



Report

Organic Agriculture and Food Processing in Cambodia

Status and Potentials

Prepared by the
Cambodian Organic Agriculture Association (COrAA)

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The Cambodian Organic Agriculture Association (COraA) is a nationwide alliance for the promotion of organic agriculture. It was founded in 2006.

COraA's Objectives

- To assist farmers/producers in the conversion from conventional to organic farming
- To raise awareness on the health, environmental, social and economic benefits of organic production
- To conduct inspections and provide certification for products that meet the organic, chemical-free and wild harvest standards
- To support and encourage the marketing of organic products
- To encourage relevant research for the development of organic agriculture
- To support organic agriculture actors in dialogue with government, donor organizations and international organic agriculture movements

Cambodian Organic Agricultural Association (COraA)

44A, Street 320

Sangkat Boeung Keng Kang III

Khan Chamkar Mon

Phnom Penh

Kingdom of Cambodia

E-mail: info@coraa.org

<http://www.coraa.org>

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Abbreviations and Acronyms

ADG	Aide au Développement Gembloux, Belgian NGO	GTZ-TPC	GTZ Trade Promotion Cambodia
CARDI	Cambodian Agricultural Research and Development Institute	HACCP	Hazard Analysis & Critical Control Points
CDRC	Community Cooperative for Rural Development	ICS	Internal Control System (part of an organic guarantee system)
CEDAC	Cambodian Center for Study and Development in Agriculture	IFC	International Finance Corporation
CIDS	Cambodian Institute of Development Study	IFOAM	International Federation of Organic Agriculture Movements
CIRD	Cambodian Institute for Research and Rural Development	ILO	International Labour Organization
CIM	Centrum für internationale Migration und Entwicklung (CIM) is a joint operation of GIZ and the International Placement Services (ZAV) of the Federal Employment Agency	IVY	International Volunteers of Yamagata
DANIDA	Danish Development Cooperation	MAFF	Ministry for Agriculture, Forestry and Fisheries
DED	Deutscher Entwicklungsdienst, German Development Service, since 2011: GIZ	MoC	Ministry of Commerce
DGRV	Deutscher Genossenschafts- und Raiffeisenverband e.V.	NAP	Natural Agri-Products (brand, initially also marketing program of CEDAC)
GERES	Groupe Energies Renouvelables, Environnement et Solidarités	NGO	Non-Government Organization
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit	OPOP	One Province One Product Expo (Exhibition)
GMP	Good Manufacturing Practice	PDoC	Provincial Department of Commerce
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (since 2011: GIZ)	PUAC	Peri Urban Agriculture Center
GTZ-CB- RDP	GTZ Community Based Rural Development Project	RUA	Royal University of Agriculture
GTZ-PSP	GTZ Private Sector Promotion Program	SKC (SKL)	SAHAKREAS CEDAC Ltd.
		SME	Small Medium Enterprises
		SNV	Dutch Development Organization
		SRI	System of Rice Intensification
		WCS	Wildlife Conservation Society

Introduction

Organic farming as a movement is still a relatively young branch of agriculture compared to 10,000 years of crop cultivation and animal husbandry. It was only in the 1930s and 1940s that several initiatives began to explore alternatives to conventional agriculture. Since then organic agriculture has advanced considerably and is recognized by most governments as an essential approach to cope with food security and food safety.

Based on agriculture statistics from 160 countries, the 2009 data show that thirty-seven million hectares of agricultural land worldwide are farmed organically. The countries with the largest area of organic agricultural land are Australia, Argentina and the USA. Compared to the previous year, the organic land area increased by two million hectares, or six percent, worldwide.¹

The market research company Organic Monitor estimated the global market for organic products in 2009 at 55 billion US dollars (€40 billion), roughly 5 percent more than in 2008. The largest amount of organic products is sold in Europe and North America. In Europe, over €18 billion were spent, with Germany leading at €5.8 billion, followed by France (€3 billion) and the United Kingdom (€2.1 billion). The countries with the highest per capita spending were Denmark and Switzerland with more than €130 annually.²

Cambodia is certainly a latecomer on the international organic agriculture scene. Cambodia's neighbor Thailand, for example, has already a long record of recognized organic agriculture. It was only in 2006 several NGOs, entrepreneurs, development programs conducted by international donors and individuals in government ministries established the Cambodian Organic Agriculture Association (COAAA). COAAA was established as a domestic organization where Cambodian stakeholders, especially those from the private-sectors will have ownership and take leadership in promoting organic agriculture in Cambodia (in contrast to a rather donor-promoted organic agriculture movement).

Although Cambodia is somewhat late in building a domestic organic sector and has limited capacity to advise interested farmers and entrepreneurs as well as to certify organic

¹ These figures are from the 12th edition of The World of Organic Agriculture.

<http://www.fibl.org/fileadmin/documents/en/news/2011/press-release-world-of-organic-110215.pdf>

² as above

operations, Cambodia has some advantages in terms of organic production. For some crops such as rice or cashew, many farmers have never really accepted the propagated intensive use of farm chemicals. An exception is, unfortunately, conventional vegetable sector where farmers use pesticides too often indiscriminately.

Although a considerable number of farmers in Cambodia still cultivate especially rice with little use of synthetic fertilizers and almost no pesticides; they do not necessarily farm organically as their practices might further exhaust the soil. At any rate, they do not improve the fertility of the soil. In many areas particularly rice yields are still on stable low level.

Contrary to the public opinion, organic agriculture is much more than farming without chemicals. Organic agriculture has evolved largely in critique of and as an alternative to an industrial style of agriculture and agribusiness that are detrimental to the environment. Visionaries, theorists and enthusiasts from all over the world realize that mainstream agriculture has numerous undesirable implications. The main problem is the increasing use of external inputs, namely fertilizer and pesticides that fulfilled for a short time the promise of increased yields, but not necessarily increased incomes. The experiences are similar, wherever modern agriculture is practiced.

Unlike agribusiness and conventional agriculture that are based on concepts that simplify reality and techniques that make them unsustainable, organic agriculture is rooted on the metaphor of ecology. It is emphasizing co-evolution with – and not the domination of – nature. It is based on an understanding and study of the ecological context, biological processes as well as socio-economic relationships. In this notion, human well-being is inseparable from that of the land community. In addition, organic agriculture is grounded on a set of methods, technologies and tools that guide the agricultural practice.

From the consumer perspective, the most important feature is the healthiness of the food. Besides the purity of the product, consumers increasingly want to be sure that the product was produced without agrochemicals and not exposed to high levels of pollution. Hence, the promotion of good agricultural practices and chemical free cultivation should be considered as steps in the right direction.

As consumers commonly do not meet the producers, it is difficult for consumers to trust products sold with the claim to be produced organically. In fact, the term has been widely misused. To overcome the predicament, many organizations have taken pains to formulate standards which guide producers and serve as basis for inspection and certification. Since the British Soil Association came up with the first organic standards in 1967, many

organizations around the world have followed to set similar standards and to set up certification system.

COrAA's Organic Standards guide producers wishing to comply with the organic standards. They should convert their whole farms to a sustainable organic farming system and may not use any chemical fertilizer or other chemical substances such as pesticides and fungicides. Fertilization and crop protection must follow organic procedures as outlines in the standards. After a conversion period of three years, a farm can be certified as organic. COrAA's Standard is based on The IFOAM Standard for Organic Production and Processing³ which has served as reference in the formulation of countless organic standards around the world.

Certified organic products

Based on a definition by the International Federation of Organic Agriculture Movements (IFOAM), "Certified organic products are those which have been produced, stored, processed, handled and marketed in accordance with precise technical specifications (standards) and certified as "organic" by a certification body. Once a certification body has verified conformity with organic standards, the product can be labeled as such. It is important to note that an organic label applies to the production process, ensuring that the product has been produced and processed in an ecologically sound manner. The organic label is therefore a production process claim as opposed to a product quality claim".⁴ Certification requires producers to record activities in their farms as well as the purchases of inputs and sales of crops or food.

In general, only products that comply with the relevant standards and are certified can be called organic. In this way, organic already defines a guaranteed quality standard, unlike other labels such as 'natural', 'eco-friendly' or 'biological'. The use of the latter is not controlled by an independent agency but can be applied by producers freely.

Group certification

In view of small farms and relatively small quantities an inspection of individual farms by a certifier is for most crops too costly, the concept of group certification was developed to enable smallholders to access organic markets. This scheme allows developing countries also to commercialize their organic products at the international level at reasonable cost.

³ IFOAM, 2005. The IFOAM Standard for Organic Production and Processing
http://www.ifoam.org/about_ifoam/standards/norms/norm_documents_library/IBS_V3_20070817.pdf

⁴ IFOAM. FAQ, <http://www.ifoam.org/sub/faq.html>

Groups of organic producers therefore need to establish an Internal Control System (ICS) as part of a documented quality assurance system that allows an external certification body to delegate the periodical inspection of individual group members to an identified body or unit within the certified operator. This means that the third party certification bodies only have to inspect the well-functioning of the system, as well as to perform a few spot-check re-inspections of individual smallholders. In Cambodia, group certification is applied in rice and cashew production. Small scale vegetable growers are considering utilizing this approach as well.

Scope and methodology

In this report we look chiefly into the status as well as the opportunities of the production, processing and marketing of several organic and chemical-free food products in Cambodia. Without doubt, in terms of the number of farmers rice is the most important sector, yet surprisingly the organic cashew sub-sector has made considerable advances and involves almost ten times more families than organic or chemical-free vegetable production. Information on organic pepper, fruits and palm sugar products are included as well. The study does not cover non-timber forest products and animal products,

Much the information provided here is based on interviews with key persons as well as on recent reports or presentations. For the background information, the team has utilized various documents, which to a great extent originate from development projects. Most of them have been published or are accessible on the web, but some documents just have been shared among experts working on various aspects of organic or sustainable agriculture.

Rice

Rice is by far the most important agricultural produce in Cambodia. About 70 percent of Cambodia's population depends on rice cultivation which covers about 75 percent of the arable land.

Since some decades, rice yields in Cambodia are among the lowest in Asia. This is chiefly attributed to low soil fertility.⁵ Only about ten percent of the farms have access to irrigation. Compared to most Asian countries, Cambodian farmers use relatively little inputs and a considerable number of rice farmers never have used farm chemicals. However, only a small portion of the produced rice has been certified as organic.

Background

In the year 2003, several programs led by GTZ, OXFAM Quebec and the NGO CEDAC began promoting the production of organic rice among farmers. One intention was to obtain rice which could meet the increasing demand for organic rice in industrialized countries. Organic rice was thought to diversify the export earnings of the garment sector.⁶ The Cambodian government, especially the Ministry of Commerce (MoC), supported by GTZ and CIM, supported the emerging organic sector and to explore opportunities for exports.

However, Cambodian rice millers did not warm up until today to the potentials organic rice could offer. Due to the rice crisis in 2008, which triggered a sudden interest in Cambodian rice, the focus shifted fully to the export of conventional rice.

So far, only a few containers of organic rice have been exported, yet the domestic market for organic rice has developed noticeably. In 2010, about 1,000 tons of milled organic rice was sold, most of it through CEDAC's shops. Nevertheless, this quantity comprises only a very small share of the rice market in Phnom Penh, approximately 0.5 percent. What is the volume of organic rice demand in Cambodia?

