth interviews, a harvest of 156.7 bundles of the predominant variety, *bukig*, in Nagacadan could roughly support a household with 7.6 members for 3.8 months (compared with the 4.2 months general estimate). Comparatively, a harvest of 330

bundles of the variety *lokoop* in Bocos could roughly support a household with 7.7 members for 6 months (compared with the 6.4 months general estimate);

- Perception on the effect of modern agricultural practices on selected native attributes of the ecosystem. Over-all, the cultivation of HYVs of rice, application of chemical inputs, and shortened fallow period were perceived to have significantly affected the ecological balance. Bocos farmers generally had perceived these practices to be "moderately degrading".

Of interest is the microwatershed, *muyung,* which serves to provide water to the rice ponds. This therefore serves as an important support system for agricultural production. The *muyung* in Nagacadan was documented to have a more diverse vegetational composition (24 overstorey and 18 understorey species) compared to another site in Kiangan, *Patukan,* (21 overstory and 15 understory species). The streamflow (water) discharge from the Nagacadan site was highly significantly more compared to that in Patukan. Moreover, the moisture and organic matter content of the Nagacadan soils were highly significantly correlated with the streamflow discharge.

Based on the foregoing, it can be said that a considerable segment of the population, particularly in Bocos, still values the age-old practice of organic agriculture. This is especially true at the household and community levels. The rice produced in Banaue have gained entry into the US market, although in a very limited scale. The threat posed by new agricultural practices undermines the potential of organic agriculture.

Conclusions

In terms of food availability, comparisons in productivity of different traditional rice cultivars have been generated in the study, although generally, the yields have not been fully sufficient to address the needs of the household. In regards to food access, aspects such as knowledge of several indigenous varieties of rice, which is basically a domain of women in subsistence agroecosystems has also been documented in the study. As brought out in the in-depth interviews, participants have demonstrated understanding of natural dynamics such as the ecological significance of nutrient cycling and ecological sustainability. In terms of food quality and safety, the general adherence to traditional farming practices especially in Bocos is a revelation of their deep respect to nature; what nature provides to them, is the safest. Any foreign additions to the system is detrimental.

Some gaps in data need to be addressed such as the extent of irrigable area which should be mapped out by geographic information systems (GIS) to be more precise. The dynamics of pest incidences in organic farms should also be assessed in order to have better productivity. The other UNESCO-declared heritage sites which are also showcases of traditional organic rice farms in Hungduan, Batad and Jolongan should also be assessed spatially using GIS.

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Biography

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Philippines (Food Utilization)

Growth Perfomance of Broiler Fed with Different Strains of Probiotics

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Introduction

The study was conducted at the Isabela State University, San Mariano Campus, Sta. Filomena, San Mariano, Isabela, Philippines which has temperate and irrigated lands. During the study, students enrolled in agriculture courses were involved in the project and lessons learned were then disseminated to the people within the community. Students established projects in their own villages and used the technology that has been generated. This study focuses more on an integrated farming system approach because production of organically grown feed resources has been simultaneously produced within the farm itself to be assured that the feed ingredients used in the formulation of ration or feeds is really an organic or free from any synthetic pesticides and fertilizers. A completely randomized design (CRD) was used in the study and chicks were randomly distributed to the different treatments and replicated three times with ten (10) birds per treatment. For comparison of treatment means, Least Significant Differences (LSD) was used. Four (4) treatments used as follows:T_1 - Control (0 Probiotics);T_2 - 2 kg Lactobacillus sp./ MT of feeds;T_3 - 2 kg Bacillus sp. / MT of feeds;T_4 - 2 kg Pediococus sp./MT of feeds. Identical care and management was provided to all birds throughout the duration of the study. Birds in the different treatments were fed with their corresponding rations throughout the duration of the study. Ad libitum feeding was practiced. Clean fresh water was provided as drinking water to the birds. The study was conducted for 40 days to determine the effects of different strains of probiotics on the growth performance of broiler. A 120 straight-run day old Broiler chicks was used. All mash rations containing 21% crude protein was formulated. The experimental diets were formulated using the following ingredients: ground yellow corn, soybean meal, fish meal, molasses, limestone, copra meal, salt, vitamin/ mineral premix and strains of probiotics.

Results

The average initial body weight of broilers before feeding diets containing different strains of probiotics is presented in Table 1. This study revealed nonsignificant differences among treatment means. The initial body weights ranged from 54.25 to 59.66 grams. No significant variation was obtained on the first week of the experiment. The body weight ranged from 190 to 240 grams. However, on the 2nd and 3rd week of the feeding trial, a highly significant variation was obtained among treatment means. Birds in T_2 (*Lactobacillus sp*) produced the heaviest weight of 916.67 grams, followed by T_3 (*Bacillus sp*.) and T_4 (*Pediococcus sp*.) with 883.33 and 865 grams respectively. The lowest was obtained by birds in T_1 (Control) with 808.33 grams. However, on the 4th week of the feeding trial, significant differences was obtained where T_2 consistently obtained the highest weight of 1358.33 grams followed by birds in $T_{3,\ and}$ T_4 while birds in T_1 obtained the lowest with 1300.00, 1253.33, and 1083.33 grams respectively. This indicates that addition of 2 kg probiotics in feed could enhance the growth of broilers. Highly significant differences among treatments on the final body weight of broilers given diets with different strains of probiotics. Birds in T_2 obtained the highest weight among treatments followed by T_3 and T_4 with a mean of 1625.00 and 1516.67 grams respectively. However, birds in T_4 obtained 1358.33 grams body weight which was statistically comparable with the birds in T_1 with body weight of 1300.00 grams. The gain in body weight of broilers revealed highly significant differences among treatment means. T_2 (*Lactobacillus sp.)* still gave the highest mean gain in weight of 1565.34 grams. This consistently followed by T_3 (*Bacillus sp.*) with 1457.42 grams while T_4 (*Pediococcus sp.*) obtained a mean of 1299.35 grams, which comparable to birds in T_1 (Control) with 1245.75 grams. The average cumulative feed consumption of broilers has no significant differences among treatment means. The feed consumption ranged from 3039.00 to 3073.33 grams. This implied that the inclusion of probiotics in the diet of broilers did not influence the feed intake of the birds during the feeding trial. A highly significant variation was observed on the average feed conversion ratio of the birds (Table 2). Birds fed with *Lactobacillus sp.* obtained the highest feed conversion ratio of 1.96 percent, followed birds fed with *Bacillus sp.* and *Pediococcus sp.* with 2.10 and 2.34 percent respectively. The lowest was from birds

fed diets without probiotics. This clearly indicates that the inclusion of probiotics in the diet of broilers significantly improved the feed conversion efficiency of the birds. Nonsignificant differences were noted on the dressing percentage of the birds fed diets containing different strains of probiotics. The average liver weight of the birds given diets with different strains of probiotics did not vary significantly among treatment means. This indicates non-toxic substance which may adversely affect the growth of the experimental birds. Highest return was noted in birds fed with *Lactobacillus sp*. (T_2) after deducting the cost of deeds with a value of Ph 109.33/bird, followed by birds fed with *Bacillus sp.* (T_3) and birds fed with *Pediococcus sp.*(T_4) with a return of Ph 99.55 and Ph 85.45 respectively. The least return was noted in birds fed without probiotics (T_1) with Ph 80.44/bird (Table 3).

Table 1.Average Initial, Wkly and Final Body wt. of Broilers Fed Diets Containing Dif. Strains of Probiotics (g)

TREATMENTS	Average Initial and Weekly Weight (g)					
	Initial	1st	2nd	3rd	4th	Final
T_1 (O Probiotics)	54.25	190.00^{b}	433.33^{c}	808.33^{c}	1083.33^{b}	1300.00^{c}
T_2 (Lactobacillus sp)	59.66	223.33^{ab}	566.67^{a}	916.67^{a}	1358.33^{a}	1625.00^{a}
T_3 (Bacillus sp	59.25	211.33^{ab}	523.33^{ab}	883.33^{ab}	1300.00^{a}	1516.67^{b}
T_4 (Pediococcus sp.)	58.98	240.00^{a}	503.33^{b}	865.00^{b}	1233.33^{ab}	1358.33^{c}
C.V. (%)	5.5	10.5	5.3	2.2	7.0	3.5
LSD (%)						
.05	6.02	42.72	50.99	35.54	164.75	96.09
.01			74.17	51.70	239.67	139.78
	ns	ns	**	**	*	**

Table 2. Average Gain in Body weight(g), Feed Consumption (g) and Feed Conversion (%)of Broilers Fed Diets Containing Different Strains of Probiotics (g)

TREATMENTS	Average Feed Consumption (g), Gain in Body weight (g), and Feed Conversion (%)					
	Feed Consumption	Gain Wt.	Feed Conversion	Dressing Percentage		Liver Wt
				W/ Giblet	W/o Giblet	
T_1 (O Probiotics)	3052.00	1245.75^{c}	2.45^{b}	75.86	70.09	55.33
T_2 (Lactobacillus sp)	3073.33	1565.64^{a}	1.96^{a}	74.89	61.04	55.00
T_3 (Bacillus sp	3062.67	1457.42^{b}	2.10^{a}	78.96	65.90	54.00
T_4 (Pediococcus sp.)	3039.00	1299.35^{c}	2.34^{b}	87.74	69.89	55.33
C.V. (%)	0.8	3.6	3.8	10.4	9.7	1.5
LSD (%)						
.05	43.54	93.80	0.16			
.01	63.34	136.45	0.23			
	ns	**	**	ns	ns	ns

Table 3. Return Above Feed Cost (P) /Broilers Fed Diets Containing Different Strains of Probiotics.

ITEMS	TREATMENTS			
	T_1	T_2	T_0	T_4
Amount of feed consumed (kg./bird)	3.052	3.073	3.063	3.039
Cost/kg of feed (P)	11.98	12.16	12.16	12.16
Live weight/bird (kg.)	1.30	1.63	1.52	1.36
Cost of feed consumed (P)	36.56	37.37	37.25	36.95
Value of bird produced at 90.00/kilo live weight (P)	117.00	146.70	136.80	122.40
Return above feed cost/broiler (P)	80.44	109.33	99.55	85.45

Conclusion

Based from the result of the study, the inclusion of 2 kg *Lactobacillus sp.* /MT of feeds in the diet of broilers had improved the growth of the experimental birds in terms of body weight, gain in weight, feed conversion and its economic returns which is due to lactic acid content of Lactobacillus. This suggests that inclusion of 2 kg of *Lactobacillus sp*. per metric tons of feeds can safely be used in the diet of broilers to produce an organically grown chicken for table meat as it produced the highest gain in weight, feed conversion and return above feed cost.

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Romania (Food Availability)

Organic Agriculture – A Chance for Food Availability in Romania

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Introduction

Romania is situated in the South-Eastern part of Central Europe, inside and outside of the Carpathian Mountains, on the Danube lower course and opens to the Black Sea. The total area agricultural land of Romania is 14.800 million ha, out of which 9.283 million ha is arable land, 4.930 million ha pastures and meadows; 0.298 million ha are vineyards and 0.289 million ha are orchards. The arable land is about 0.43 ha/inhabitant. The Romanian climate is temperate-continental of transition, with oceanic influences from the West, Mediterranean influences from the South-West and continental-excessive influences from the North-East.