⁵ USDA Commodity Intelligence Report, 2010. CAMBODIA: Future Growth Rate of Rice Production Uncertain, <http://www.pecad.fas.usda.gov/highlights/2010/01/cambodia/>

⁶ Launey, Guy De, 2005. Cambodia targets organic market, 17 October 2005, <http://news.bbc.co.uk/2/hi/asia-pacific/4350290.stm>

Of the first initiatives, the cooperatives initiated by the Rural Development Program of the GTZ in Kompong Thom and Kampot province have continued to produce of organic rice although they encounter various problems in their undertakings.

The Community Cooperative for Rural Development (CDRC) in Pursat, which received support from several international NGOs, discontinued its interest in the organic sector after a planned export of organic rice to Germany failed in 2006. The Danida IPM project, which supported organic rice farmers in Battambang province, discontinued due to land tenure problems. Farmers' groups cooperating with CDRC and Danida IPM already had been certified by international certifiers.

At the onset, especially the GTZ development program and the NGO CEDAC promoted principles of the System for Rice Intensification (SRI) which enabled farmers to reduce the use of chemical inputs and many farmers eventually met the criteria of organic agriculture.

During the past two years, over 8,000 hectares of rice land have been cultivated organically. The production of organic rice has focused on aromatic varieties as the initiating agencies and programs anticipated that consumers wishing to eat organic rice would prefer these varieties.

Most organic farmers plant several varieties and consider the aromatic rice varieties, which achieve the highest price, as a cash crop. Farmers cultivate traditional varieties such as Somali, Neang Malis and Phka Malis. GTZ distributed also the CARDI variety Phka Rumduol which was derived through a selection process from the traditional variety Somali. All varieties are photoperiod sensitive and only grow during the rainy season. They are well suited for rainfed lowland conditions and are also drought resistant which enables the plants to endure longer dry spells during the rainy season, a trait high yielding varieties planted in irrigated fields no longer have.

Organizations involved in organic rice production

1. Rice farmers' cooperatives initiated by GTZ in Kampong Thom and Kampot Province

a) Stung Sen Agriculture Development Cooperative

Stung Sen district, Kampong Thom Province, 116 members, 178 hectares

b) Trapaeng Russei Commune Agriculture Development Cooperative

Kampong Svay district, Kampong Thom Province, 71 members, 89 hectares

c) Mithapheap Prashsrey Agriculture Development Cooperative

Stong District, Kampong Thom Province, 91 members, 61 hectares

d) Srer Cheng Organic Agriculture Development Cooperative

Srer Cheng Commune, Chum Kiri district, Kampot Province, 202 members, 295 hectares

The establishment of these cooperatives was initiated by the Community Based Rural Development Program (CB-RDP) of the German Gesellschaft für Technische Zusammenarbeit (GTZ). The agricultural component of the CB-RDP chiefly helped the members of the cooperatives to improve rice cultivation. Besides, the program assisted the members in enhancing their livestock and fish-raising activities, vegetable production and horticulture. The CB-RDP project ended on December 31, 2007

With the improvement of the rice production, the farmers increasingly produced marketable surpluses and subsequently shifted to a market oriented production. In this context, the production of organic rice and other crops emerged as an alternative to improve farmers' incomes. The potential for organic rice production was identified in December 2002. On the one hand, it was realized that due to the low level of chemical inputs, rice farmers could easily shift to organic practices. It was also expected that Cambodian organic rice could meet a ready export markets. On the other hand, it was expected that through the promotion of organic practices farmers would not be tempted to intensify production with the use of agro chemicals.⁷

The forerunners of the cooperatives, various Organic Rice Producer Associations, were founded in 2003. During the project term, GTZ had initiated one cooperative in each province. The report of an inspection of the Kampong Thom cooperative conducted by COrAA in early 2010 indicated that the cooperative had considerable difficulties to manage its ICS system. Consequently, COrAA suggested conducting a workshop. The original Stung Sen Agriculture Development Cooperative encompassed the members of the Trapaeng Russei as well as of the Mithapheap Prashsrey Agriculture Development Cooperative. The restructuring was decided in March 2010. It had become clear that the management problems were chiefly due to the coverage of too many districts which are far apart from each other. The cooperative had no longer the means to cope with the needs of the members in the different districts. As a result, among others, the internal control system

⁷ Rosenkranz, J, 2002. Potentials for Market Oriented Organic Farming, Cambodia, Report on Short Term Consultancy for the Agriculture Component GTZ Rural Development Program in Kampot and Kampong Thom Provinces, Cambodia

(ICS) had not been efficient. The results of the internal inspections conducted during the 2010/2011 season showed that the cooperatives had already improved the management of the ICS.

The members of the cooperatives have adopted the System of Rice Intensification (SRI) as an improved low-external input system. This served as a starting point for the conversion towards the organic production of rice. Rice seeds planted by the farmers include Phka Rumduol, Phka Malis, Phka Khney as well as deep water rice varieties.

2. CEDAC

The Cambodian NGO CEDAC (Centre d'Etude et de Développement Agricole Cambodgien) has actively promoted sustainable rice cultivation along principles of the Systematic Rice Intensification (SRI) since 1999. After the successful adoption of sustainable practices following the System of Rice Intensification (SRI) which helps farmers in improving productivity and reducing the use of external inputs, an increasing number of farmers were able to produce rice completely without agro-chemicals. Many of them soon were able to produce a surplus which met the criteria of organic agricultural production.

At the onset, the need for an established market channel for organic products was perceived. However, rice traders had no interest in organic rice and too often were cheating farmers with manipulated scales. Organic farmers, on the other hand, needed to realize a higher price for their efforts to assure an organic quality. A higher price serves also as an incentive for others to shift to organic cultivation.

As a result, CEDAC ventured into rice marketing in 2003; initially, CEDAC started buying milled rice from individual farmers for retailing in Phnom Penh. However, due to the fact that CEDAC interacted only with individual farmers, only 10 tons were acquired that time. The quality of the milled rice was inadequate for the urban market due to the low standard of the mills in the provinces.

As a consequence, CEDAC decided to buy paddy instead from the farmers and store and process it in Phnom Penh. This led to the creation of CEDAC's Natural Agriculture Products Marketing Program (NAP) in 2005. The program facilitated the set-up of organic rice producer groups in seven provinces including Kampong Cham, Kampong Thom, Kampong Chhnang, Kampot, Takeo and Kampong Speu, mostly within a radius of 100 km around Phnom Penh, the capital city of Cambodia. The province Siem Reap was also recently included.

The primary target group is small farmers who are producing rice essentially for their subsistence, but are able to generate surpluses of at least 500kg of jasmine rice per family and other varieties of high value, such as Phka Khney.

In this phase it was realized that it was difficult to provide customers a sufficient proof that the rice was organically produced. Consequently, CEDAC came up with the *Natural Standards for Plant Production* which serves as the binding guideline since the year 2005. Earlier, CEDAC and the producer groups had started to set up an organic guarantee system. Per group, one farmer was selected and trained as “internal inspector” who is tasked to assure that the participating farmers follow the standards. The work of the internal inspectors is supervised by CEDAC. During this period, GTZ’s CB-RDP program and CEDAC cooperated and shared experiences in several ways.

During the first years, CEDAC staff acted as facilitators and trainers in tandem with CEDAC’s Natural Agri-Products marketing program (NAP). The NAP program conveyed technical skills as well as business skills to the farmers participating in organic producer groups. Interventions towards consumers were advocacy work, dissemination of product information as well as information on issues pertaining to food safety, agricultural production and food processing. In addition, customer surveys have been conducted.

In November 2007, representatives of clusters of producer groups founded the National Federation of Organic Rice Producer Groups, which represents all producers.

End of 2009, the NAP program eventually was converted into the company SAHAKREAS CEDAC (CEDAC Enterprise), which is the primary buyer as well as wholesaler and retailer of organic rice.

At the height of the expansion of its organic rice program in 2008, CEDAC involved about 7,800 farmers in 790 producer groups (associations). However, due to the financial crisis in autumn 2008, an anticipated loan arrangement failed and consequently CEDAC was only able to buy 1,380 tons of raw rice (paddy) from 2,532 farmers of 386 groups. The plan at that time was to procure about 4,000 tons. During the 2009/10 harvest about 1,800 organic farmers sold almost 1,500 tons of paddy to CEDAC.

Based on the 127 respondents of a survey conducted by a CEDAC team in May 2010, the members cultivate on average 1.99 hectare, while the members of the organic rice producer cooperatives in Kampong Thom cultivate on average about 1.2 hectare rice land.

3. Other organizations

There are several of smaller local initiatives promoting the cultivation and marketing of organic rice in Cambodia such as the PunLue NetKdey SanKhem (PNKS) in Prey Veng province which started promoting organic rice in 2009. As of early 2011, the initiative involves 185 families in 28 groups. The farmers cultivated about 45 ha organically resulting to 87 tons of organic paddy. Of this quantity, PNKS was able to by 13 tons at a price of 1400 riel/kg while 74 tons were bought by local traders of conventional rice at 1100 riel/kg. The groups have established an ICS system, but it is not covered by a certification scheme.

Also several provinces support the marketing of fragrant rice in 'One Province One Product' fairs. According to representatives of the provinces Pursat and Preah Vihear during the recent OPOP Trade Fair in Phnom Penh (December 2010), farmers commonly produce the rice without chemical inputs. However, the farmers are not organized and could not provide evidence on the agricultural practices.

A special case is the Ibis rice program of the Wildlife Conservation Society (WCS) Cambodia Program, which encourages practices which do not endanger wildlife and do not lead to further expansion of farmland at the expense of the wildlife, particularly the ibis. The rice is marketed by the local NGO Sansom Mlup Prey (SMP) which buys products at a premium from village marketing networks (VMN), whose members are made up of farmers who are often not food secure and rely on forest resources for income.⁸ For the recent season, the program intended to procure 120 tons of paddy from participating farmers.

Organic rice production

Most organic rice producers follow the principles of the System of Rice Intensification (SRI) which serve as an entry point to sustainable rice cultivation. Usually farmers cannot implement all the suggested twelve principles, nevertheless the principles enable them to completely avoid the use of farm chemicals and increase the organic fertilization instead. There are no sufficient data on the yields of organic farms, but most farmers do obtain similar yields to their conventional neighbors. According to the Department of Planning and Statistics of Ministry of Agriculture, Forestry, and Fisheries, the average yield for the rainy season 2007/2008 was 2.3 metric tons per hectare.⁹ However, in some areas organic rice

⁸ For details see: <http://www.smpcambodia.org/Home/tabid/2658/Default.aspx>

⁹ <http://www.foodsecurity.gov.kh/RiceYield.aspx>

farmers obtain average yields slightly below two tons per hectare while farmers who are able to plant green manure crops such as beans obtain 3.5 to 5.4 metric tons.¹⁰

Yet, following the principles of SRI in combination with sound organic practices allow some farmers to obtain more than four tons per hectare. The highest reported yield obtained by an organic farmer is 7 tons/hectare. Most farmers rely solely on compost to fertilize the poor soils. However, commonly the amount of compost the farmers can generate and the available cow manure is not sufficient to improve the yields.