Agriculture is an important sector of the Romanian national economy, with 28-35% of the active population involved in agricultural productive sectors and a contribution of 15-25% to the GDP. Rural space occupies more than 95% of the territory, and agricultural space 62%. Our investigations have led to the conclusion that, in Romania, in 2006, there are 3,676 officially registered farmers practicing organic agriculture and they cultivate approximately 170,000 ha, or one percent of all farmland, and estimated for 2007, 200,000 ha. Of this, cereals such as wheat, maize, sorghum, rye and millet make up more than half of the certified area. Organic hay and animal feed crops are grown on 50,000 ha and industrial crops take up 22,000 ha. Organic apiculture produced more than 600 tonnes of bee products in 2006.

As Romanian organic agriculture is harmonizing its structures with the European and world standards, it is important for Romanian agriculture and for the food chain system to collaborate in favour of local agricultural producers and to expand the market for the Romanian organic agricultural products. This can be achieved only with increasing assistance from the authorities that should create economic and legislative framework for a functional economy in general, and organic agriculture products and food availability in particular.

The present situation of Romanian economy and agriculture is very favourable for the extension of the organic agriculture sector. Romanian agriculturists are interested to produce marketable agricultural products and food for domestic and external market. Romanian people know that, through Romania's integration in EU, the organic agricultural sector and the organic products and foods have favourable opportunities of valorization on the European market.

Results

Trends associated to internal and external market

Organic products are mainly sold in urban areas where the target beneficiaries are families with significant income, as well as those educated in the concept of certified food products. An estimated amount of families consuming organic products in Bucharest includes about 100,000 families. Organic food tends to be sold more through specialized shops, in small neighborhood supermarkets where dedicated selling areas do not cover more than 3% of the total area per shop. Organic products could also be identified in supermarkets. There is a general sense of an ecological product in Romania, related to the good fate of the common-sense family, either placed in urban or rural areas. Forty percent of the Romanian population lives in rural areas while the rest has relatives in Romanian villages.

Traditional agricultural methods, still practiced on a wide scale in rural area are perceived as "ecological", acknowledging the good sense of producing the agricultural produce without using intensive techniques.

Therefore, even though not necessarily true, market agricultural products – artificially labeled as "Romanian" are considered ecological. This is true in most cases, provided that labeling respects the origin. In modern thinking, this cannot be recorded as valid certified organic products. This means that changes must occur in the perception of what certified products mean. Iimported organic products sold in Romania include a limited range of products (about 30 products), among which brown sugar, flavored milk, etc.

The internal production market of Romania is developing owing to a strange driving force, namely associated to the poverty of the average farmer and grows constantly in the range of products, together with the awareness of the farmers to establish market association, to keep certification costs low per farmer, awareness to enable them to negotiate better prices at the farm gate. Export is made particularly for raw products. Those are mainly associated with operators who could have afforded large investments in processing plants.

Needs

The marketing needs for the Romanian organic products are connected to the level of perception of the necessity to buy products from a trustful source. The internal market also needs grow in the purchase power of the average Romanian families. Spectacular changes in this respect are not expected to take place on short term.

In the case of exports, in close connection with the international market trends, the organic sector of Romania must adapt its production, storage to the cleaning possibilities to the following link in the "organic chain" international transport. There is a clear requirement in Romania for the development of the intermediary operators such as whole crop purchasers, and cleaning and storage facilities. The progress in organic agriculture is, by its very nature of making use of local resources, dependent on knowledge of optimum local conditions.

Problems of mentality and production

Organic production methods by Romanian regions are not easily accessible to most farmers. Also, extension services must be trained to provide the whole range of necessary technological and organic inputs. Specific sets of machinery are difficult to purchase in Romania as well. There is the confusion between the traditional good faith in the "rural Romanian ecological product" and the certified organic product. Although the Romanian farmers like to use the examples of successful neighbors, extension services and the academic sector could design well articulated nationwide programs to reach out with relevant information, in direct contact with the most practical production levels. The approach of the outputs generated by the academic and R&D sector to production level must be made according to market principles and based on the conscious request from organic operators. This must be supported by complete and competent information provision on all aspects of organic agriculture, but also on a clear professional good understanding of the market needs by the academic R&D sectors.

Problems managing the selling of organic products

These problems are those of the adaptation of post harvesting system to following links of organic chain:

- relationship with selling procedures and operators;
- relationship with handling and transportation possibilities further in the chain.

All these must take into account the quality requirements underlined in the merchandise specifications. The capacity of good quality storage to increase access to better pricing over time seems to be crucial at farmers' level. For farmers, it is important the income (income generated by selling of organic products) and the cost associated with the necessary inputs. Farmers will use more money during the conversion period before certification, and the modernisation of facilities is expensive - especially for dairy and animal farmers. On medium and long term, organic agriculture and rural development will play an essential role in the government's strategy that will provide high domestic food quality and sustainable and diversified production according to European safety standards. During 2007-2009, Romania will receive almost 4 billion euros from the EU in order to support agriculture and in specially, organic agriculture by direct payments, rural development (also including the reconversion of the labor force), and funds for market interventions.

Conclusions

In the conditions of EU integration, food industry has to meet some essential conditions too. Thus, the farmers and the companies within the entire technological food industry chain must adopt the rules and regulations that are specific to a common market and the EU agriculture policy and all the institutions involved in organic agriculture that will promote the organic agriculture principles.

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South Africa (Food Utilization)

Organic Sprouts as a Nutritional Solution

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Introduction

Although the production and growing of sprouts has been ongoing since time immemorial, it is a new activity and technology for most cultures. Sprout production addresses the very basic food security issues and all the dimensions thereof as well as nutritional problems and the needs of poor people. The objective of the following project was to introduce organic sprout production within households as a means of providing additional nutrients to people in Cape Town, South Africa. Sprout production was done indoors and has involved approximately 1000 households to date. Using micro indoor hydoponics, organic sprout seeds are grown in moist conditions which cause the seeds to sprout and grow with no soil, chemicals and natural indirect light. After the organic seeds are soaked they are rinsed twice daily with clean water until harvested.

Results

Measurable outcome indicators: Improved health and energy levels through improved nutrition from the ultimate self-sufficiency garden producing a reliable supply of organic, pesticide-free, high fiber, vitamin/mineral/enzyme-rich and energizing fresh food. Once the principles of sprout production are understood, with viable organic seeds and water, it is possible to use recycled material to keep the garden organized for daily harvesting. Sprouts are the easiest and least expensive crop to produce and the sprout kitchen garden allows for the production of the least expensive fresh food all year long, in a minimal indoor area. Sprouts are fresh nutritious plants that will grow in any climate. They rival meat in nutritional value (and tomatoes in Vitamin C) and mature in 3-5 day. Furthermore, sprout production requires neither soil nor sunshine and has no waste and sprouts can be eaten raw.

Many underprivileged communities and urban dwellers are unable to have vegetable gardens due to lack of space, infertile land and lack of resources. With sprout production, anyone is capable of having an indoor kitchen garden that produces the least inexpensive and most nutritious fresh food all year long, in a minimal area requiring no chemicals, soil or direct sunlight. Access to hot water to maintain hygienic conditions in the growing containers and cultural acceptance are the main constraints.

Conclusions

Adequate nutrition is essential in relation to health and education. With the current state of the HIV/AIDS pandemic and yet unknown future epidemics, it is essential to cultivate and to have a strong immune system. In relation to education, one cannot be a learner without adequate nutrition. Food security is provided by sprout production requiring only seeds, clean water and knowledge, as one is only days away from having adequate nutrition, thus making sprouts ideal for providing relief through nutrition for management in disaster areas, famine crises and refugee camps.

With people being able to produce a significant portion of their own nutritional requirements with little effort and little expense in the comfort of their own home, this will free their time and scarce economic resources for other priorities. By being able to feed oneself to some degree, restores dignity through a sense of accomplishment. Over time this could develop to where the produce grown could be sold to a local processing facility where the products can be dried creating snack foods. This in turn offers employment and entrepreneurial opportunities. Through this concept, the quality of life of all will improve and sustain and through nutritional education, human resources for science and technology will be further developed as a result of improved nutrition

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Biography

- Joseph Feigelson
- Institutional affiliation: National Organic Produce Initiative (NOPI); South African Council on Organic Development and Sustainability (SACODAS) Western Cape Hemp Initiative (WCHI)
- Experience: Author has been sprouting since early seventies and in the nineties developed a system to allow for organisation of the sprouting containers through the innovation of a container stand that provides the optimum drainage angle. With the launch of his full service sprout company 'Kitchen Garden", his company became the purveyor of the largest variety of organic seeds for human consumption in Africa and Europe, currently offering 50 varieties for sprouting.

South Africa (Food Access)

Contribution of Organic Agriculture to Household Food Security in KwaZulu-Natal, South Africa

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Introduction

Food insecurity and hunger are a reality in South African rural areas, particularly in KwaZulu-Natal Province (Hendriks, 2005; Labadarois, 2000). Although South Africa is one of the few nationally food secure sub-Saharan countries, household food insecurity is prevalent (Labadarious, 2000). While most rural households have access to land and some knowledge of farming, agricultural production accounts for only 15-20 % of the total share of household consumption (Hendriks, 2005). The purpose of this study was to investigate the potential of small-scale organic farming to contribute towards household food security and sovereignty in a rural community of the Maphephetheni highlands, a semi-arid, hilly and mountainous area of uncertain rainfall, KwaZulu-Natal, South Africa.

Quantitative and qualitative methodologies were used in 2005 to determine the potential contribution of organic farming to food security and sovereignty. Quantitative methodologies included household surveys while qualitative methodologies involved group sustainable livelihoods analyses. The study participants were 279 garden club members (representing 279 households) from ten community gardens in Maphephetheni highlands. The members were engaged in a variety of crop production. The ten community garden clubs investigated were Bhekokulwe, Enkululekweni, Enkanyezi, Siphamandla, Siphesihle, Siyajabula, Siyazama, Sizathina, Thathani and Vuswaindlala.

Results and discussion

One way to assess the role of organic agriculture in improving rural livelihoods was to look at its contribution to household income. Household income sources were divided into two primary categories of farm and non-farm sources. Farm income included income derived from the sale of produce while non-farm sources included government social security grants, remittances and household commercial enterprises. Table 3.1 shows the various household income sources and the average monthly contribution of each to total household income.

Table 3.1 Income sources among the Maphephetheni uplands farmers (n = 279), 2005

Income source	Average monthly income (Rands)	Income expressed as %
Wages	716.09	41.0
Social grants	714.56	40.9
Home organic gardens	123.53	7.0
Small-scale household commercial enterprises	72.55	4.2
Organic community farming	69.46	4.0
Remittances	50.00	2.9
Total	**1746.19**	**100**

The household survey, conducted in 2005, shows that wages received were the greatest contributor to household income. Forty one percent of total household income was generated from wages. This finding presents a strong case for the school of thought that recognises the contribution of agriculture, but attaches more importance to non-agricultural activities (McIntosh & Vaughan, 1996: 91-118; Gardner, 2005; Machete, 2004). Social grants were the second most important source of household income with a contribution of 40.9% to total household income followed by organic home gardening contributing 7%. The

fourth contributor to household income was small-scale household economic enterprises[10] (4.2%) followed by organic community farming (4.0%). In total, organic community and home gardens contributed 11% to total monthly household income. Even though low, the contribution of organic farming to food security and sovereignty cannot be ignored, considering the large number of rural households dependent on it.

The study clearly suggests that non-farm income sources as a category contributed more to household income than organic farming among the participating households. Eighty nine percent of total household income was from non-farm sources. Specifying small-scale economic enterprises and analysing the contribution of the various sources of income to total household income within the same category provided interesting results as illustrated in Table 3.2 below.