Only a smaller group of the organic rice farmers are practicing green manuring, the planting of crops such as mung bean (*Vigna radiata*) or rice bean (*Vigna umbellata*) before or after the rice crop (when the land is vacant) with the purpose to incorporate the generated 'biomass' into the soil. Besides a lack of knowledge, the common practice of letting cattle and water buffalos freely graze on the rice land during the off season hinders farmers to successfully grow green manure crops.

Costs compared to conventional rice production

Based on a study conducted by An Kimheng in 2008, the production costs for organic rice do not significantly differ from conventional production. Organic farmers spent less on inputs; however, they had higher costs for labor.¹¹

Studies in other countries show that farmers benefit from organic cultivation since they need almost no external inputs and consequently less capital. In view of the fact that most capital comes from informal loans, the paid interests are significant and make often conventional rice production a losing business. Yet, generally low yields limit farmers' revenues from organic rice cultivation.

Rice seeds

Like the rural development program the GTZ, CEDAC provided farmers interested in organic rice production and marketing with seeds of jasmine rice, mostly the variety Phka Malis. Especially in the preparation of export orders, CEDAC realized that many farmers still do not fully appreciate the importance of rice seed selection. The paddy contained varying degrees of other varieties and small grains. Especially disturbing were red grains which are not allowed in brown rice exported to the US. As these grains have to be removed and achieve a

¹⁰ Personal communication with members of the Srer Cheng Organic Agriculture Development Cooperative, Kampot province, 04/03/2011

¹¹ An Kimheng, 2009. Factors Effecting Farmers' Adoption of Organic Rice Cultivation in Cambodia, Case Study of Damrei Romeal Organic Rice Federation Cooperative in Tramkok District, Takeo Province, Tokyo University of Agriculture and Technology Graduate School of Agriculture.

price similar only to broken grains, about 50 percent of the milled rice. Hence, the purity of the seeds affects the profitability. CEDAC consequently advised farmers and other stakeholders to focus on rice seed selection during harvest and before sowing to improve yield and grain quality.¹²

Climate change

Producers of organic rice solely plant in rainfed fields. Thus, the success of the cultivation depends on timely rainfall. In the recent years, many organic farmers increasingly had to cope with deviations in weather patterns. The most common problem was delayed transplanting due to late rains. In 2010 the preparation of the seed nurseries was delayed by about one month. In some villages, where farmers had managed to sow the rice early on, an outbreak of army worms devastated the established seedbeds.

Some areas, for example in Takeo and Kompong Speu, suffered more often from drought than other areas. Rainfall patterns differ quite a lot even within provinces. Other problems experienced are heavy rain falls and strong winds during flowering period which reduced the number of filled grains per panicle. This phenomenon was responsible for the low yield in the organic farms in Kampong Thom province which had already been planted late due to the late onset of the rainy season in 2010.

In view of possible greater disturbances in future due to changing weather pattern caused by global warming, the risk of harvest failures is likely to increase. Farmers, however, can reduce the risk by significantly improving the humus (organic matter) content of the soil. This improves among others the capacity of the soil to absorb and retain water; thus, compared to soils of low organic matter content, dry spells do not immediately affect the crop. By improving soil fertility through the recycling of organic matter and the planting of green manure crops, farmers increase the carbon content of the soil. By binding atmospheric carbon, soils act as carbon sinks. In this way, organic farmers can contribute to a lessening of greenhouse gas emissions. Organic farmers are employing closed nutrient cycles within their farm and consequently do not need inputs such as nitrogen fertilizers. These are produced in industrial processes which require a lot of energy and thus release significant amounts of carbon. As organic farmers do not apply nitrogen fertilizers in their fields; they also minimize the emissions of nitrous oxide, a gas which considerably contributes to global warming.

¹² CEDAC. 2010. Rice Selection Important in Improving Yields, www.cedac.org.kh/ev_pdf089.pdf (June 14, 2010)

Status of certification

Early on, organic rice producer groups cooperating with CEDAC as well as the cooperatives supported by the GTZ CB-RDP project have set up internal control systems which allow the certification of groups instead of individual farmers. In mid-2003, CEDAC facilitated a first round of training for participants from several programs and initiatives¹³. The first ICS inspections took place after transplanting in September 2004.

The cooperatives in Kampong Thom and Kampot had been certified by international certifiers in the years 2004, 2005 and 2006. In 2007 the GTZ management had asked the cooperatives for a significant counterpart contribution to the costs. No agreement was achieved, leaving the cooperatives in a limbo concerning the organic status of their produce. Consequently, COrAA improvised a training for local inspectors and conducted inspection. Both cooperatives obtained a certificate. While the cooperative in Kampong Thom was able to maintain its internal control system and to obtain external inspection and certification, the Chum Kiri Organic Rice Cooperative in Kampot failed to continue internal inspections.

Also in 2008 and 2009 COrAA conducted inspections, however in 2009 no certificate was granted due to the deficiencies in the internal control systems. As a consequence, the cooperative structure was revised and COrAA retrained the (internal) ICS inspectors. COrAA assisted also the inspections conducted by the internal inspectors.

CEDAC maintains a kind of dual system. All producer groups maintain an Internal Control System (ICS) and CEDAC as ICS operator supervises the internal inspectors and consolidates the data. Likewise, CEDAC conducts trainings for the internal inspectors every year.

Since 2007, CEDAC facilitates the inspection and certification by an IFOAM accredited certifier of the Damrei Romeal Organic Rice Producer Cooperative Federation in Takeo, which supplies rice for the international market. This cooperative which covers 35 villages in 4 communes supplied the rice for export at the end of 2009. In 2007, the cooperative had 456 members who cultivate a total of 599 hectare organic rice land. In 2009, about 250 members supplied certified organic rice.

For the bulk of the supply” for the ‘Natural Agri Products’ brand, CEDAC does not distinguish paddy from sources which are ‘organic in transition’ and which are fully ‘organic’.

¹³ Anonymous, 2003. Report on the internal control system training, 10th -23rd July 2003.

One problem bothering organic programs is the so-called parallel production. Many farmers produce in some fields organically while in others they continue to farm conventionally. While risks of comingling of organic and conventional rice can be excluded by the planting of different varieties which can easily be distinguished, farmers who continue some conventional cultivation cannot achieve the fully organic status (based on COrAA's Standards for Crop Protection as well as on the EU Organic Regulation.) Due to the parallel production, many farmers use all the compost and manure they can generate in the organic fields while the conventional fields do not receive any compost, thus the conventional fields are further deprived of natural fertility which also lowers the effectiveness of synthetic nitrogen fertilizer.

Although the cooperatives of organic rice farmers have obtained certification, they still have to improve their recording system and the monitoring of the respective ICS systems. No matter, how plausible their organic production is, the external inspection has to rely to a great extent on the records of the ICS. If data are inconsistent or records are lacking it still can result in the denial of the certification by the certifier. More often, certificates are granted with obligation to correct the deficiencies within a certain period.

Another common problem is that most stakeholders have difficulties to ensure the traceability of their produce. This requires a code for each producer and an appropriate way of marking of sacks at each processing level and a correlating recording system.

Market

Cooperatives and Producer Groups

Producer groups and cooperatives have two major functions: to combine the produce to achieve some economies of scale and to assure the organic integrity of the produce by facilitating internal controls. So was the initiation and formation of *organic rice producer groups* instrumental for CEDAC's expansion in the organic rice sector.

Over a period of five years, the number of organic rice producer groups increased from 18 in 2003 to 790 by the end of 2008 and the membership grew from 253 in the first year to more than 7,800 farmers in 2008. For this work with the producer groups including training for leaders and internal inspectors, CEDAC received small funds from several donors such as SEED (Supporting Entrepreneur for Environment and Development) and the German Development Service (DED), now GIZ.

Several cooperatives and many organic rice producer groups also engage in group savings as way to mobilize small funds for improvements. The groups also use their monthly meetings to exchange information about their farming experiences.

Survey among members of organic rice producer groups initiated by CEDAC

In an effort to evaluate the achievements, a CEDAC team conducted a survey among 127 members of 12 producer groups in May 2010. The survey focused on the achievements of the groups and the satisfaction of its members.

Generally, the respondents confirmed that the producer groups and the trading of organic rice have contributed to an improvement of their livelihoods, even though in many instances the members could not always realize the expected higher prices compared to the conventional market (due to the intensive competition among CEDAC and local rice traders). Nonetheless, most members expressed that without organized groups, they could not have achieved a better price for their produce. Together they are able to negotiate a more favorable paddy price.

As the Federation of Organic Rice Farmers and CEDAC agree at the onset of each season on the buying price based on the regional and local markets including a premium of at least 10 percent, they help farmers who are not part of the program as well. In many districts paddy prices for fragrant varieties generally increased due to CEDAC's intervention and the resulting competition. While commonly paddy prices decrease to some extent during the harvest season, the opposite was observed since 2006 in areas where CEDAC buys fragrant rice.

Local rice traders, who are keen to buy their jasmine rice which is also high in demand in neighboring Vietnam, try to outmaneuver CEDAC. They buy wet and unclean paddy for a price similar as the one agreed by CEDAC and the Federation whereas CEDAC requires dry paddy of good quality. However, frequently traders try to cheat the farmers with manipulated scales.

On the other hand, respondents mentioned that CEDAC often is late to buy the paddy. Since many families have financial constraints, a considerable number of members had decided to sell their produce or a part of it to traders.

The respondents mentioned that they benefit as well from the development budget provided by CEDAC at the end of the season based on the volume of paddy supplied. These funds enabled them to pursue, for example, infrastructure projects. Likewise, they appreciate that they were able to improve their cultivation skills by adopting principles of the System of Rice

Intensification (SRI) which help them to achieve higher yields. At the same time, the group members acquired knowledge on chicken, pig and fish raising.

All respondents reported that they understand the effects of chemical fertilizers and pesticides as they had joined trainings conducted by CEDAC's staff. As they value their health, they are determined to stay away from harmful chemical pesticides. However, several respondents disclosed that they cannot produce enough compost for all their fields. Consequently they apply the chemical fertilizers in fields far away from the villages which are not included in the organic scheme.