Table 3.2 Income from small-scale commercial enterprises (n = 279), 2005

Income source	Average annual income (Rands)	Contribution in percentage
Shop-keeping	326.56	37.51
Making furniture & handcrafts	248.53	28.55
Selling of *muti* (traditional medicine)	116.96	13.43
Selling firewood	60.93	7.00
Building and repairing houses	54.41	6.25
Domestic working	31.34	3.60
Sewing	13.24	1.52
Hawking	11.32	1.30
Catering	2.94	0.34
Other/not specified	4.41	0.50
Total	**870.64**	**100**

Among small scale economic enterprises, shop-keeping was found to have the greatest contribution to total household income followed by furniture making and handcrafts (37.51% and 28.55% of the total annual household income, respectively). The third most important commercial enterprise and/or income source was sale of *muti* (traditional medicine) with a contribution of more than 13% to total household income in the category of commercial enterprises. Sale of firewood and building and repairing of houses accounted for 7% and 6.25%, respectively while hawking, sewing, domestic work and catering contributed between less than 0.5 and 4%.

Overall, Table 3.2 indicates that small-scale commercial enterprises contributed on average R870.64 annually. These results suggest that households in the Maphephetheni uplands diversified their sources of income and/or livelihood activities to supplement organic agriculture-based livelihoods. This finding is substantiated by other studies by McIntosh and Vaughan (1996), Gardner (2005) and Machethe (2004) that concluded that typical livelihood strategies in rural South Africa comprise diverse income sources. This means that while organic agriculture (potentially) plays a role in rural livelihoods, livelihood insecurity in South Africa cannot be solved by promoting organic agricultural growth alone.

Conclusions and recommendations

Organic farming appears to offer an opportunity for small-scale farmers to realise commercial and food sovereignty goals that may otherwise not be possible through conventional agriculture for the following five reasons:'

- organic farming eliminates use of agro-chemicals, bringing down costs of inputs;
- organic production systems are similar to traditional African production systems practised for years, which need to be promoted;
- organic niche markets are growing rapidly, which could enable small farmers obtain higher revenue than typically gained from conventional or GMO agricultural markets. The current commercial boom

[10] Small-scale economic livelihood activities included catering, building and repairing houses, hawking, shop-keeping, domestic work, selling firewood and *muti* (traditional medicine), sewing and craftwork.

in organic agriculture demands a "new African farmer" requiring a supportive environment that includes technical, market and financial assistance to ensure economic benefits from new consumer trends;

- organic farming production methods support environmental sustainability through biological pest management and composting while discouraging use of GMOs and synthetic chemicals in crop production.

Finally, more attention should be accorded to the promotion of non-farm activities, particularly those linked to the ecological agricultural sector. This suggests that a strategy that pays attention to the enhancement of organic farm and non-farm linkages is likely to yield better results in terms of income generation and sustainable rural livelihoods, particularly, food security and sovereignty.

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Biography

Samuel Chingondole Mpeleka is Deputy Director for Pietermaritzburg Agency for Christian Social Awareness (PACSA) - an human rights NGO, established in 1979, whose main thematic areas include Economic Justice and Participatory Democracy (with special focus on Trade, Water, Food Security and Governance), Gender, Youth and Conflict Transformation and HIV/AIDS. Samuel is also a 5th year part-time PhD student (thesis submitted for examination) in Food Security Programme in the School of Agricultural Sciences and Agribusiness, faculty of Science and Agriculture at the University of KwaZulu-Natal, Pietermaritzburg, South Africa. His research areas of interest include rural sustainable livelihoods, food security and GMOs.

South Africa (Food Access)

Emerging Issues in Smallholder Organic Production in South Africa: The Development of an Organic Production Decision Support Interface

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Based on the review of emerging issues in smallholder organic production, several questions were investigated. These include:

1. What crops can be grown in the three chosen areas based on climatic data?
2. Can farmers grow these crops organically?
3. What are the risks of disease?
4. Based on the model, which crops can be considered low risk for production by smallholder farmers in the three study areas?
5. Do farmers agree that the crops grown are suitable?
6. How useful do farmers and extension officers consider the model as a decision making tool?
7. What are the organic production constraints and the sustainable livelihoods context for three farming groups?

The main findings as per the questions above include a specific crop list based on climatic date for each area. There are serious manure and compost limitations for smallholder farmers to grow crops using exclusive organic production thus rendering exclusive organic production for smallholders risky. Disease risk is related to rainfall quantities per area. The risk of disease was highest in summer and during rainy periods. All crops carried a risk when grown during rainy periods and in summer. Farmers disagreed with finding where familiar crops were rejected by the model but did not disagree with "new" crops suggested as suitable by the model. End users of the model which include extension officers welcomed the model and expressed that it is useful to have tool that would assist them in decision making related to organic crop production. Farmers were faced with constrains in finance, marketing, technical knowledge related to natural pest and disease control, fencing, irrigation and lack of extension services. Risk in certified organic farming for smallholders was further exacerbated by a poor policy environment, poor yields to satisfy market requirements, lack of natural pest and disease control skills and low literacy levels amongst farmers.

The Model and Main Findings

The first problem investigated was which crops could be grown according to the model, at the three study locations based on climatic data. Minimum criteria which included area rainfall, photoperiod, area number of rainy days and crop minimum temperature were used to identify the crops. According to the model, all crops except (Taro) *Madumbe*, lemon and peach were suitable to grow in all three areas.

The second problem investigated if the identified crops could be grown organically using manure as the only source of soil nutrition. NPK crop requirements (withdrawal norms) for optimum growth were used as a basis for comparison of the concentration of NPK in kraal manure and in commercial fertilizer. Commercial fertilizer was stronger than kraal manure. Commercial ferlizer provided up to a 100 fold more NPK than kraal manure.

A farmer risk profile (problem 3 & 4) was investigated. The first element of risk was defined as the availability of water over twelve months of the year. Rainfall was used to assess water availability. Water availability was used to determine when crop disease was likely to be present. Three ranges of rainfall (low (0-50mm), medium (51-100) mm and high (>100mm) were used to determine the likelihood of crop disease to be present. In all areas, it was clear that periods of high rainfall were also periods of high likelihood of crop disease presence. All farmer groups are faced with difficulties in natural pest and disease control. Poor knowledge of natural pest and disease control is a serious threat to certified organic farms and to farmers in conversion. Risk in certified organic farming for smallholder was further exacerbated by a poor policy

environment, poor yields based on available manure and compost to satisfy market requirements, lack of skills and low literacy levels amongst farmers.

The fifth problem investigated if farmers were in agreement or disagreement on whether indicated crops can grow in their areas or not. Only three crops were rejected by the model as unsuitable to grow. Farmers in Mbumbulu expressed the disbelief on the outcome that (Taro) *Madumbe* was rejected by the model.

The sixth problem was aimed at investigating the farmer's opinions of the usefulness of the model. All farmer groups welcomed the idea of having an instrument that can guide their decisions in organic farming but wanted the tool to be simplified and translated into their own language.

In the seventh problem it was of paramount importance that farmer constraints and a livelihood context for the three farmers groups is established so that the role of organic agriculture within the three groups is identified. Findings revealed that farmers were faced with production, resources, marketing and policy and institution constrains in organic production.

Evidently, solving small-scale organic farmer problems is complex. Findings from this study led to the following conclusions: agroecology is an important consideration for organic production, especially for resource poor farmers, there is a need for farmer appropriate information and extension services that provide technical skills and support in areas such as compost making and natural pest and disease control. Furthermo, current policy and institutional environment in South Africa is having a negative impact on the growth of organic production especially for small farmers who are often resource poor and cannot access certification, supplementary irrigation etc. A linear approach to solving the problems would be ineffective. A Multi-stakeholder Process (MSP) is advised. The study concludes that there is a desperate need for farmer appropriate information skills support and a condusive policy environment for smallholder farmers who are considering organic farming.

Biography

Ms Joyce Thamaga-Chitja is a young academic working at the University of KwaZulu-Natal. She studied Horticultural Science before diverting to the field of Food Security in her Masters degree. Her current PhD research is in organic production, food security and smallholder farming issues in South Africa. Ms Thamaga-Chitja has published a paper and has one accepted by accredited journals in South Africa. She has also presented her PhD work at the IFOAM World Congress which was held in Adelaide, Autralia in 2005.

Spain

Gestión del Riesgo en Producciones de Agricultura Ecológica: Garantía de Rentas para el Productor y Estabilidad de la Producción

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Introducción

El objetivo del presente estudio ha sido analizar los aspectos diferenciadores de la gestión de riesgos de las producciones ecológicas españolas que, debido a las particularidades de gestión de su sistema productivo, han de enfrentarse con riesgos diferenciales que no siempre coinciden con los de producciones convencionales (Madge, 2005). La obtención de información se ha llevado a cabo mediante la elaboración de más de 300 cuestionarios a agricultores ecológicos de cereal y frutal de diversas regiones españolas áridas y semiáridas tanto de secano como de regadío. Estos productores alcanzan ya en España los 19.200, siendo de 300 millones de euros el valor de la producción ecológica y 930.000 ha. la superficie dedicada al efecto (MAPA, 2006).
El análisis del riesgo de un caso práctico mediante aplicaciones informáticas estadísticas, probabilísticas y de simulación estocástica y el análisis de diversos estudios internacionales realizados al respecto, han sido la base de la metodología empleada para el mismo. Con ello se han logrado identificar y cuantificar, desde el punto de vista de los propios agricultores, los riesgos específicos de dichas producciones, poniéndose de manifiesto las diferencias existentes en cuanto a la percepción y la vulnerabilidad al riesgo, así como el distinto nivel de riesgo y de recuperación ante un suceso de condiciones climáticas adversas, que las producciones ecológicas poseen frente a las convencionales, aspectos estos relacionados directamente con la estabilidad de la producción de alimentos.

Resultados

En torno a un 60% de los agricultores encuestados señalan los riesgos de plagas y de enfermedades como los más importantes a tener en cuenta en sus explotaciones, riesgo de mayor importancia en explotaciones frutales. A pesar de que la utilización de métodos de control no químico de este tipo de riesgos trae consigo grandes ventajas al no generar resistencia en las plagas, gran parte de los encuestados asegura que sus producciones son más vulnerables a este tipo de ataques que las convencionales. Además, la muerte de insectos beneficiosos debido a pulverizaciones realizadas en explotaciones cercanas, puede contribuir a hacer más difícil la gestión de este tipo de riesgos.

Además de los anteriores, los riesgos de sequía (en zonas de secano) y de heladas son los otros dos riesgos más importantes que señalan los agricultores encuestados (65% de media). A diferencia de los anteriores, dichos agricultores afirman en su mayoría que, en comparación con explotaciones convencionales, el riesgo es similar. Sin embargo, la mejor preparación del suelo en explotaciones ecológicas puede hacerlas menos vulnerables a los efectos de la sequía. Además, la mayor libertad de elección de rotaciones de cultivo y las posibilidades de diversificación que estas ofrecen especialmente en producciones de cereales, pueden ayudar en gran medida a una autogestión del riesgo a nivel de parcela (Hanson, 2004). Otros riesgos debidos a distintas adversidades climáticas como el pedrisco o las inundaciones son también valorados por los agricultores encuestados aunque en menor medida (24%). La explicación al bajo porcentaje de agricultores que han manifestado tener riesgo de contaminación por transgénicos se encuentra en que la producción de maíz no ha sido objeto de estudio y es ésta la que, en la actualidad, más se está viendo afectada en nuestro país. Sin embargo, destaca que un pequeño número de productores tenga ya sensación de este riesgo cuando no afecta aun a sus producciones.

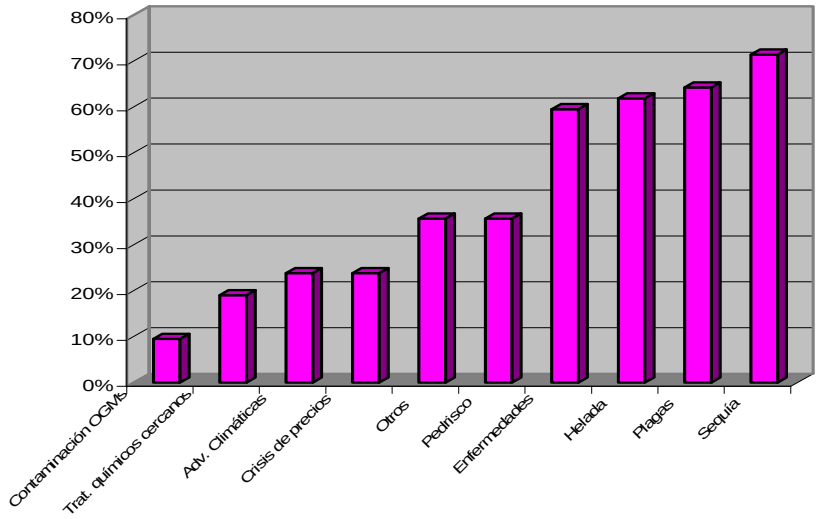

Figura 1. Importancia concedida por los agricultores a cada uno de los riesgos

Un 40% de los productores de cereales encuestados afirma tener problemas para abastecerse debidamente de semillas ecológicas, efecto que, aunque en menor medida, también ocurre en explotaciones de frutales. Además, un 50% de ellos afirma que su producción ecológica puede tener problemas para cumplir los requisitos mínimos exigidos por las normas de calidad vigentes, especialmente aquellos relativos al calibre mínimo y a la homogeneidad de los mismos.
En el caso de los productores de frutales, la realización de riegos oportunos y suficientes y la aplicación de tratamientos fitosanitarios en la forma y número necesarios para mantener la planta en un estado sanitario aceptable, son los dos requisitos más difíciles de cumplir, en parte debido a los problemas de sequía existentes en nuestro país y a las prácticas agrarias propias de este sistema de producción.

La escasez de utillaje ecológico y de equipamiento especializado, son factores que influyen negativamente en el manejo del cultivo y en las escasas posibilidades de tomar decisiones que puede tener un productor en un momento determinado. Es por ello que, con el objetivo de gestionar este riesgo particular, alrededor del 50% de los productores de cereales encuestados realizan tanto asociaciones de cultivos (cereal-leguminosa, cereal-forrajera, cereal con plantas aromáticas), como rotaciones (dos cereales - barbecho, cereal – leguminosa – barbecho, etc.)

La utilización del seguro agrario como herramienta de gestión del riesgo en los últimos tres años ha sido bastante desigual entre los productores encuestados. Un 60% de los mismos ha contratado el seguro alguna vez en dicho periodo, siendo los productores de frutales los que más lo han hecho (70%). En el ensayo experimental del cultivo de cebada en la región de Castilla-León, el análisis realizado mediante la simulación Monte Carlo, evidencia la mayor probabilidad que las producciones ecológicas tienen de obtener ingresos frente a las producciones convencionales. En el la siguiente figura se representan el valor de los ingresos (miles de €/ha) que pueden obtener cada una de las producciones en ausencia de ayudas y la probabilidad que ambos sistemas de producción tienen de obtener ingresos. La explotación de cebada ecológica, representada en verde, tiene mayor probabilidad de obtención de ingresos (95%) que la de cebada convencional, representada en rojo (5%).

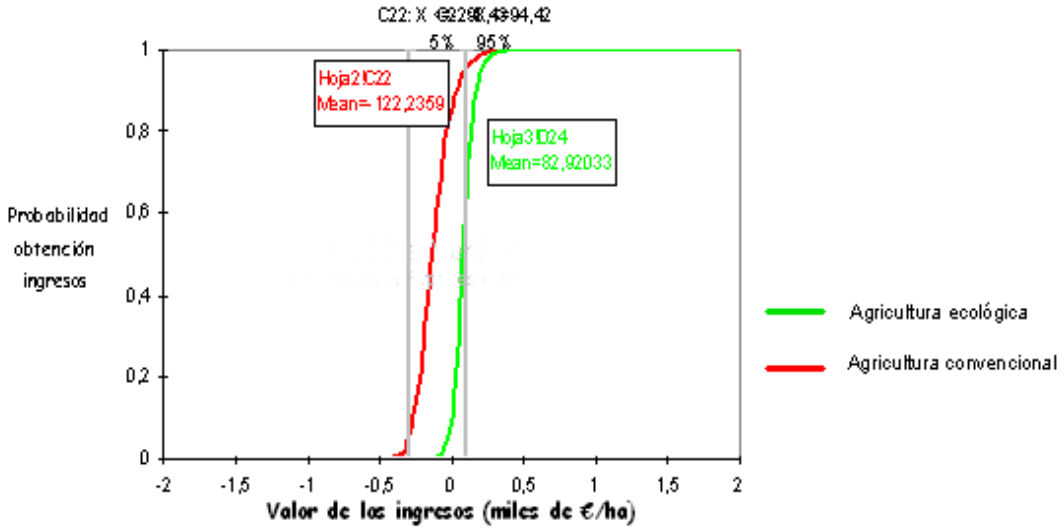

Figura 2. Probabilidad de obtención de ingresos y valor de los mismos

Conclusiones

Los riesgos a los que se enfrentan productores ecológicos y convencionales son de características muy diferentes. La valoración de estos riesgos demuestra que, además, un mismo riesgo no tiene el mismo grado de afección sobre unas producciones y otras. Por ello, las estrategias de gestión de cada uno de estos riesgos son muy diversas y dependen en gran medida de la naturaleza de cada una de las explotaciones.

La probabilidad de obtener ingresos que poseen las producciones ecológicas en las mismas condiciones que las convencionales, es mayor y por tanto, el riesgo de no desarrollar una actividad económicamente viable, es considerablemente menor. Este hecho, junto con la valoración de los beneficios medioambientales que este tipo de producciones generan y la calidad nutricional de los productos que comercializa, evidencian el apoyo que, mediante políticas agrarias públicas, merecen este tipo de producciones. El seguro agrario puede ser una herramienta de utilidad para estabilizar la renta de estos agricultores ecológicos, siempre y cuando pueda adaptarse en mayor medida a las condiciones particulares propias de este tipo de producciones. De esta forma podrá contribuirse a una mayor estabilidad de la producción.

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Sri Lanka (Food Availability)

Organic and conventional farming systems contribution to household food security in Sri Lanka

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Introduction

The study was conducted in the Matale and Anuradhapura districts situated in the central and north central provinces of Sri Lanka, respectively. The Anuradhapura study area was located in a lowland dry zone with low rainfall with irrigated conditions. The Matale study area was located in the mid country intermediate zone with moderate rain. This research was carried out from October to December in 2005 in three villages of Anuradhapura and two villages of Matale district, with 52 organic and 53 conventional rice and vegetable farmers. This research investigated the potential effectiveness of organic agriculture for the food security of the small-scale farmers. Key informant interviews and questionnaire surveys were administered to obtain qualitative and quantitative data among organic and conventional farmers in the area, related to the selected indicators of food security.

Results

To address the issue of food security, we considered three main areas: 1) natural resources, 2) management of resources and 3) food availability and health. Under natural resources, land availability, soil quality and water availability were studied. Under management of resources related to food security, livestock resources, seed availability, crop diversity, crop productivity and marketing were considered. Daily food intake, health security, food availability, storage losses and coping strategies were considered under the third section, describing food availability and health. Descriptive statistics were used to analyze the data. Comparisons were made using chi-square and student t-test. Correlation analysis was used to find interrelation between selected indicators.

Most of the organic farmers had properly followed the basic steps of organic farming, such as making organic fertilizers, mulching, mix cropping, crop rotation and use of herbal treatments for pest control. More than half of the respondents of the organic farmers practiced Nawakekulama which is the traditional rice cultivation practice involving straw mulching, minimum land preparation and without synthetic inputs. Many of them practiced rituals, 'kems'[1] and similar practices and adapting farm practices at auspicious time[2]. A kem is a practice in which the underlying principle was not explicitly explained to the people; it is possible that this may be due to religious influence which strictly prohibits killing. Auspicious time is decided from astrological calendar considering the Farmers' horoscopes and type of activity carried out in the farm.

Conventional and organic farming systems were significantly different in terms of soil quality, months of rice availability, months of food shortage and buying food during food shortages. Conventional farmers experience more months of food insecurity (when production was not sufficient for consumption) than organic farmers. Also the number of farmers who faced food insecurity among conventional farmers was higher. Organic farmers consumed meals with a higher intake of vegetables and traditional varieties compared to conventional farmers, although the overall food intake score between the two groups did not show statistically significant difference. Food intake score is calculated by taking percentage of a certain dietary component (e.g. plant protein) included in a meal. Correlation analysis showed that there was a positive correlation between extent of home garden and crop diversity among the total farmer group.

The constraints for sustaining the practice of organic farming were found to be: outbreak of pest and diseases, contamination of organically cultivated land due to small land size and narrow buffer zones between ecological and conventional farms, low soil fertility due to starting up of organic farming in abandoned land which showed low response to organic matter, small and irregular supply of organic products in the market, no value additions or any other marketing strategies adapted for organic products and mostly lack of market awareness of the quality parameters of organic products.

Conclusion

There is a high potential to develop organic farming in abandoned land because of poor response to conventional farming systems. During this study we were able to identify some successful organic farmer groups, who could encourage other farmers in Sri Lanka to convert to organic farming practises. Results of this study could be utilized to develop national strategies by the agriculture policy makers to improve food security among rural households, and for promoting sustainable small scale farming systems. It is evident from the results of this study that it is advisable to promote organic farming systems to ensure farm food production and the use of food products for food and health security of the household. Although more research is needed, the results of this study suggest that organic farming is a valuable strategy already used by small farmers in Sri Lanka.

The observed differences between organic and conventional farms can be due to above-mentioned indicators of food availability or due to other causal factors not mentioned or evident in this study. Therefore, it is necessary to conduct an in-depth follow-up study on this research topic using qualitative research techniques such as case studies, large group discussions and focus group discussions. Crop productivity, diversity of home garden production and health status of the children could be compared to further identify the contribution of farming practices to food security.

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Biography

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Sri Lanka

Success of Traditional Organic Paddy Cultivation in Tsunami Affected Fallow and Marginalized Fields in Sri Lanka.

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Introduciton

After the green revolution paddy has become a high input consuming intensive crop production in Sri Lanka. As a result number of high yielding, high fertilizer responsive varieties and low LD (Lethal Dose) value pesticides came into the fields. After about 3 decades cost of the inputs became higher and higher, therefore conventional paddy cultivation was not a profitable business at all (National Federation of Traditional Seeds and Agriculture Resources- NFCTSAR, Annual report 2005). Marginalized paddy fields were appeared all over the country as a result of the least profit compare to industrial jobs and less social recognition for paddy farmers.

Apart from that, paddy is one of the sectors that were seriously affected by the Tsunami disaster in 2004. More than 3000 Acres were devastated by salt water intrusion in to the paddy fields (Tsunami Reconstruction and Development Agency annual report 2006). Conventional paddy varieties couldn't withstand over the salinity and low fertile lands. There have been more than 150 traditional indigenous paddy varieties in Sri Lanka as conservation level and few demonstration plots (NFCTSAR Annual 2005).