Most of the respondents agreed, even though they experienced some difficulties in the cooperation, the involvement in the organic rice trading has benefitted their families as well as the environment.¹⁴

Branding

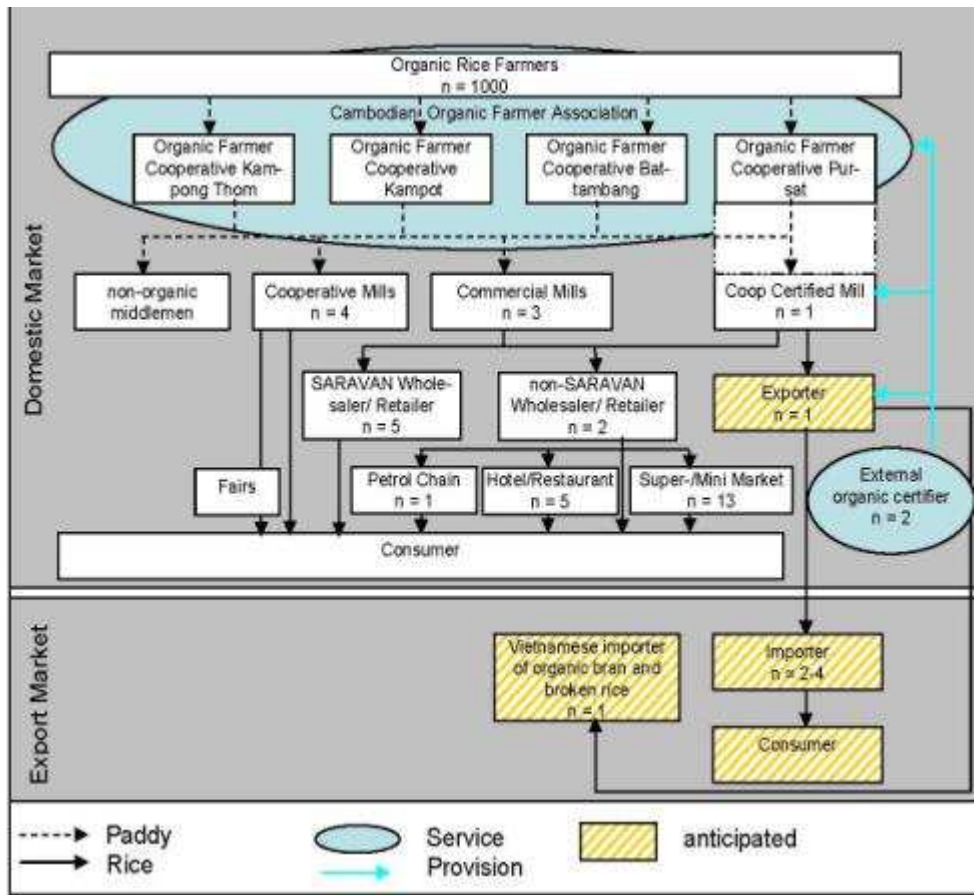
In order to facilitate the sales of rice, both GTZ and CEDAC respectively established brand names. Whereas GTZ was targeting the domestic market as well as the export market, CEDAC exclusively focused on the domestic market and considered exports only when approached by foreign companies.

Saravan Rice

The brand Saravan Rice¹⁵ was introduced in 2005 by several initiatives including the GTZ CB-RDP project to promote and marketing of organic rice in the domestic market. The brand name Saravan Rice was also considered as an option for the export promotion. The quantity of the production by organic farmers in the provinces Kampong Thom, Kampot, Pursat and Battambang was estimated about 300 tons (2005). Especially the organic rice farmers in Kampong Thom were able to utilize the brand name. However, currently sales under this brand name have ceased.

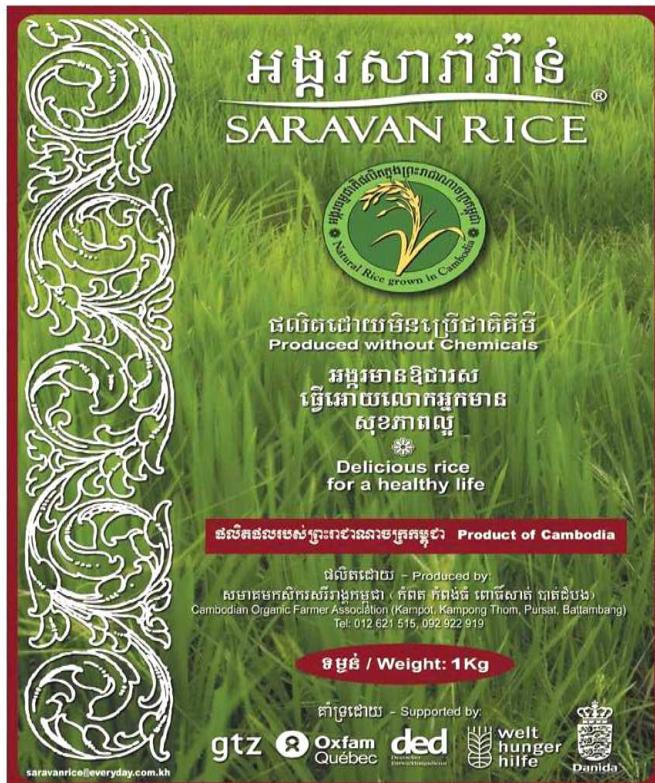
¹⁴ CEDAC, 2010. CEDAC-NAP Bulletin, 1-2010, p1.

¹⁵ Schmerler, C., 2006. Value Chain Promotion: Experiences with Organic Rice from Cambodia, GTZ.



Supply chain for Saravan Rice as envisioned in 2006.

Below: Design of the package for milled rice



Natural Agri-Product

Following GTZ, CEDAC created the *Natural Agri-Product* brand which is chiefly used for rice but also for products such as palm sugar and rice wine.

Premium price

CEDAC as well as the cooperatives have some troubles to abide by the promised premium price which serves as an incentive for organic farmers and rewards them for their efforts, especially for the organic guarantee system.

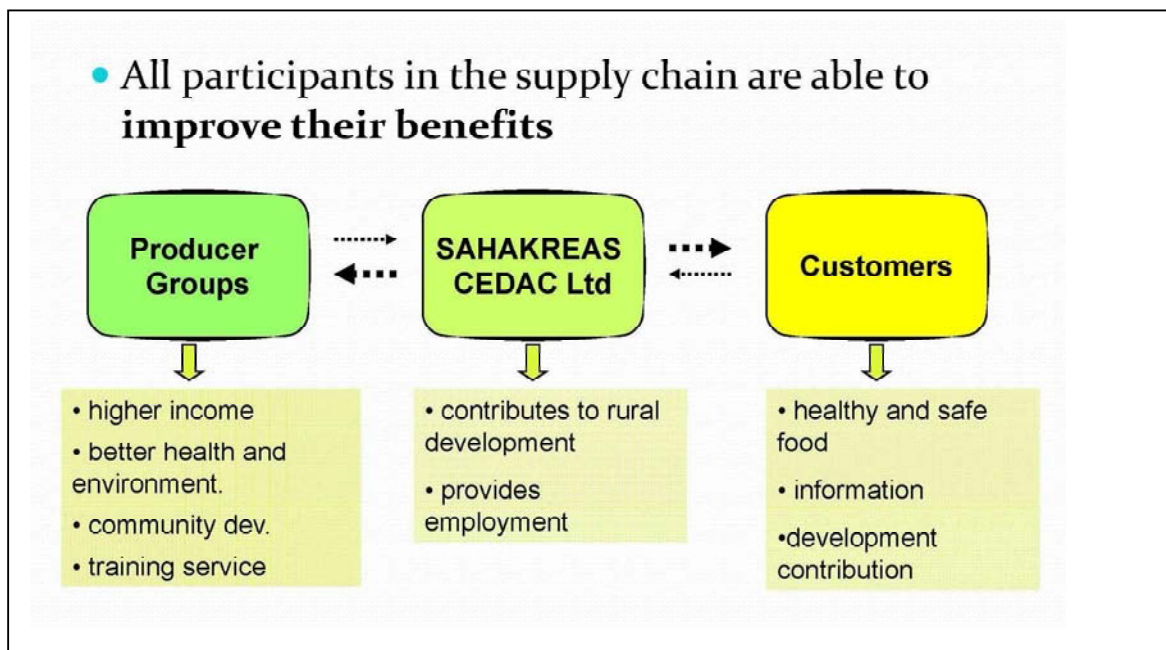
For several years it was difficult to fully achieve the target of a 10 percent higher price due to the interference of rice traders or their agents who offered prices similar to those agreed by the Federation and CEDAC.

However, for the harvest 2008/2009 CEDAC could fulfill its promise to pay producers an over 10 percent higher price than conventional farmers received for the same kind of quality (1,100 Riel/kg - 4197 Riel = 1 US Dollar, Nov. 26, 2009). CEDAC paid the organic farmers 1,250 Riel on average or 13.6 % more. This price does not include payments by CEDAC-NAP to the *development fund* of the Producer Groups between 50 and 100 Riel per kilogram paddy delivered in the years 2007 and 2008. The respective amounts were paid at the end of a business year.

Post harvest practices

In order to improve the milling quality of its rice CEDAC spent efforts to inform farmers about appropriate harvest and post harvest practices. An 8-page brochure for farmers was distributed in 2007 and reprinted in 2010. Apparently the quality of the paddy increased as well as the awareness of the leaders in-charge of the procurement on group level. However, until 2009/10, CEDAC had no scheme in place to reward the delivery of well dried and clean paddy.

One particular problem is that CEDAC and cooperatives can buy only well dried paddy (moisture content 14 percent) while the traders offer to buy fresh paddy at a competitive price disregarding the organic quality. In view of the weight loss due to drying and the labor cost, paddy with moisture content of 14 percent need to achieve about 10 percent higher price than fresh paddy which has a moisture content of over 20 percent.



Benefits envisioned by SAHAKREAS CEDAC

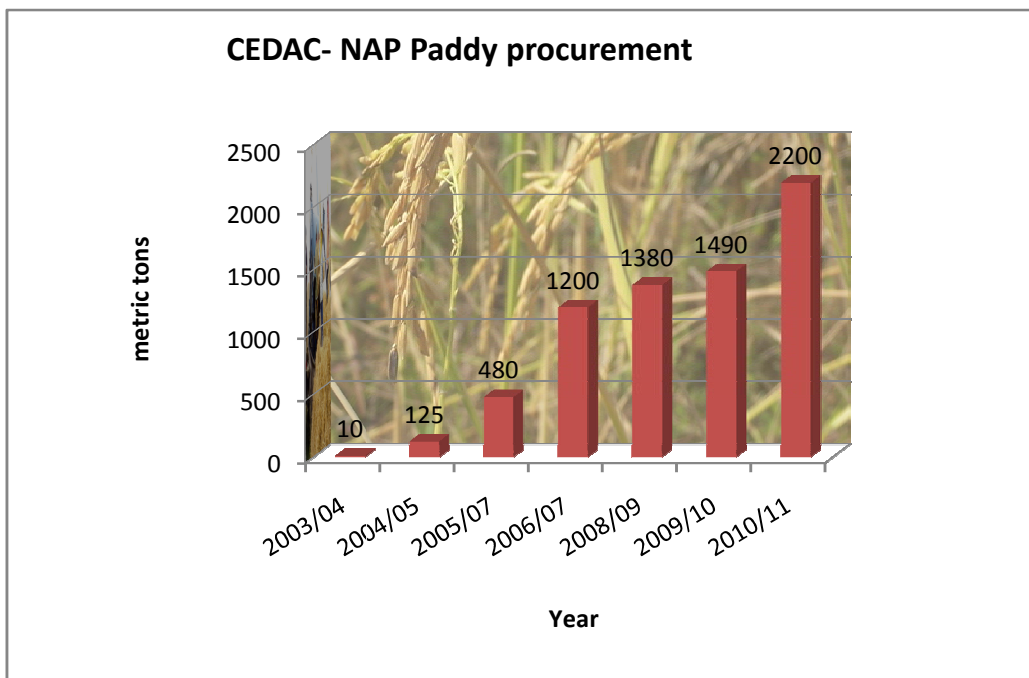
[http://www.organic.moc.go.th/upload/SpeakerPresentation/5\)%20Cambodia%20-%20Bun%20Penhpheak.pdf?Mode=1&BpGroup=0520Bun%20Penhpheak.pdf?Mode=1&BpGroup=05](http://www.organic.moc.go.th/upload/SpeakerPresentation/5)%20Cambodia%20-%20Bun%20Penhpheak.pdf?Mode=1&BpGroup=0520Bun%20Penhpheak.pdf?Mode=1&BpGroup=05)

Especially CEDAC’s intervention triggered in many districts a competition with local traders who are keen to buy their jasmine rice which is also high in demand in neighboring Vietnam. Consequently the paddy prices for fragrant varieties generally increased. The Federation of Organic Rice Farmers and CEDAC agree at the onset of each season on the buying price based on the regional and local markets including a premium of at least 10 percent. As the traders try to outmaneuver CEDAC, farmers who are not part of the program benefit as well. SAHAKREAS CEDAC reported early February that it was able to buy 2,000 tons from 2,668 farmers in 332 groups during the 2010/11 harvest season so far. The company intends to buy a total of 2,200 tons.