Sri Lanka has more than 150 indigenous traditional rice varieties which can withstand over a range of adverse conditions. They can grow in saline conditions, high resistance to pest and diseases and also perform well in drought as well as flooded conditions. Specifically these traditional rice varieties have tremendous nutritional qualities as well as medicinal values which are recommended for disease conditions such as diabetes, hepatitis, cancers and brain diseases in traditional medicine. It also has a growing market potential as a weaning complementary food for infants, in tourist hotels, traditional medical centers, hospitals and supermarkets. These varieties were kept in certain places for conservation purpose mostly as seed banks but not popularized among farmers due to a myth that these varieties give extremely low yield. To some extend it's true that indigenous traditional rice varieties give low yield compare to conventional hybrid rice varieties as it's not responsive to inorganic fertilizer. Critical illustration of cost benefit analysis was needed to prove the reality of organic traditional paddy cultivation in Sri Lanka. The objective of this work was to demonstrate the cost effectiveness of indigenous rice varieties in fallow lands affected by tsunami.

Methodology

The action research targeted on marginalized fallow paddy lands after tsunami, ownership by small scale paddy farmers. 20 locations were selected which affected by tsunami and fallow due to inability of paddy cultivation. The lands were flooded by salt water from tsunami and therefore unfavorable for conventional paddy cultivation. Fungal diseases and pest issues were common in the barren fields. 10 traditional indigenous paddy varieties were selected with participation process with farmers. Plot sizes vary from 1/6 Acre to ¼ Acres. For all the 20 plots, vary basic organic measures were practiced and from beginning of the land preparation organic manure was added. There were no proper organic standards or practices there in the areas at the time. Simple guide lines were prepared with the participation of farmers and practices mainly continued by the trust of each other. Farmers were not used any of the inorganic fertilizers, pesticides or weedicides through out the cultivation process. Apart from the organic practices several bio dynamic practices used like auspicious times for cultivation and harvesting times. Participatory data collection was practiced and the experiment done in a one season.

Results

Final comparison was done from the random plots taken from farmers who had grown conventional rice with inorganic inputs and traditional indigenous rice grown with organic inputs in a one season.

Hybrid varieties with chemical fertilizer, herbicides and pesticides 2005-2006 May to August

No.	Name of the farmer	Paddy variety	Cultivated extend (Acres)	Yield Obtained (kg)	Kg's per Acre
1	*N.D.A.Gunasekara	AT 352	03	4305	1435
2	*Gamini Madanayake	AT 352	02	1476	738
3	*M.Chandrawathi	AT 352	01	1312	1312
4	*Rohana Madanayake	AT 352	¾	615	820
5	*M. Amarasena	AT 352	¼	266.5	1066

Average yield per Acre – 1074.2 Kg Paddy
Maximum market price of 1 kg – 15/- SLR**

Traditional Indigenous rice varieties with organic practices 2005-2006 May to August

No.	Name of the farmer	Paddy variety	Cultivated extend (Acres)	Yield Obtained (kg)	Kg's per Acre
1	N.D.A.Gunasekara	Madathawalu	1/6	205	1230
2	Gamini Madanayake	Suwandal	1/6	164	984
3	M.Chandrawathi	Rathdal	1/6	143.5	861
4	Rohana Madanayake	Kuruluthuda	1/6	143.5	861
5	M. Amarasena	Kuruluthuda	¼	205	820

Average yield per Acre – 951.2 Kg Paddy
Maximum market price of 1 kg – 20/- SLR**

It was calculated the cost of production of two systems (Organic and Conventional) and analyze the production costs in each step.

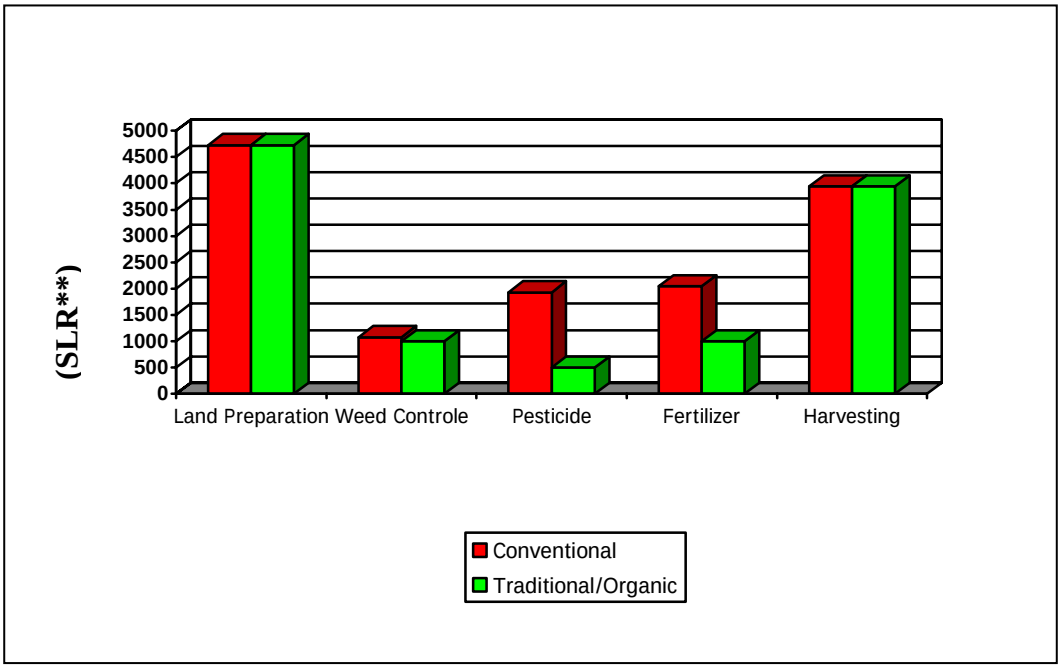
Production cost and Profit per Acre

Cultivation Method	Expenditure (SLR)**	Income (SLR)**	Profit (SLR)**
Conventional	**13126.00**	**16113.00**	**2987.00**
Traditional/Organic	**11126.00**	**19024.00**	**7898.00**

The production cost for conventional paddy cultivation was 62% higher than the traditional organic paddy cultivation.

Break down of production cost: 1kg of conventional paddy varies from 10 to 15 and traditional organic paddy varies from 20 to 30 rupees** in the market.

Cost benefit analysis: The seed paddy for traditional rice varieties supplied through a revolving process. If farmers borrow 1kg of seed paddy in one season he/she has to return 1.5kg of seed paddy in next season. This was the traditional system.



Conclusion

The research showed the profitability of traditional organic paddy cultivation in tsunami affected marginalized paddy lands. Due to low inputs and high value in the market traditional organic paddy cultivation shows this profit. Apart from the profits organic cultivation can utilize the marginal fallow paddy lands and protect biodiversity and the whole environment. Presently traditional organic paddy is popular among farmers at consumption level. These data was not statistically analyzed and that needs further replications over a period of time.

Thailand (Food Access)

Profitability and Profit Efficiency of Organic Rice Contract Farming in Thailand

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Among the poor in Asia a very high proportion are subsistence farmers living on low-value traditional crops. While development in the agriculture sector has traditionally put emphasis on increasing productivity using external inputs, it has become increasingly clear that conventional 'Green Revolution' farming has bypassed the poor in marginal areas. There is also increasing evidence that high external input agriculture is unsustainable, resulting in stagnant or declining yields, increasing ecological degradation, and worsening rural socio-economic conditions. Increasingly, organic agriculture (OA) is emerging as an alternative strategy to improve food access in marginal areas.

Due to the requirement for organic crops to be grown in areas free from chemicals, converting conventional farmers to organic agriculture often requires a transition period of reduced yields and income. The largest growth potential for organic agriculture is thus in marginal areas, where the use of agrochemicals is minimal and farmers often experience an increase in both yield and income after adopting organic practices.

Contract farming is one mechanism for facilitating organic agriculture in developing countries. There are a number of potential benefits to poverty reduction from promoting contract farming for organic agriculture, including improved access to markets, facilitation of organic certification/tracability system, better access to credit, access to training and assistance and reduced price risk. The principal motives for smallholders to take part in organic contract farming include the promise of higher profit due to higher price and lower cost of production, assured market with steady income, and lower health risk of exposure to pesticides.

Using data from small farms in two marginal areas in Thailand, we compared the profitability and profit efficiency of organic contract and conventional non-contract farmers and examined the impact of organic contract farming on smallholders farming marginal lands. The 2003 Thai government carried out a survey on 445 farms in five provinces in the North and Northeastern regions of Thailand. In the Northeast (Ubon Ratchathani, Surin and Yasothon provinces) organic rice farming was introduced by NGOs in the mid-1980s. In contrast, organic rice farming in the Northern region (Phayao and Chiang rai) was a private sector-led initiative. The vast majority of farms surveyed were smallholders in marginal areas, with little or almost no access to agricultural extension services. All of the contract farmers are organic or low-chemical farmers in transition to organic practice, while all of the non-contract farmers practice conventional methods.

We compared the profitability of contract and non-contract farming. Contract farmers on the average generated a profit of 2,001 baht per rai in the North and 2,114 baht per rai in the Northeast. On the other hand, non-contract farmers produced a profit of 1,697 baht per rai in the North and only 1,163 baht per rai in the Northeast. The higher profitability can largely be explained by the significantly higher price of rice received by the organic farmers. In the North, private-sector contracting firms offered a fixed premium of 0.5 baht above the market price, while in the Northeast, the price premium was agreed upon based on negotiations with the purchasing NGO.

Table 1 shows profit to farm size. For organic farmers, profit (after cash costs) per unit of land decreased as farm size increases but not so for conventional farmers. We conclude from this that organic contract farming as practiced in these areas of Thailand does not seem to be biased against smaller farms in terms of profitability. Furthermore, profits are significantly higher for organic farmers, regardless of farm size. In both regions, all organic groups show significantly higher profitability than conventional non-contract farmers. The study also found organic farmers to have higher level of profit efficient, with a mean profit efficiency of 0.72 versus 0.64 (see full paper for details).

Table 1 Profitability by farm size (profit after cash costs per rai)

Land category	All farms	Conventional	Organic
0-5 rai	1,719	1,374	2,432
6-10 rai	1,744	1,413	2,076
11-20 rai	1,723	1,337	2,021
>20 rai	1,646	1,276	1,866
Total	1,721	1,369	2,072

This analysis suggests that a combination of contract and organic farming has been effective in enhancing the profitability and to some extent the efficiency of small-scale rice farmers on marginal lands in Thailand. Particularly in the case of provinces in Northeast Thailand, where a majority of the poor resides and where the green revolution has not been effective in addressing poverty, and has worsened ecosystems, contract farming of organic rice is shown to be effective means of raising incomes and by implication addressing food access and reducing rural poverty.

Biography

Sununtar Setboonsarng is a senior research fellow at the Asian Development Bank Institute (ADBI). She holds a PhD in Agriculture and Resources Economics (University of Hawaii) an MA in International Development Economics (Yale University), an MS in Agriculture and Resources Economics (University of Hawaii), and a BSc. degree in Botany (Chulalongkorn University). She also completed an Environmental Economics and Policy Analysis Program at Harvard Institute of International Development. She is seconded to ADBI from ADB, where she worked as a poverty specialist. Prior to ADB, she worked extensively in Viet Nam, Cambodia, Thailand, Lao PDR, PRC, and other Asian countries. Her work at ADBI focuses on poverty reduction, private sector development, rural and microfinance, and regional cooperation. One of her research projects is the Comparative Study of Contribution of Organic Agriculture to the Millennium Development Goals in Asia.

Thailand (Food Access)

Food Access through Organic-Fairtrade Project in Thailand

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Introduction

Established in 1993, the Green Net/Earth Net Foundation (GN-ENF) is a local non-government organization with key objectives to promote organic agriculture and fair-trade. The GN-ENF is currently working with 12 producer groups all over different regions in Thailand. Some of the groups are in the northern region where land is predominantly covered with mountainous areas and small flat plains in the valleys. Those producers in the north-eastern region would have flat table land. These two regions have tropical climate conditions with distinct wet and dry period. There is one producer in the southern region with to coastal climatic conditions. All producers have no access to public irrigated land and they need to rely on monsoon rainfall for farming. These GN-ENF producers are small-scale producers with an average of 3.59 ha of land holding and all are involved in organic crop productions, including rice, vegetables and fruits.

Producers are supported with technical assistance in order to convert their farm to organic agriculture. Technical assistance is provided through training on organic soil fertility management, pest management, buffer zone management, etc. Also, producers are helped to prepare themselves for organic certification through competency development of their internal control system. The GN-ENF also helps to establish an organic and fair-trade supply chain management from "seed-to-sale" where quality management system is introduced to provide an comprehensive production and handling plan and management tools for producer organization. The GN-ENF works to provide market access and promote organic and fair-trade markets in Thailand.

Results

Through organic supply chain management approach, the GN-ENF has managed to assist a large number of producers to convert successfully to organic farming with low budget inputs. For instance between the years of 1999 to 2003, the GN-ENF experienced an annual expansion of over 100% of its organic producer members. At the end of 2006, there were 784 producer families participating in the GN-ENF's organic and fair-trade network with a total of certified organic land of 2,747.15 ha.

Through the fair-trade commercialization programme, converted farmers can continue to practice organic farming and receive benefits from organic premium prices. Producer members are given a guarantee premium price for the produce around 10-15% above conventional prices. With lower cash expenditure, organic-fairtrade producers have a higher cash income from their farming activities. The GN-ENF, aware about the importance of food security, has incorporated several key components that help to strengthen the food security base. These include:

- Participatory learning of production technology so that producers not only learn about appropriate organic farming technologies but they also acquires the knowledge about how to generate new knowledge by themselves. This means that producers are empowered to learn to adapt to the continuous changes of external conditions. And as we would expect that the external environment would change quite rapidly due to global warming, the capacity to adapt farm management can be critical to the survival of small-scale producers, especially their ability to access to food amidst the climate chaos.
- Crop diversification is another important aspect of ensuring food access. The GN-ENF has built in the requirements of its internal control system the requirement that each producer must grow some vegetable food crops for their own family consumption and rice farmers must set aside sufficient land to produce rice for their own consumption. In the last 2 years, the GN-ENF has tried a positive incentive system by giving cash rewards to producers who have grown over 100 food crops on their land. In 2006, 40 producers (7.3% of the participating farmers) were awarded the 100 food prizes.

- Access to quality seed is a fundamental to successful farming, and thus food access. As part of the requirement on organic seeds, the GN-ENF had started to give efforts to train farmers to select and save their own seeds to supports some farmer leaders to produce good quality seeds as a back up mechanism. The GN-ENF's organic seed programme would include all the major food crops as well as the green manure seed because the later is needed for soil fertility management.
- Post-harvest and storage play an important role in the organic-fairtrade supply chain management. The average yield loss of grain, for instance, due to poor post-harvest and storage management is around 5-10% but in the extreme cases can be as high as 50%. The GN-ENF had installed and continuously improved the quality management system of the post-harvest handling and storage management which helps to keep the yield loss under 3%.
- Processing, especially for grain, is important in making food available and ensure quality food. The organic-fairtrade supply chain management installed by the GN-ENF helps producer organization to improve the efficiency and quality management of grain processing.

Conclusions and Recommendations

The organic-fairtrade product supported by the GN-ENF in Thailand demonstrates that it is possible and desirable to integrate food security concerns into project designs and programming. Food security components should be considered along the food supply chain, from seed to farm inputs to storage and processing. A break down in the food supply chain can interrupt food security and it may be necessary to shorten the supply chain for securing food access of rural producers.

More efforts are needed to focus on water harvest and management at farm level. With climate change, small-scale rain-fed farmers would need to constantly rely on rain water for irrigation. Improving efficiency and effectiveness of rain water harvest and management can help to prepare farmer to better cope with the climate chaos.

Turkey (Food Availability)

Organic Agriculture in Gokceada – Turkey 'Organic Island Cokceada'

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Introduction

It is obvious today that conventional agriculture causes many adverse environmental effects and is not a sustainable form of producing food (Altieri and Nicholls, 2002). Organic agriculture provides a good model of agriculture based on sustainble practices and has been adopted by many growers on Gokceada Island in Turkey. Gokceada (Imbros) is the biggest island of Turkey situated in the northwest. According to the legend the name of Imbros comes from ancient Greek and means "Windy Island". The island's total area is 289.5 km^2 of which 3 000 ha is intended for agricultural facilities. The total population is 8 894 and 1 616 inhabitants still live in villages. Gokceada is provides a good model for preventing agricultural environmental degradation. Gokceada has not only significant tourism opportunities but also suitable conditions for organic agriculture as it is isolated from the main land. Island people's main livelihoods are agriculture, animal husbandry and tourism. Because of short tourism season basic livelihood still seems to be agriculture for the next years. Therefore for the better use of local natural resources and to create more sustainable systems in 2002 an organic project has been carried out on the main crops of the island; olive, honey and grape production. Participants involved with increasing organic agriculture on the inland include the local administration of Gokceada, Provincial Directorate of Ministry of Agriculture and Rural Affairs, Small Scale Farmers, Canakkale Onsekiz Mart University Agriculture Faculty, Enterprises and Gokceada Municipality.

Results

Organic Olive and olive oil production project began in 2002 with 14 producers and yielded 17 376 tonnes of organic olive oil. In 2003 and 2004, 26 and 64 certified organic growers produced 15 402 and 24 583 tonnes of organic olive oil respectively. In 2005, 114 producers produced 156 tonnes of olive oil on 413 ha of land. In four years time, olive yields per tree have dramatically increased from 15 kg to 22 kg. Not only yields have increased but also the incomes are increasing as the unit prices are higher in organic crops. For example, in 2005 the net purchased price declared by TARIS (Turkish Agricultural Sales Cooperatives Union.) for organic olive oil (with 0.5 acidity degree) was 5.70 euros while conventional prices with the same acidity were 3.56 euros. Today it is proved that organic agriculture has not only plenty of positive effects but also cause increases in yield (Blaise, 2006).

An organic honey project was initiated in 2003 and in the following year 25 beekeepers produced 11.06 tonnes of organic honey from 793 hives. In 2005, these numbers increased to 53 beekeeper who produced 25.32 tonnes honey with 1665 hives.

In 2005, two organic grape growers (fresh grapes and wine producers) yielded 10 tonnes of table grapes on 1.7 ha of land. Ongoing work is being done to expand organic table and wine grape production. Besides this, fodder and field crops were produced organically on 200 ha area whereas miscellaneous vegetables especially; tomato, cucumber, pepper, leek, cauliflower, melon and watermelon in 50 ha. Current studies are going on to lay out a new project involving organic sheep (Imbros sheep) production in Eselek pasture on an 4 200 ha area (Konyalı et al., 2004).

Before conversion to organic agriculture almost none of the producers use pesticides or chemical fertilizers so; it was not difficult to convert the system into organic production. Producers share the certification fees by forming producer associations which decreases the costs dramatically. Organic island producers have some financial opportunities. In the organic honey project, bee producers were supported with a total of 1500 bee hives and 3100 boxes of organic insecticide. Local administration donated organic insecticides to olive

growers for control of olive fles. A National Bank offers interest discount (60%) in loans for organic producers. In 2002 and 2003, control and certification expenses were paid by local administration of Gokceada (Anon. 2006).

Conclusion

Gokceada has very favourable conditions for organic agriculture and has exciting, ambitious and laborious enterprisers. Thirty percent of the organic products are consumed by the seasonal tourists and island inhabitants and the remaining products are sold at organic fairs, sent to the organic market in Sisli Municipality-Istanbul, sold to luxury hotels and the rest is exported. The common brands both in organic olive oil and organic honey have great effects in marketing. Organic farming facilities provide; food security and safety, guarantee economic viability for growers and preserve the structure of the rural community. But the main goal must be to sustain the agricultural system and improve it with sharing responsibilities.

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Biography

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Uganda (Food Access)

Household Food Security Effects of Certified Organic Export Production in Tropical Africa: a Gendered Analysis

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Introduction

As organic farming has caught momentum around the world, critical voices have been raised against it arguing that organic conversion will jeopardize food security in developing countries and even globally by reducing crop yields. Yet little empirical evidence has been advanced in support of these claims, nor in support of the counter arguments. In this light, this paper examines the effects on household food security of certified organic export production through a gendered analysis. It also discusses how organic conversion affects men and women differently in respect of changes in the costs and benefits of farming.

The paper is based on research carried out in 2005-06 among smallholder farmers in eastern and central Uganda. Certified organic Arabica coffee and pineapple producers were compared to matching control groups of conventional farmers (Bolwig et al., 2007). Both case studies were in the humid tropics. A total of 172 organic and 159 conventional farmers were interviewed in a formal household survey. Nine focus group interviews were conducted with organic farmers (males and females were interviewed seperatley). Organic production was in both cases organised on a contract farming basis, in schemes operated by the firm exporting the organic product and holding the organic certification. Certified organic farming is found mainly in this form in tropical Africa. The size of the pineapple and coffee schemes was 34 and 3 870 farmers, respectively, and organic certification took place in 2000 and 2004.

Results

Organic pineapple farmers enjoyed high levels of food self-sufficiency and organic conversion did not appear to have reduced food production. This was mainly because the expansion of pineapple farms and their improved management had occurred through additional investments in land and hired labour rather than through the diversion of household resources away from food crops. These positive dynamics were related to the high incomes earned in pineapple farming as well as to large average farm size. Hence most organic farmers could satisfy their calorie needs through their own production and moreover purchase higher value foods such as meat, fish, sugar, tea, and rice. Food purchases ranked only five in household expenditures due to the combination of high food self-sufficiency and high cash income.

In the case of organic coffee, the general trend has been a reduction in local food production since organic conversion, mainly due to the expansion of coffee on land previously cultivated with food crops. Very small average farm size combined with low capacity for buying more land means that the expansion of coffee had occurred at the expense of land planted with maize and its intercrop, sweet potatoes. But, farmers had adapted their farming strategies in ways that mitigated the intensified competition for land between coffee and food crops. Firstly, while land scarcity had eliminated monocropping of beans in the area, improved weed management in coffee induced by the organic project had created new opportunities for intercropping beans with coffee. Secondly, some farmers invested coffee incomes in renting land for maize and rice farming outside their home area where land was more abundant. Other causes of reduced per capita food output that were unrelated to organic conversion included intensified population pressure, declining soil fertility and disease infestation in cooking banana.

Organic conversion of coffee had also caused a change in the utilisation of family labour, but without seriously impacting food production. Farmers had clearly increased their labour efforts in coffee farming and processing. This was due in part to higher and more stable coffee prices and to the stricter quality requirements of the organic exporter. Most of this extra labour was supplied by women who were mainly responsible for food production, but because land was the dominant production constraint, this change in

labour use did not significantly reduce efforts in food production. Instead, the women had adapted by working longer hours and by reducing the time spent in off-farm activities (reducing their access to personal incomes).

Few organic coffee farmers were self-sufficient in calories and proteins and food purchases thus ranked high in household budgets. This was likely also the situation before organic conversion when land was also a major production constraint. In this context it is worth emphasizing that despite reduced food production after conversion, the interviewees observed that food security had not worsened but rather improved. This was because the higher coffee incomes more than compensated for the loss in food production by improving the capacity for accessing food through the market.