Milling

For milled rice CEDAC is able to supply high quality (5 percent broken grains). The miller chiefly contracted by CEDAC for the domestic market improved the equipment during the recent years. This helped for example to significantly lower the content of foreign matter such as small stones.

For export, CEDAC cooperated with the government owned company Green Trade which had obtained a state-of-the art rice processing unit in mid 2009. This allowed CEDAC to meet the requirements of the US importer (based on the US Rice Standard.)



Financing

A common problem that actors in the organic rice business encounter is the lack or the access to capital. As a result the cooperatives could buy only a smaller share of the organic produce of their members. In 2006, the Kampot cooperative, for example, was able to buy 47 percent of the organic paddy. In 2008, the share declined to almost 24 percent.¹⁶ Apparently, this trend continued, thus most of the more than 200 tons of organic rice produced by the members of the Srer Cheng Organic Agriculture Development Cooperative enters the conventional channel.

CEDAC encountered a severe problem as an expected loan arrangement failed in the course of the global financial crisis in autumn 2008. CEDAC consequently had to cut its procurement plans. Later CEDAC was able to tap several foreign social investment funds to finance its rice operation.

Unfortunately the Cambodian banks commonly do not facilitate a commodity-based collateral lending; they still prefer to extend loans against fixed assets. In the past this has made it difficult to obtain loans to support rice trading. This is changing, and the Cambodian bank ACLEDA is now prepared to offer 50% lending against commodity as collateral.

¹⁶ Sreng Sopheak, The study of the organic rice value chain and the potential crops for organic produce in Kampot and Takeo provinces, Cambodia, University de Tours ,October 2009

Exports

The German rice trader Rickmers Reismühle which had turned to Cambodia to diversify its sources of conventional rice also aimed to explore the market for organic rice in Europe. A first trial delivery was scheduled late 2006 with CDRC as supplier. At that time of the preparation on the Cambodian side, however, Rickmers encountered a considerable problem as shipments of US rice which the company had received were contaminated with genetically modified rice. Rickmers consequently had to make sure that this rice was not sold in the European Union and encountered financial constraints. As a result, it was not able to finalize the order for Cambodian organic rice. CDRC's management was frustrated and gave up on the idea of export.

In 2007, Cambodia Biologicals Co. Ltd. (New Rain Organics brand) succeeded to ship certified organic rice to Europe.

Rickmers Reismühle got in contact with CEDAC and a cooperation agreement was signed by both parties end of 2007. CEDAC, however, had first difficulties to supply due to the 'rice crises' in 2008 during which the Cambodian government issued a temporary export ban. Later CEDAC established that it could not meet the required milling quality. Only when the government owned Green Trade had setup its new processing line mid 2009, it became possible to meet quality standards such as 5 percent broken grains. By that time, however, Rickmers, which focuses on large-scale consumers, had realized difficulties with the sales of Thai organic rice and did not pursue its plans to order rice from CEDAC any longer.

Parallel, CEDAC had developed a partnership with the US company Lotus Foods¹⁷ which concentrates on rice specialties. After a long preparation and overcoming countless obstacles, CEDAC succeeded to export one container of brown Phka Malis rice in December 2009. In October 2010 Lotus Foods signaled its strong interest to continue imports from Cambodia. For 2011, SAHAKREAS CEDAC plans to export 200 metric tons of milled rice.

So far, the organic rice sector could not positively respond to requests by importers for example, from Malaysia and Spain, who are interested to import Cambodian organic rice.

¹⁷ <http://www.lotusfoods.com/>

Potentials and Constraints

Production

Cambodian farmers plant many traditional varieties which are very suitable for organic production. Among these are also several aromatic varieties. Aromatic rice comprises about 15 percent of rice world trade.¹⁸ Yet, taking into account that consumers of organic rice are general willing to pay a higher price, a focus on aromatic varieties appears to be appropriate. However, domestic customers of organic rice are also keen to avail of non-aromatic varieties such as Pkhar Khney, Neang Minh, and Neang Khon.¹⁹

In view of the low fertility of most soils, Cambodian organic farmers could benefit more by giving extra attention to farm-based soil fertility management. Several Cambodian organic farmers, who obtain yields per hectare twice or even three times as high as the average yield, serve as models. Through the consequent use of compost and green manure crops they have gradually increased the fertility of their fields. This enables them to have good harvests of excellent grains. Fertile soils have a much greater capacity to hold water and can help crops to survive longer dry spells. Thus, comprehensive organic practices help farmers to enhance the resilience of crops to better withstand adverse climate conditions. When discussing strategies to improve yields in a sustainable manner, most Cambodian farmers can learn a lot from these model farmers.

Regular seed selection and good post harvest practices will contribute to an improved grain quality and thus increase not only yields per hectare, but also the milling results (un-broken grains), and thus the overall economic result.

In view of that many farmers are still producing rice basically without farm chemicals and that over 110,000 farmers (as of 2009) have learnt to improve rice cultivation based on the principles of System of Rice Intensification (SRI) especially through the work of CEDAC's by involving farmer trainers, there are still a significant number of farmers who could produce rice organically. Also other NGOs in various provinces promote sustainable practices among rice farmers. However, to market organic rice, farmers must be open to join groups to enable group certification.

Market

Taking into account, that there are more than over 8,500 rice producers who have been members of organic rice producer groups or cooperatives during the recent three years, and that on average each member produces at least 1,000 kg of organic rice annually, about

¹⁸ Slayton, Tom, 2009. Road Map for Cambodian Rice Exports, unpublished.

¹⁹ CEDAC, 2009. Customer Network Building" in the neighborhoods of CEDAC Shops in Phnom Penh, Results of a study, compiled by Chhim Phallyboth, unpublished.

8,500 tons of organic rice would be available, if the groups and cooperatives could find interested buyers. (The members interviewed in the CEDAC evaluation produced on average 1.3 tons of Phka Malis, the members of the Srer Cheng Organic Cooperative produce on average over one ton of fragrant rice).

While a part of the producers could realize a premium price, the retail prices do not necessarily reflect the premium. Most of the time, CEDAC offers its rice at an only slightly higher price than conventional fragrant rice of comparable quality. Although there is an increasing awareness of the benefits of organic products among consumers, it has not necessarily resulted in a willingness to pay a higher price.

As Cambodia produces since several years a considerable surplus of rice, the prospects for exports of organic rice improve. Concerning the export of rice, Cambodia has to take into account that the world rice market is dominated by its neighbors, Vietnam and Thailand. As a smaller producer, Cambodia might benefit more, if it could utilize niche markets. The demand for organic rice is increasing in several Asian countries. Cambodia can offer varieties and qualities for niche markets the Thai producers do not cover.²⁰

Since October 2009, Cambodian products including rice enjoy a preferential access to the EU market. While exports of conventional rice to Europe have increased substantially, the organic sector has not utilized this arrangement.

However, organic growers can only realize the benefits for their extra efforts only, if the cooperatives and associations can find business partners who are interested in a long term partnership. Such a partnership would require trust building measures on both sides and investments in the organic guarantee systems of the farmers' organizations.

²⁰ As of 2008, 2'498 organic farms with 21,701 hectare were (certified) organic in Thailand, this equivalent to 0.1% of agricultural land. Of this 17'328 ha were planted with organic rice
Source: IFOAM, 2008. The World of Organic Agriculture, Statistics and Emerging Trends.

Vegetables

While several agricultural sectors are able to produce a significant surplus, the vegetable sector in Cambodia is dominated by imports from Vietnam and Thailand which together supply 40 to 50 percent of the vegetables consumed in the country. According to the Vietnam Business News, during 2010, Cambodia imported 70-80 tons of vegetables per day.²¹

The massive importation of vegetables is affecting most Cambodian stakeholders in the vegetable sector. Due to the massive importation of Vietnamese vegetables, prices in Phnom Penh are significantly lower than in provincial towns. Given this condition, for many vegetable growers, including the organic growers, there is little incentive to deliver to wholesalers in Phnom Penh. This predicament makes it even more difficult to build reliable supply chains of local vegetables of good quality.

Yet, consumers are increasingly becoming aware of the problems related to the production practices of conventional vegetables. Unfortunately, many conventional vegetable growers in Cambodia indiscriminately use pesticides on their crops. Commonly they are unaware of the effects on their and the consumers health. This is aggravated by the fact that most pesticides sold have no label in Khmer so that farmers have no way to understand any instruction or warning on the package or bottle.

Consequently it is not surprising that vegetables supplied to Phnom Penh markets contain pesticides residues. Tests conducted on 245 leafy vegetables and long bean samples from several markets in Phnom Penh in 2010 revealed that between 15 percent (long bean) and 95 percent (white stemmed kale) contain detectable level of pesticides called organo-phosphate and carbamate pesticides²² which include commonly used insecticides, many of them ranked as hazardous.

In this challenging environment, several initiatives and entrepreneurs promote chemical – free or organic vegetable production and explore possible markets.

²¹ Vietnam Business News, 2010. An Giang to tap Cambodian vegetable market, <http://vietnambusiness.asia/an-giang-to-tap-cambodian-vegetable-market/>

²² Neufeld, D.S.G. et al. 2010. Prevalence and Persistence of Organophosphate and Carbamate pesticides in Pesticides in Cambodian Market Vegetables. Asian Journal of Water, Environment and Pollution, Volume 7, Number 4 / 2010, <http://iospress.metapress.com/content/wn9776111t681437/>

PUAC - The Peri-Urban Agricultural Centre

The pioneering initiative in this sector is the Peri-Urban Agricultural Center (PUAC) which was created in 2001. Supported by the Belgian NGO Aide au Développement Gembloux (ADG), PUAC works for the improvement of the living conditions of Cambodian farmers through the production of high value vegetable.²³

The objective was to strengthen support to the production of high added value and chemical residue free vegetables and the organization of the commercialization channel of the farmer production to hotels, restaurants and supermarkets of Phnom Penh; thus directly contributing to the increase of farmers' incomes.

Currently about 350 farming families are generating additional income through the sale of high value European vegetables of good quality to luxury hotels and restaurants of the capital Phnom Penh. Owing to the chain of distribution approach, the PUAC is able to step in at any level, from the farmers' training to production organization so that it becomes more stable.

PUAC is well-known for the commercialization and horticultural production. A study on the small holders' cash crops production and marketing reported that several buyers in Phnom Penh consider the PUAC the currently the most reliable supplier for high value, chemical-free leafy green vegetables, particularly for salad ingredients used by restaurants that are tourist- and expatriate oriented.²⁴

Throughout the years, the initiative has undergone several changes. The current consolidation project aims at guaranteeing the expansion of the model on the one hand, and the durability of the established structure and of its main objective – to increase the poor Kampong Speu families' income - on the other.²⁵

An impact study conducted in 2010 points out that the project has led to improved livelihoods, especially to increased income from the sale of European organic vegetable for those whose are farmer members. The participating families derive 33% of the total agricultural income from the sales of European chemical-free vegetables. The families also improve their vegetable consumption. The estimate is that on average each family consumes 20 kg of European organic vegetables.²⁶

²³ <http://www.puac.info/>

²⁴ Psilos, P and Charlesworth, P, SNV, 2009. Linking Smallholder Cash Crops to the Tourism Sector Project Design submitted to SNV, (Netherlands Development Organisation), p. 3

²⁵ <http://www.ong-adg.be/spip/Cambodia-Market-gardening.html?lang=fr>

²⁶ Prom Tola, 2010. PUAC Impact Study, Peri-Urban Agricultural Centre, (PUAC)

The agricultural cooperative was created by 145 farmers in June 2009 and took over the function of the NGO structure. Besides the 255 members (as of the end of December 2010), other farmers produce occasionally for PUAC. In total about 310 families cooperate with PUAC. Many of them however, do produce not regularly. At any given time, only between 80 farmers plant vegetables during the low season) and 150 in the high season In 2010 PUAC farmers produced about 80 tons and sold 50 tons of various vegetables through the cooperative. Approximately, 15 MT is sold by the farmers directly to other buyers by PUAC marketing staffs PUAC's target is to sell 70 tons annually to improve the viability of the operations.

PUAC is supplying year-round produce to about 61 clients in the Phnom Penh restaurant and hotel market. In the recent two years, PUAC has lost some of its important clients and with it a significant part of its market due to competitors who have been able to closely observe PUAC's business. Partially the competitors obtain their supply from farmers in the periphery of PUAC's farmer network. As a result, PUAC's sale dropped by over 10 tons/year.

A critical part of PUAC's strategy is an extension service that visits each farmer 2-3 times per week to ensure the growing plan is being adhered to and that any issues are attended to rapidly. Despite their success, PUAC is still facing several issues such as contract compliance from producers and maintaining constant, good quality supply.²⁷

The cooperative utilizes a grower selection process, strict contracts, backed-up by intense extension visits to ensure the resulting production is the market required quality. Psilos and Charlesworth observed that over time PUAC developed a tight management structure that supports a rapid and effective feedback loop, from buyer to marketing unit to production unit to farmer and back. This organization allows them to synchronize planting, harvesting, and buyer ordering, year round.²⁸

Whereas in the beginning PUAC made the availability of water a requirement, it now provides if necessary irrigation equipment. This support allows PUAC to select farmers based on their commitment, work-force, and agriculture surface only, without looking at prior water access. This equipment is subsidized by 50 percent.

For the day to day work, PUAC relies on 32 so-called master farmers who aide their fellow farmers in the production. The master farmers see to it that production plans are met. Besides advising the members in cultural practices, they also monitor if the farmers follow

²⁷ Psilos, P and Charlesworth, P, 2009, p. 20

²⁸ Psilos, P and Charlesworth, P, 2009 p.58

PUAC's protocol or production guidelines. Concerning certification, PUAC observed that most clients are satisfied with the quality they obtain and are not really interested in certified vegetables.

Conversely, PUAC observed that individual clients are increasingly inquiring on how PUAC assures quality is checked. According to PUAC, this is due to the fact that competitors claim to sell local "organic" vegetables, even so if they are purchased then from China or Vietnam. Because of this development, PUAC sees the need to develop an internal control system that will assure the compliance with PUAC's protocol which disallows the use of farm chemicals.

Farmers manage soil fertility through the application of compost and straw mulch. To reduce the impact of the sun, several crops are protected with a net. PUAC provides the seeds to the farmers. The seeds are imported from Vietnam; however, they are produced by European and Chinese growers. As the current systems cannot fully assure that all growers are following the protocol, PUAC plans to conduct a survey on the actual practices of the farmers in near future.

PUAC supplies about 30 different kinds of high value European leaf plants, aromatic plants, fruit plants, and some root plants. PUAC has a storage facility in Phnom Penh and a fleet of vehicles and motorcycles to distribute every day products from the farms to customers.

PUAC's top clients by quantity purchased.²⁹

Lucky Market

Sunway Hotel

Intercontinental Hotel

Phnom Penh Hotel

Hotel Cambodiana

Thai Huot Supermarket

Living Room Restaurant

Bodhi Tree Restaurants

²⁹ PUAC: <http://www.puac.info/Chemicalfreevegetables.php>

Vegetable producers cooperating with CEDAC

CEDAC had started its involvement in the trade with organic products with rice. As the marketing of rice expanded, CEDAC realised an increasing demand for chemical-free and organic vegetables. Even as the first attempts to establish a supply of vegetables were not continuous, overtime more than 70 farmers got involved to produce for vegetables for CEDAC. Unlike other initiatives, most farmers grow traditional vegetables appropriate to the local conditions.

In 2010, about 53 small farmers in the provinces of Kandal, Kampong Chhnang, Takeo, Kampong Speu, Kampot and Pursat were supplying 38,870 kg chemical free vegetables to CEDAC. In 2009, about 30 tons of vegetables were traded.

The farmers are able to produce about 30 kinds of vegetables, among them:

Chinese kale, cauliflower, head cabbage, green petiole, mustard green, leaf lettuce, tomato, Chinese cabbage, water convolvulus, bunching onion (oriental green onions), yard-long bean, bitter gourd, sponge gourd, cucumber, wax gourd, egg plant and pumpkin. In addition to these, the group of vegetable growers in Pursat can produce among others: head cabbage, cauliflower, carrots, green petiole, and Chinese radish, etc.

The organic vegetable growers supplying CEDAC have established an internal control system (ICS). Specially trained farmers check the other members to guarantee that everybody is following organic production standards. However, they are not certified by a third party.

In 2009, a team led by a junior expert of the German Development Service (DED) conducted a survey to examine the situation and the agricultural practices of the vegetable growers cooperating with CEDAC. The team identified major challenges to organic/chemical free vegetable production. The questions covered seed production, agricultural practices, pest and diseases and marketing aspects.³⁰

Major outcomes of the survey:

- A major obstacle is the high dependency of the farmers on rain fall. Especially during dry season cultivation is many places no longer possible.
- During the rainy season, many vegetable areas are waterlogged.

³⁰ Meusinger, Anna, 2009. The current status of chemical free vegetable producers in Cambodia, DED and CEDAC

- Most farmers are producing on less than 1,000 square metres. This was considered too small to achieve a commercially viable scale.
- The farmers only have basic knowledge about chemical-free or organic vegetable production. Farmers are struggling to produce in a sustainable way and meet consumers demand in Phnom Penh.
- In many cases the overall farm management is not satisfactory and farmers lack skills to improve cultivation techniques.

Many farmers are confident in

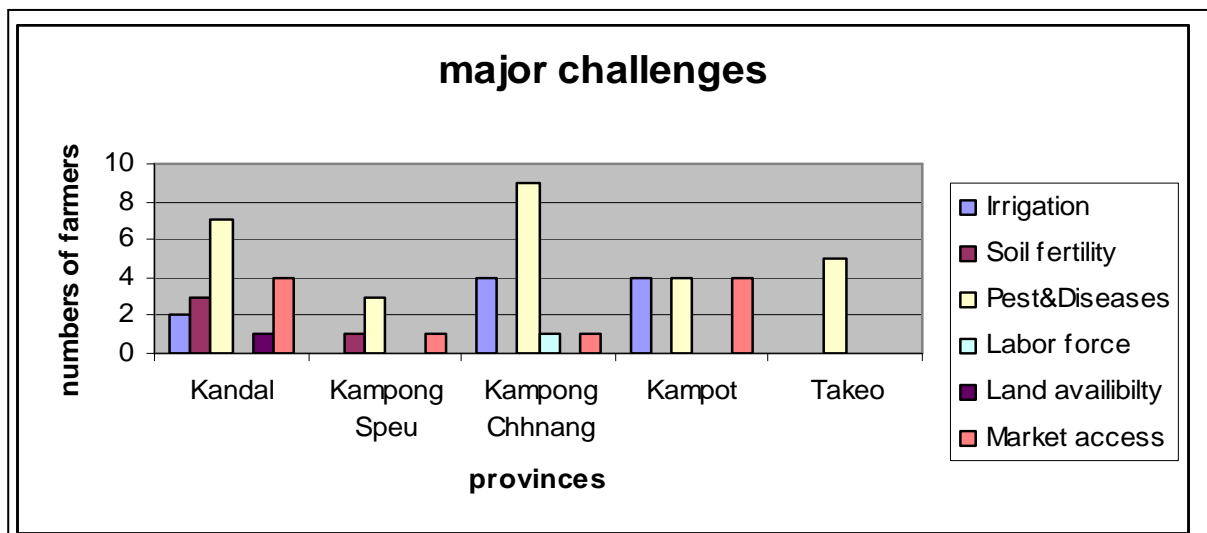
- preparing and using botanical pesticide,
- producing solid and liquid compost,
- growing crops on elevated beds
- producing seeds of leaf lettuce
- using sprinkler irrigation

On the other hand it became clear that most of the participating farmers lack knowledge on appropriate practices for land preparation and lack knowledge who to manage pest problems according to the organic standard. Likewise many farmers lack knowledge on predators or plants which could help to repel pest and disease management. Similarly knowledge about crop rotation or intercropping is inadequate.

The farmers often have to cope with the low germination rate of purchased seeds and are not well versed concerning the selection and storage of own seeds. Also their knowledge on cultural practices such as knowledge about crop rotation or intercropping is not sufficient.

In addition, many vegetable farmers also find it difficult to prepare a production plan to produce based on such a plan to match CEDAC Enterprise's needs.

Most surveyed farmers stated the major reason for the conversion to organic vegetable cultivation is the positive effect on their health. Especially in Kampong Chhnang farmers showed a strong concern about their health. Many of them had appalling experiences with the use of pesticides. Farmers in Kandal and Kampong Speu mention higher yields after the conversion as a reason. Most farmers are sure that they are improving their soil quality.



When asked what they consider as the major challenges in vegetable production, more than 90% of all interviewed farmers answered pests and diseases which affect the quality of the vegetables. Irrigation is the second important concerns of the farmers. About 13% of all farmers consider soil fertility management as a relevant issue.

Most respondent appreciate the easier access to information about market developments, prices and new technologies and that CEDAC is supporting them with technical assistance and guidance. However they consider the nearness to conventional growers as a threat to the organic production. They are afraid of chemical residues in soil, water and the drift of sprayed chemicals. They do not have enough capital to invest in contamination barriers.