Both pineapple and coffee farmers had applied some of the improved farming practices acquired through the organic project on their food crops and there was some reinvestment of organic revenues into food crop farming. In both cases, organic certification was associated with moderate increases in production costs, especially in respect of inputs of family and hired labour. But the benefits of conversion in terms of higher organic crop revenues far outweighed the extra costs, resulting in significant income increases, especially in the case of pineapple.

The effects of organic conversion on gender inequality were mixed and depended to a large extent on the local context and on commodity characteristics. The distribution of the additional costs and benefits associated with organic conversion was much more biased against women for coffee than for pineapple. But it is worth underlining that the interviewed women found that organic farming was well worth the extra work effort due the income benefits for the household as a whole, even if they had no or little control over the use of these incomes.

Conclusions

The study indicates that conversion to organic export production has not reduced food security in the examined cases but rather improved it by raising cash incomes that have enabled households to increase the amount and quality of food purchased in the market. This suggests the importance of considering changes in the capacity for accessing food through the market as well as through own production when assessing household food security impacts of organic export production. Another insight is that technology and investment spill-overs from the organic export crop to food crop farming, as well as a more efficient use of available land and labour resources achieved through farmer adaptations, may mitigate the competition over factors of production between food crops and the organic cash crop. In general, where local food markets are functioning and organic conversion does not involve major risk-taking by farmers, the integration of smallholders in international value chains for organic products does not normally constitute a threat to food security.

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Biography

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Uganda (Food Access)

The Economics of Certified Organic Farming in Tropical Africa: A Preliminary Assessment

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Introduction

Over the last fifteen years the market for certified organic agricultural products has grown from a very low base to reach 1.5-2.5% and up to 5% in some cases of total food sales both in North America and the EU (Willer & Yusufi, 2005). Most of this growth has been satisfied by increases in certified organic production within these regions, but there has also been an increase in organic imports, including fruits and vegetables and beverages, from tropical countries. Emerging alongside organic market growth has been limited literature on the economics of organic farming. This literature focuses on the relative profitability of organic and conventional agriculture, and a finding of rough equivalence has been commonly arrived at, based upon the fact that organic farming's price premiums and lower input costs compensate for reduced yields (Padel & Lampkin, 1994). These findings are however entirely based on research from North America and EU. Economic studies of organic farming in the tropics have received much less attention and there few quantitative reports (e.g. Bacon, 2005). In light of this, this paper examines the relative profitability of certified organic and conventional farming operations in tropical Africa as well as differences in rates of adoption of farming practices and in household factor endowments (Gibbon and Bolwig, 2007).

These results are based on three household surveys of smallholder farmers involved with certified organic Arabica coffee, cocoa-vanilla, and pineapple and of matching control groups of conventional farmers. The surveys were conducted in eastern, western and central Uganda, respectively, all in the humid tropics, and covered a total of 172 organic and 159 conventional farmers. Organic production was in all cases organised on a contract farming-type basis, in schemes operated by the firm exporting the organic product. Scheme size ranged from 34 to 3,870 farmers and organic certification took place between 2000 and 2004. Data analysis involved, for each crop, t-tests to establish whether differences in the indicators used to compare organic and conventional farmers were significant, and bivariate correlation analysis to identify associations between farmer performance on selected indicators and other variables.

Results

Significant or nearly significant differences in farm revenue (land and crop sales) in favour of the three cohorts of organic farmers demonstrated significantly higher farm incomes (revenue minus fixed and variable costs) for these cohorts relative to the conventional farmers. The revenues earned by the organic farmers benefited primarily from higher revenue of the crop subject to organic certification (CSC) which was significantly higher for all CSCs except cocoa. This reflected mainly the fact that organic farmers produced higher volumes of CSCs. Organic price premia also contributed to higher revenues, but their effect was reduced by the fact that farmer sold a proportion of the organic produce off-scheme at conventional prices. The results also revealed enormous differences in profitability between organic farmers of different CSCs. At over US$2,000 a year, the average income of organic pineapple farmers was three and five times higher than for cocoa-vanilla and coffee farmers, respectively.

In contrast to the experience in developed countries, we found that organic conversion was associated with increases rather than reductions in yield. The absence of yield loss relates mainly to the low-input characteristics and general low productivity of conventional farming in tropical Africa. Focus group interviews suggested that organic farmers enjoyed higher yields due to more effective farm management, but this could not be verified statistically.

Most studies of organic agriculture in developed countries observe few differences in fixed costs between organic and conventional farmers. The economic differences are due to variable cost structures, with organic

farmers spending more than conventional farmers on labour and less on synthetic inputs. Organic farmers' cost structure in tropical Africa has a completely different character. Expenditure on fixed costs represented a remarkably low share of organic farmers' revenue – and in most cases also of conventional farmers'. Overall expenditure on variable costs was higher than on fixed costs for organic farmers, but this was neither due to rising expenditure on labour nor to falling expenditure on synthetic inputs. Instead, organic farmers incurred higher variable costs on post-harvest handling and processing activities required to meet the higher quality standards of the exporter.

Where organic farmers adopted more labour-intensive organic and other improved practices (and focus group interviews indicated this), this occurred mainly through increased family labour inputs rather than through hired labour. Meanwhile, the prohibition on using synthetic inputs was financially neutral due to their low level of use in conventional agriculture. As a result, differences between conventional and organic farmers' costs had little impact on differences in income. If anything, income differences in favour of organic farmers were amplified by their lower costs compared to conventional farmers.

We also examined factors that might explain the difference between the two groups in respect of volume and income, particularly regarding CSCs. Possible reasons included superior factor endowments of organic farmers, price incentives related to the organic premium and higher yields. Among factor endowments, area under CSCs and numbers of CSC plants had the strongest relation to volume and income, while yields were similarly strongly related to volume. Other factors including price incentives (in relation to volume) and family labour availability were much less important. A coming study will use multivariate regression techniques to assess the income effects of organic status while controlling for the effects of factor endowment variables like land or number of plants.

Conclusion

The study showed that farms engaged in certified organic export production were significantly more profitable in terms of income than those that engaged only in conventional production. It also indicated that in the context of contract farming-type schemes, conversion to certified organic export production for smallholder farmers is fairly easy, involves little risk, and demands few if any fixed investments. Further research is needed to assess whether this is also the case in the context of cooperatives. On balance this evidence suggests that organic farming is a useful measure to increase incomes among poor farmers in Africa and it should therefore be promoted.

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Uganda (Food Stability)

Innovativeness in Imporving Food Security in Rural Households: The Case of Intercropping Cassava with Bananas IN Wakiso District of Uganda

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Introduction

Uganda is one of the poorest countries in the World. It is located in East Africa with a population of 27 million people (2002 census). Most people (90%) live in the rural areas and depend on subsistence farming. The hand hoe is the tool of choice for tilling land. In the southern part of the country, Bananas and Root crops like cassava and sweet potatoes are the major food crops grown.. The area receives bimodal rainfall ranging between 1000 - 1500mm and has high humidity with temperatures range between 23 -30^{0}C. Crop yields have declined over time as a result of soil degradation. This is particularly notable around the Lake Victoria crescent where continuous land cultivation is practiced to meet the high food demand of the population.

Organic agriculture was introduced in the area in 1999 by a local NGO (AFIRD) to improve food security and increase household income, and protect the Environment. The farmers have managed to improve their household food security in particular food availability through innovativeness and persistence. One farmer who has obtained commendable results is presented as a case study in this paper.

Results

Mrs. Mugerwa Janati is a house wife. She lives in an urbanite environment on a small piece of family land measuring about 0.5 Hectare. The household uses half of the land owned to produce Bananas (Matooke), Cassava, Maize, and Beans. Bananas and Cassava being perennial crops are particularly important for ensuring that the family is food secure through out the year. In 2004, Mrs. Mugerwa Janati together with other women belonging to a commune self help group took up sustainable agriculture to address food insecurity on their individual farms. Limited by land as a resource of production, the farmers came up with the following innovation to increase land productivity basing on knowledge gained in organic farming. The innovation caters for the efficient use of manure, space and land.

Description of the innovation

Holes measuring 1x1 m and 0.5m deep are dug at regular intervals between the Banana rows at intervals of 3 - 4m apart, depending on spacing. Soil is dug out from the hole and mixed with 1 wheelbarrow load-full of seasoned manure. The thoroughly mixed soil is then put back into the hole to make a big mould. Two healthy cassava cuttings measuring 20 - 30cm are identified and prepared for planting by debarking. This is done by removing 2 sections of the bark of 0.25-0.5 cm about quarter and mid length of the stem. The planting material is then planted upright in the middle of the mould leaving 15-30cm of the unstriped end above ground. The cassava is left to grow and harvested at leisure. Yield is very high, the tubers are taster and there are minimal effects on bananas. About her cassava, Mrs. Mugerwa says that *'I no longer admire big cassava gardens; my cassava-banana intercrop looks better and yields much more.'*

Conclusions

The success of Mrs. Mugerwa in improving food security using organic farming shows that there are numerous opportunities to be exploited by farmers. In this case, livestock production should be taken up as it directly supports crops by providing manures and in turn the crops are used as feed for the livestock. Intercropping as a practice of organic farming makes it possible to grow complimentary crops even in areas of land scarcity where it is difficult to sustain monocropping.More so; the farmer has control of essential

planting materials or seeds and doesn't have to depend on genetically modified seeds or planting materials from commercial sources.

The farming practice in this case study has proved easy to replicate any where in our project area. Potentially it can be used anywhere in Uganda and any other country in the world where cassava and other perennial crops are grown. Although no work has been done to quantify the rate of adoption, on ground the method is becoming a common farming practice in Wakiso District.

Regarding constraints, crops intercropped with cassava are likely to experience nutrient shortage, it (cassava) being a high yielding crop draining a lot of nutrients from the soil. In communities where livestock is not kept, this practice may not be possible as it requires lots of nutrients in form of manures. Diseases and pest could also cross attack crops that are intercropped. Food theft can be a problem with such a practice as it becomes easier to uproot the food.

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Biography

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Uganda (Food Stability)

Improving Food Security through Organic Farming in Uganda

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Introduction

Uganda is located in East Africa. The majority of the population (90%) is rural based practicing subsistence farming. The hand hoe is the major tool used to till the land. In 1995, Organic farming was introduced in Uganda to address food insecurity, improve household income and protect the environment. This programme was monitored and evaluated in November 2005 in a study[12]. Part of the results is discussed in this paper.

The study area consisted of Western, Central and North West parts of Uganda. The regions receive bimodal rainfall ranging between 1000 - 1300mm and have high humidity. Temperatures range between 23 -30^{0}C. The soils have been degraded especially around the homesteads. A sample of 350 farmer households was randomly selected from 11,598 households under 7 organizations promoting sustainable organic farming. These were compared with an equal number of farmers practicing conventional agriculture as the reference group. The farmers practicing organic farming were divided into the 2-5 years (medium) and 6-10 years (high) groups. The data was collected using formatted questionnaires and analysized using bio-statistic programmes. The reference years were 1995 and 2005.

Results

It was shown that in 1995 all farmers were at the same level of food insecurity or food security of 1.5-1.8 months a year. For 2005, food insecurity of the reference group rose to 3.1 months while that of trained farmers, remained at 1.8 months a year. The static position of trained farmers was explained by the fact that 2005 was a drought year whereas 1995 was a good one. This revealed that farmers practicing organic farming were in a better position to withstand drought compared to their counterparts in the reference group (Bachmann, 2005).The survey also showed that organic agriculture farmers were better at coping with food shortages. Basing on these facts, Agency for Integrated Rural Development (AFIRD) has been able to lobby local leaders to support organic farming.