The study looked chiefly into aspects of the production, it suggests evaluate separately the post harvest practices and the transport to Phnom Penh. Commonly vegetables are not optimally stored during transport and suffer from unnecessary exposure to heat.³¹

Many farmers are reluctant to commit to contracts as they feel it difficult to fine tune their production plans to better meet the demand. Representatives of the producer groups and SAHAKREAS CEDAC meet regularly to set the prices. Generally, prices are 10 percent higher than conventional vegetables.

In addition to the small farmers, CEDAC is venturing into vegetable production on a 150 hectare site in Kirirum, Kompong Speu province, with fertile soil and water supply. CEDAC

³¹ Meusinger, 2009. page 36

sees this as an opportunity to supply organic vegetables to meet the demand for healthy organic vegetable of customers in Phnom Penh.³²

Vegetable producers groups cooperating with CEDAC

1. Kampot province: The organic vegetable producer group is located in Bous Brabeak Village, Trabeang Thom Commune, Teouk Chhou District, 7 members, cooperating with CEDAC since 2008.
2. Kampong Speu PROVINCE: Kaheng Village, Kaheng Commune, Som Raong Toung District, 10 members, cooperating with CEDAC since 2007.
3. Kampong Chhnang, several villages near Kampong Chhnang town, 42 members in seven groups, cooperating with CEDAC since 2007.
4. Kandal province: Chom Bork village, Bak Kheng commune, Mok Kom Poul district, 14 members, cooperating with CEDAC since 2009.
5. Takeo province, 8 members in Tram Kork district, 7 members, cooperating with CEDAC since 2008.
6. Tom Peaov village, Bramaoy Domry commune, Veal Veng district, Pursat province. 8 members (6 female), cooperating with CEDAC since 2007.

International Volunteer Center of Yamagata (IVY)

The civic organization International Volunteer Center of Yamagata (IVY) was established in 1991 in Yamagata City, Yamagata Prefecture, in northeastern Japan.

In Cambodia, IVY is implementing a project for regional development in order to reduce the poverty of farming villages.

IVY supports two Village Women's Association Farmer Associations (VWAFAs) which are engaged in vegetable cultivation. One association focuses on chemical-free production. 102 vegetable growers intend to obtain a certification for chemical-free production. In 2010, COAA assisted IVY with a first training to set up an internal control system (ICS). As of writing, IVY is about to start with the set-up of an ICS system among interested farmers.

³² CEDAC, 2009. CEDAC Hosts Organic Vegetable Farm Visit for Customers and Journalists, http://www.cedac.org.kh/ev_pdf132.pdf

In 2009, the 400 VWFA members of both associations produced about 77 tons of conventionally produced vegetables. The bulk was supplied to one hotel in Bavet City. The chemical-free producers sell the vegetables chiefly in the locality. The farmers produce among others cucumber, water convolvulus, Japanese celery, leaf onion and green cabbage.

By March 2012, IVY plans to establish the Svay Rieng Vegetable Supply Association which will be operated mainly by its members, and will establish a systematic delivery. Furthermore, IVY will train the farmers to improve skill of vegetable growing and support the association to operate a Natural Agricultural Shop. On the agenda are as well the development of additional products and the strengthening the capacity of the associations to manage their business.

Other vegetable growers

Les Jardins du Mekong

In his farm in Pum Taskor, about 8 kilometers outside Phnom Penh, Mr. Philippe Ammeux produces seven varieties of French salad -- green Batavia, red Batavia, green oak leaf, red oak leaf, frisee, romaine and roquette -- and three herbs: basil, coriander and dill.³³

Mr. Nake Tharen (Natural Garden)

In a 1.5 hectare farm in Koh Kra Bei village, Sangkat Prek Thmei, Khan Mean Chey, Phnom Penh Mr. Tharen produces a variety of lettuce, tomatoes and on smaller scale eggplants and other vegetables. The farm has its own water supply through ponds. In the same area, Mr. Tharen is preparing another small farm for chemical-free vegetable production and intends achieve organic certification.

Khmer Harvest

The farm owned by Ms. Deng Polyda is located Tum Nun Kap Srov, Sang Kat Chom Chav, Khan Dong Kor, Phnom Penh. Ms. Polyda produces among others several kinds of lettuce, broccoli, water spinach, herbs and radish.

Triple F

Triple F manages a vegetable farm a few miles from Siem Reap which employs 17 people and provides a direct daily supply of organic vegetables such as lettuce and tomatoes.³⁴

³³ FCC Cambodia, 2010. Organic Farming Takes Root, The Wires, December 2010

<http://www.fcccambodia.com/newsletter/1210/cambodia-organic.php>

³⁴ http://www.triplef-kh.com/about_us.html

Conclusion

There are a good number of vegetable farmers who either produce organically or chemical-free. Although there is quite some variety, many focus on leafy vegetables, especially lettuce which can relatively easily be cultivated and entail little risk of crop failure.

However, the high end market for organic/chemical-free lettuce appears to be saturated to a certain extent. This begs the question, which other European vegetables in demand can be gainfully produced in the tropical lowlands. Testing of more varieties from other countries might enable growers to diversify production. Varieties used in conventional production are often not suited for organic production as they were bred and selected to meet criteria such as size and color but to a lesser degree resistance to pests or diseases.

The other option is to focus on traditional vegetables as farmers cooperating with CEDAC do, or to integrate more of them as PUAC does.

One bottleneck apparently is the management of soil fertility. The use of commercially produced compost, often labeled as organic fertilizer poses a problem. In organic systems these could only be accepted if the sources of the biomass are clearly organic. Compost derived from household waste from dump sites is not acceptable at all in organic production. A safer way would be to integrate green manure crops in the crop rotation to maintain soil fertility. However, this would mean to take out a certain percentage of the area for production. Nitrogen fixing shrubs can likewise help to produce biomass for mulch and composting. Use of high value legume crops is another option.

So far, no operation in the organic/chemical-free vegetable sector has obtained a third party certification. Some are on the way to improve the compliance with the standards in order to be certified based either on the organic or on the chemical-free standards.

Cashew Nut

The cashew, botanically-known as *Anacardium occidentale*, is the seed of a tropical evergreen tree related to mango, pistachio, and poison ivy. Originating in Brazil, the cashew plant made its way to India in the sixteenth century via Portuguese sailors. From India it spread throughout Southeast Asia. Cashew nuts became commercially relevant only in the 1920s.

Unlike most fruits, where the seed is found inside the flesh, the cashew seed hangs from the bottom of the cashew apple. Although the fresh cashew apple fruit is not only edible but delicious, it is only available to those who grow the plant. It is much too perishable to bring to market. Cashew apples begin to ferment as soon as they are picked and will barely last 24 hours. Cashew apples are highly prized in their growing locale, where they are sometimes found canned, in jams, or used to make liqueurs.³⁵

Cashew is a versatile crop with many economic uses in the food industry as food and feed. Cashew nuts consist to 35-45% of seeds and around 55-65% of shells. The shells contain 15-30% oil. A ton of nuts contains around 200 kg seeds and 180 kg oil (cashew nut oil or cashew nut shell liquid "CNSL"). CNSL is used as oil in industry. The cashew apple can be sold fresh as soon as they have been picked, and then used, e.g. as a culinary ingredient, or further processed.³⁶

Cashew has a high potential for commercial cultivation as there is a steady demand for nutritious food items and an expanding market for processed and other value added cashew-based products in the international market. In Cambodia, it is grown in many provinces including Kampong Cham, Preah Vihear, Ratanakiri, Moundul Kiri, Stung Treng, Kratie, Kampong Thom as well as in Kandal. It is estimated that Cambodian farmers produce annually on approximately 120,000 ha about 60,000 tons of raw cashew nuts, three percent of the world's supply.

Cashew trees grow preferably on sandy well drained soil and are very appropriate for organic practices. Generally cashew is produced with a low degree of farm inputs and a considerable part of the production meets organic standards. Under organic management, the farmers use compost, cow manure and natural pesticides.

³⁵ <http://homecooking.about.com/od/foodhistory/a/cashewhistory.htm>
http://www.hort.purdue.edu/newcrop/morton/cashew_apple.html

³⁶ Naturland, 2000. Cashew nuts, Organic Farming in the Tropics and Subtropics, Exemplary Description of 20 Crops, p.1.
<http://www.naturland.de/fileadmin/MDB/documents/Publication/English/cashew.pdf>

A Naturland guide suggests that in organic farming systems cashew plantations should be complemented with a wide variety of other trees and bushes, because diversified agroforestry systems are especially suited to the cultivation of cashews.³⁷

Even though raw cashew nut is an important cash crop for Cambodian farmers, the productivity of plantations is far below its potential. Even without much external inputs, the introduction of improved planting material and proper manual plant protection the average yield of 0.4 tons per hectare could be doubled, while the use of external inputs could raise the harvest to the average yield to the level of 1.6 tons as prevailing on similar soils in the neighboring countries.³⁸

Assistance to cashew farmers³⁹

The Community Based Rural Development Program (CB-RDP) of the German GTZ assisted cashew farmers in Kampong Thom in 2006 and 2007. During that time, organic cashew farmers formed 11 groups with 385 members. GTZ involved several experts including an Indian specialist and arranged several trainings for the farmers. During 2008 the activities to assist organic cashew farmers were carried on by the GTZ Trade Promotion Project.

The NGO Srer Khmer picked up from this work when it started working with cashew farmers in the provinces Kampong Thom and Kampong Cham. With funding from IFC, the NGO facilitated the formation of 120 farmer associations, 83 associations in Kampong Thom and 38 in Kampong Cham.

As of December 2010, 3,968 farmers joined the associations. Together they manage 8,249 hectare, yielding 5,774 tons of raw cashews (assumption: 1 ha yields 700 kg).

An essential part of the work was to facilitate the establishment of an organic certification system by setting up group based internal control systems (ICS). In 2010, 700 producers were already certified as Organic, In February 2011 additional 3,268 producers (phase 2) were inspected and certified.

In the course of the implementation of the program, the few farmers who were applying pesticides or herbicides, abandoned the use and became interested to convert to organic farming. Farmers started using organic alternatives such as botanical pesticides and natural fertilizers. They likewise started to prune the trees, which helps to significantly improve yields. Some key farmers set up nurseries to develop new varieties and sell to other farmers

³⁷ Naturland, 2000. Cashew nuts, p. 3

³⁸ Sun Vibol, 2007. Organic Cashew Production in Kampong Thom and Kampong Cham, final report, GTZ, Cambodia

³⁹ The information in this section is based on Pou Sovann, 2010. Cashew farmer groups training, Presentation during launching of Prospects for Cambodia's Cashew Sub-sector, IFC.

who want to expand their orchards. To enhance the learning of the farmers, Srer Khmer developed training materials which are highly appreciated by the farmers.

Likewise, the farmer groups increased their bargaining power in dealing with traders. They also became aware of more selling options and are able to exchange market price information between the two provinces.

According to Srer Khmer, the members of the associations are interested to learn more in addition to the training courses and request more training materials. As a result, farmers start to treat their cashew orchards as a business and pay more attention on improving and maintaining them. Many are now looking for good varieties themselves.