Table 1: Coping strategies with food shortages.

	reference		**2-5 years**		**6-10years**	
	1995	**2005**	**1995**	**2005**	**1995**	**2005**
Buy food	38.7	72.6	38.6	43.4	35.3	42.5
Eat less	32.3	51.5	33.7	31.5	35.3	26.3
Total hunger	4.1	3.4	5.6	5.2	7.2	6.6

Source: Bachmann (2005 p. 32)

The table shows that in 1995 about 38% of all farmers bought food, 32-35% ate less and 4-7% starved. In 2005, the situation for the reference group had deteriorated with 72% buying food, 51% eating less and 3 % starving. In the 2-5 years and 6-10 years adopter groups the majority were doing much better with 43% of farmers buying food and 25-30% eating less. These figures are about as twice as good as the reference group. However the poorest of the poor farmers were not doing any better, as 5-7% still starved. This was attributed to the lack of uniformity in extension service provision. Basing on this finding, AFIRD modified its extension approach. project impact monitoring (PIM) was introduced and extension staff meet farmers in small groups in their villages.

[11] PACE Consultants.
[12] An impact household survey conducted to monitor and evaluate the work of seven Misereor partners on Sustainable and Organic Agriculture practices in Uganda.

Farmers were classified into two income groups; above and below 500,000shs per annum to determine whether those that starved belonged to the vulnerable categories.

Table 2: influence of gender on household agricultural income

	Reference			2-5 years			6-10 years		
	<500	>500	%diff	<500	>500	%diff	<500	>500	%diff
Male	50.7	59.0	-8.3	55.3	55.6	-0.3	46.6	47.2	-0.6
Female	49.3	41.0	8.3	44.7	44.4	0.3	53.4	52.8	0.6
Single	8.0	6.6	1.4	3.5	3.5	0.0	3.4	1.9	1.5
Married	75.4	83.6	-8.2	84.2	80.6	3.6	89.7	84	5.7
Separated	7.2	4.1	3.1	5.3	9	-3.7	1.7	2.8	-1.1
Widowed	9.4	5.7	3.7	7.0	6.9	0.1	5.2	11.3	-6.1

Source: Bachmann (2005 p. 33)

The table shows that the percentage of trained, separated and widowed farmers, that earned below 500,000 UGX reduced progressively. This proved that, these two disadvantaged groups were not the majority of farmers that starved, thus the programme worked on a gender sensitive way. In order to consolidate this positive development, AFIRD has encouraged trainees to reach out to more women farmers. Labour and time saving techniques have been introduced to ensure that disadvantaged women benefit further from organic farming. Goats have also been expanded in the programme to replace pigs. This is because they are easily integrated into women household activities.

The big increase in the low income column for all trained farmer categories is visible for the married households (3.6-5.7%). This needed to be investigated further as no possible explanation was found.
The study also revealed that diet had improved for all farmers with the trained leading by 20-30%. Protein consumption was high (over 70%) for both groups. Interestingly, the level of animal protein consumption was higher for the trained farmers by 20-25%. This implied that farmers engaged in organic farming are better off nutritional wise. AFIRD has provided communal breeding goats according to community need in order to consolidate the sources of animal protein supplies.

Table 3: Percentage of farmers with better diet in 2005 compared to 1995

	Reference	Medium	High
More vegetables	66.5	94.8	88.6
More fruits	73.7	95.9	
More proteins	74.4	96.3	97
More eggs	49.2	78.3	95.2
More meat	47.4	76.4	77.8
More diary products	45.9	67.8	86.2

Source: Bachmann (2005 p. 33)

Conclusion

In conclusion, organic farming was found to have the potential to improve food stability for farmers. This was achieved through increasing the farmers' ability to cope with droughts, improving diets and increasing consumption of superior proteins. In addition, organic farming worked in a gender friendly way and didn't discriminate the marginalized groups.

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Biography

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Zimbabwe (Food Availability)

Conservation Farming: A sustainable Organic Agricultural Technology for Enhanced Household Food Security for the Vulnerable and Poor in rural Zimbabwe

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Introduction

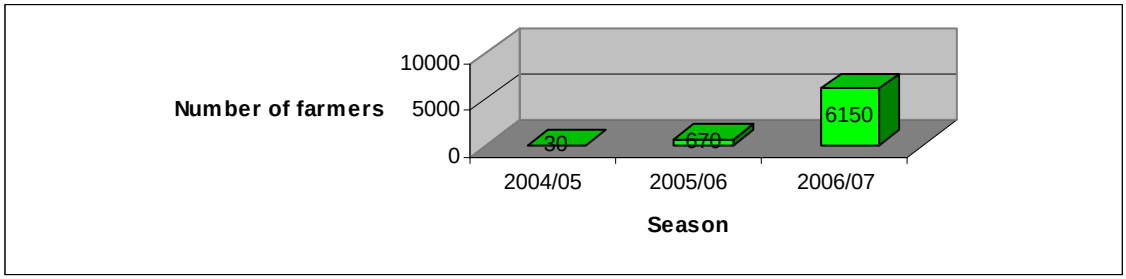
Conservation Farming (CF) is a technology that ensures the conservation of land, water, time labour and energy. CF farmers in rural Zimbabwe have attained yields of as high as 8t/ha for maize without the use of conventional fertilizers. These were attained in the third year of continuous practice of CF using organic manure, crop residues and leaf material for biomass transfer. The program was started in 2004/05 through participatory demonstrations. To date more than 6,000 farmers are practicing CF across 9 of Zimbabwe 52 districts in which CTDT's operational districts. The technology has not only benefited the resource poor and the vulnerable households but has also been adopted by the resourceful and better off farmers. CF has scored marked improvement in inherent soil fertility, texture and structure over the last three seasons. Conservation Farming has contributed immensely towards household food security in rural Zimbabwe.

Conservation Farming (CF) is a technology, which involves the preservation of the natural environment and utilise it for the benefit of human life. There is no burning of crop residues. Establishment of correctly spaced permanent planting basins prepared prior to the onset of rains. The principle is characterised by early planting of crops, hence early crop establishment, early weeding and a managed systematic crop rotation. CF encourages smallholder farmers to reduce their use of destructive methods of tillage and adopt a more productive, efficient and environmentally sustainable ways of farming. Conservation farming methods are easy to follow and they work.

Farmers who have used the technology in rural Zimbabwe have reduced their costs, increased their yields, improved their nutrition, and minimized chances of crop failure in drought years. Furthermore, farmers have increased their profits per unit area and in time improve the fertility of their land.

Conservation Farming Results In Rural Zimbabwe

Figure 2: Conservation Farming Farmers over the three past seasons



Since the inception of CF in 2004, there has been a significant increase in the number of farmers practising. To date there are 6150 farmers who are using the technology 6 district and 21 wards in communal Zimbabwe and many more who have appreciated one or two principles of CF. CF maintains high and constant plant populations over seasons because the principle ensures high germination percentages and good crop establishment. Weeds remain a major aspect reducing crop production. Weeding is time consuming, demanding and often carried out by women. CF aspects of continuous and timely weeding do not allow weeds to produce seeds and hence a reduction in the soil seed bank. This results in reduced weed pressure and weeding over seasons.

Figure 3: Early Planting and High Plant Populations

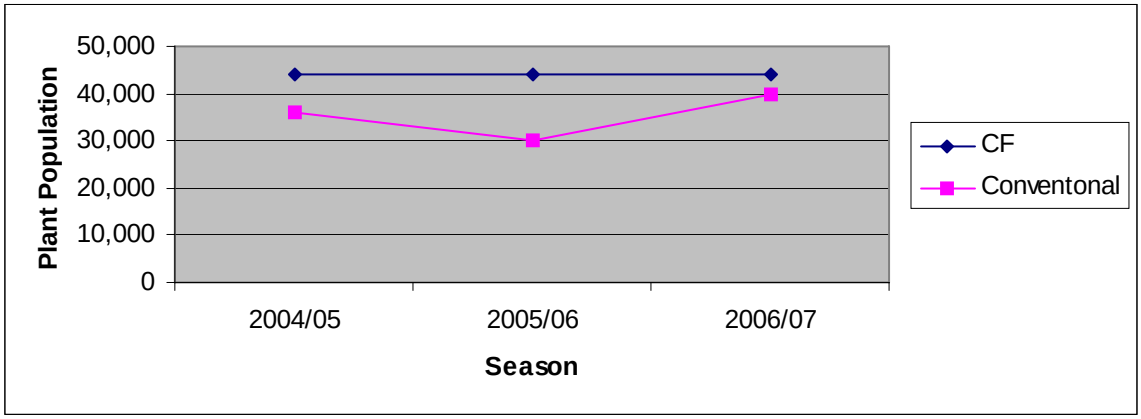
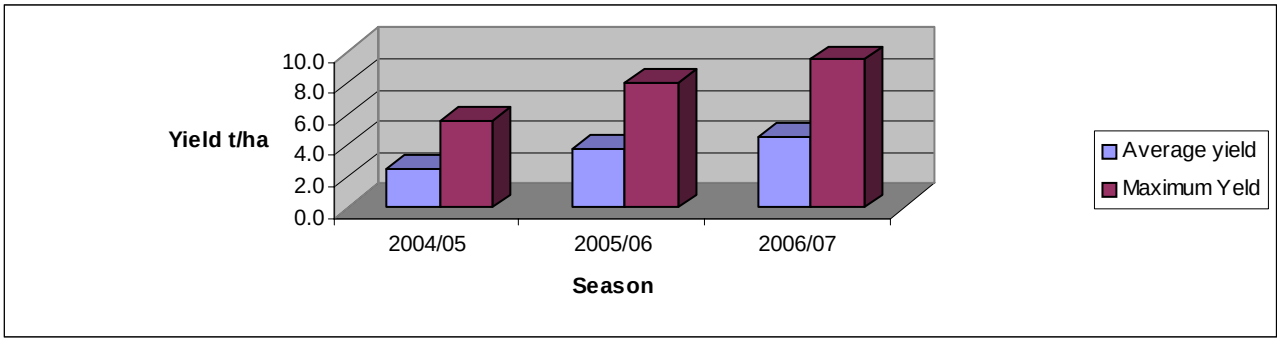


Table 1: Reduced Weed Pressure and number of Weedings across the Seasons

	Time in Seasons			
Weeding Frequency	**2004/05**	**2005/06**	**2006/07**	**2007/08**
CF	3	2	1	1
Conventional	3	3	3	3

Figure 5: Conservation Farming Maize Yields from 2004 to 2007



Crop yields of all the crops under CF have increased by up to 195% in the third season of practising the technology. It also emphasizes rebuilding the fertility status of soil and improves soil structure, texture and water holding capacity. A range of crops which have been grown under CF in Zimbabwe to date include the staple maize, sorghum, pearl millet, soyabeans, groundnuts, sunflower and cowpeas.

Conclusions

- Farmers who practice CF have experienced immediate, medium and log term benefits.
- Crop yields doubled in the first season, for instance the average yield in Murewa District was 0.6t/ha before the introduction of CF yet the minimum recorded yield for first has been 2.5t/ha.
- Even in seasons of poor rainfall farmers still get a reasonable harvest.
- In the medium term the fertility of the soil improves, weed populations declined and CF farmers are able to increase production per unit area and enhance household food security. They can introduce cash crops such as cotton, groundnuts and sunflower.
- Conservation farming is a sustainable organic farming based technology that has a lot of potential for marginalized rural poor and if properly planned and implemented can greatly contribute to food security in Afica.

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