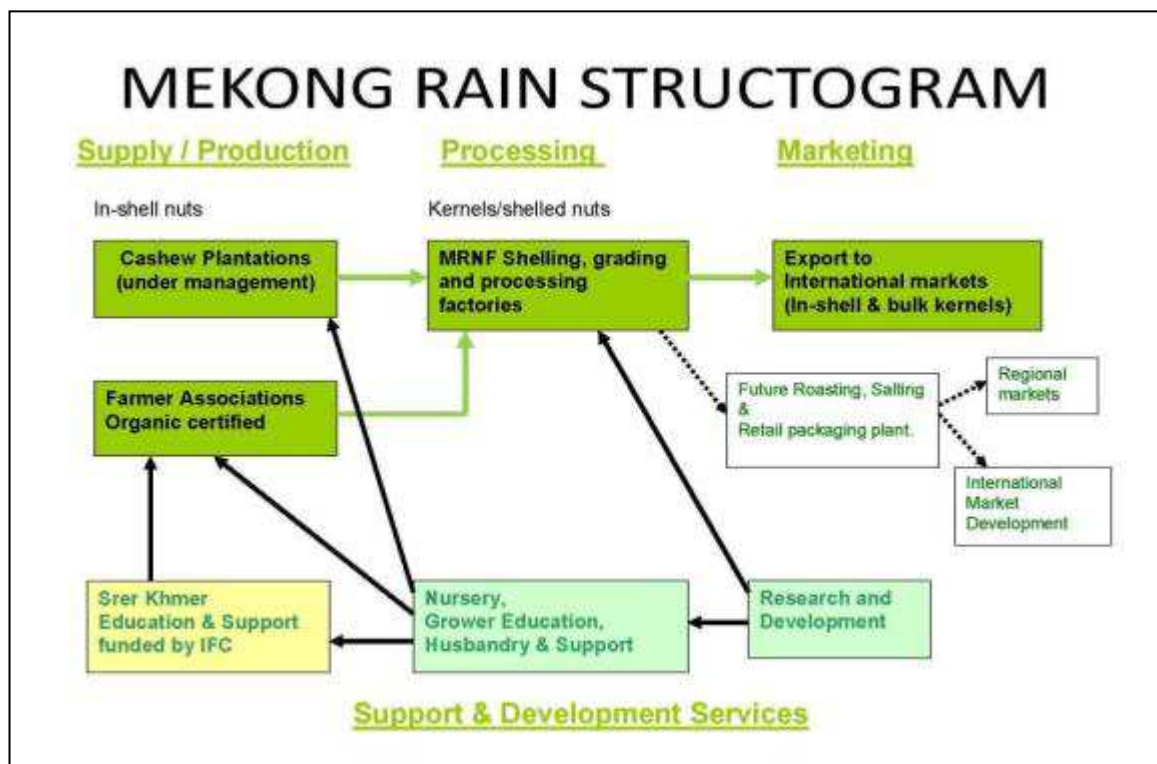
Srer Khmer realized that trainings need to be complemented by on-farm coaching and back-stopping activities. In addition to selling raw nuts other promising value adding activities such as the making cashew apple confectionary and cashew wine were explored. Srer Khmer also observed that neighboring farmers start copying organic methods. Thus, there is a considerable potential to increase the production of organic cashew.

Since the beginning of 2011, Srer Khmer is implementing the third phase. Srer Khmer will facilitate more training to further improve the internal control systems (ICS) of the associations. Another focus is the improvement of the pre and post harvest management. The trainings will be combined with individual on-farm coaching and follow up activities. Additionally, more business skills will be imparted.

Concerning the marketing, the project works closely with Mekong Rain Natural Foods Co Ltd, which paid for the ICS farmer records as well for the international certification. The partnership aims to overcome the long-lasting neglect of the cashew industry and to turn it to win-win situation for all stakeholders.

Processing

During the recent decade, the cashew sector suffered severe setbacks when the last of two processing plants operating in Cambodia shut down. Consequently, most of the raw cashew nuts have to be exported to the factories in Vietnam. The lack of processing facilities and an associated drop in farm-gate prices triggered a considerable conversion of cashew orchards to crops such as cassava and rubber.



Parallel to the work of Srer Khmer, the company Mekong Rain Natural Foods Co Ltd, which aims to modernize the Cambodian cashew industry, explored opportunities to process and market organic cashew nuts. In 2010, Mekong Rain Natural Foods, started to process cashew nuts at a pilot processing plant and could produce high quality kernels for promotion and the domestic market. In addition, through servicing international trader clients, the company gained experience in local in-shell cashew buying.⁴⁰

In early 2011, Mekong Rain will set up its first cashew nut processing plant in Kampong Cham province to boost a growing industry that could create thousands of jobs.⁴¹

The prices of raw cashews was fluctuating from between 3,000 riel to 4,500 riel per kilogram, while processed organic nuts would sell for about \$8 per kg.

The plant will buy from nearly 4,000 farmers and expects to produce 2,000 metric tons of processed cashews in the first year. The potential of the plant is about 10,000 metric tons per year. According to cashew nut trade specialist James Fitzpatrick of Ingredient Sourcing Solutions, the average quality of Cambodian cashews in the 2009 to 2010 season ranked fifth among the world's eleven top producers.⁴²

⁴⁰ McNaughton, A., 2010. Mekong Rains Natural Foods Cambodian Cashew Industry Initiative, Presentation during the launching of *Prospects for Cambodia's Cashew Sub-sector*, IFC

⁴¹ <http://www.commodityonline.com/news/Cambodia-opens-first-cashew-nut-plant-34357-3-1.html>

⁴² as above

Mekong Rain aims to establish long-term relationships with leading importers of organic cashews and will emphasize quality certification such as organic, HACCP, GMP, Halal and Kosher, ILO labor standards and low carbon footprint.⁴³

During the launching of a report on the “prospects for Cambodia’s cashew sub-sector”, James Fitzpatrick, emphasized that “Processing encourages growers to produce better quality product as processors reward quality and export traders worldwide do not. Processing opens the door to food packing, exports and brand establishment.”⁴⁴

Organic cashew market

The outlook for the world cashew market has been described in detail by James Fitzpatrick in the study on the *Prospects for Cambodia’s Cashew Sub-sector*, especially in Chapter 6: Organic Cashew Market.⁴⁵ Hence, the mention of a few points may suffice here.

Among the countries producing cashews several countries are able to offer certified organic cashews. India exports 100 metric tons chiefly to European countries. Several African countries also export organic cashews as well. The main importers of organic cashews are Europe (especially Germany and United Kingdom), America, China and Australia.

Organic cashew price move with the market, although fluctuations are less pronounced than in the conventional market. Premium prices for organic cashews range from 10 to 40 percent, elsewhere contracts settle in the range from 20 to 25 percent.

India has possibly the greatest potential to expand organic production as the production of cashew is ‘organic by default’. Yet, the nuts are mostly not marketed as such. Once Indian processors would invest in certification and other requirements, India’s output of organic cashews could significantly increase in a couple of years.

Conclusion

It is noteworthy that due to the low use of external inputs, many cashew farmers easily could convert to organic practices. In 2011, almost 10 percent of Cambodia’s cashew production is already certified organic. This could serve as a model for the rice sector, where certified organic production comprises only a tiny share, even though there is a considerable potential for organic certified rice.

⁴³ McNaughton, A., 2010.

⁴⁴ Hor Kimsay, 2011. Cambodia’s Cashew Industry: A future with great potential, Economics Today, Vol. No. 78, p.19.

⁴⁵ International Finance Corporation (IFC), 2010. Prospects for Cambodia’s Cashew Sub-sector, Cambodia Agribusiness Series – No. 1, pp 89-103.

An essential requirement is that all stakeholders have a long term vision and are willing to invest in training and an organic guarantee system as well as to develop confidence in a lasting partnership. Ideally, such undertakings are supported during the start up phase by a business development program.

Palm Sugar

The sugar palm (*Borassus flabellifer*) is known to be part of Cambodian national heritage and an important natural resource. It plays an important role in Cambodia's rural system and produces several products such as juice, sugar, building wood, fruit and root for traditional medicine. The sugar palm tree, therefore widely contributes to rural life.

In Cambodia, palm sugar production is a rural activity that generates small amounts of income for over 20,000 families.⁴⁶ Palm sugar producers commonly are landless families who rent palm trees for a fee to be allowed to collect the sap from the Sugar Palm, which can be used for the production of wine, vinegar as well as palm sugar.

As palm trees are neither treated with fertilizer nor with pesticides, palm sugar generally can be considered a chemical-free product. However, depending on the surroundings the palm can be affected by farm chemicals applied, for example in rice fields. However, only a small part of the product is certified.

It is estimated that one sugar palm produces sap in equivalent to 70 kg sugar per year. (Confirel calculates that a palm provides about 600 liters of sap, which is about 90kg of sugar.) It is further assumed that on average one palm sugar producer utilized about 25 palms.⁴⁷ Thus, the annual production of palm sugar in Cambodia could be in the range of 30,000 metric tons. For Kampong Speu province alone, it is assumed that about 10,000 families exploit 261,898 sugar palm which results to an annual of 18,000 metric tons⁴⁸.

Palm Sugar is produced from the sap of palm tree flower. The long and tedious techniques used during the manufacturing process consume a lot of wood and expose producers to harmful smoke. As the sugar quality is not consistent, it is not always easy to sell it at a good price. Traditionally paste and blocks were produced.

In the recent years, an improved technique made it possible to obtain a product which can be sold in the international market developed, extended cooking for about 15 minutes and continues stirring while the sugar cools down in the pan.

⁴⁶ Palm Sugar Stoves, 2009. <http://www.geres-cambodia.org/pdf/Project%20Sheet-Vattanak.pdf>

⁴⁷ <http://www.foodquality-origin.org/Bangkok/11June/Prak%20Cambodia%20palm%20sugar.ppt>

⁴⁸ <http://www.foodquality-origin.org/Bangkok/Session%20B1/Prak%20Kampong%20speu%20palm%20sugar.ppt>

The sugar palm tree does not require any management for biomass production. But the leaves should not be harvested when trees are kept for juice collection. Farmers believe harvesting the leaves has a great influence on the yield of juice. The juice from the sugar palm tree is normally collected once a day. However, there are high production trees (20-25 kg of juice per day) which should be collected from twice daily.⁴⁹

Confirel Co., Ltd.

Confirel is a local company founded in 2001 by Dr. Hay Ly Eang, CEO of the company and principle shareholder. From 2002 to 2003: Confirel explored options for the production process and the distribution and moved to pilot stage. After an interruption, the company went into full production in early 2004.

Confirel has a wide variety of products derived from the sap of the sugar palm:⁵⁰ Palm sugar, wine, vinegar, cocktail and liquor. Only palm sugar and one kind of vinegar are certified by ECOCERT as organic products. Confirel produced about 40 tons of certified palm sugar in 2010.

The sap for these two products comes from palms from elevated areas far enough from agricultural areas. The certification is based on regulations for wild collection. About 30 percent of the organic products are exported; the rest is sold in the domestic market. Confirel currently buys certified palm sugar from farmers at 4000 Riel/kg.

In addition Confirel handles sugar coming from producers covered by the Kompong Speu Geographical Indication (GI) for palm sugar.

As the production of palm sugar is seasonal, commonly from December until April, the delay of dry season in 2010/2011 caused considerable problems for Confirel because it could not fulfill some contracts on time.

The basic processing is done in the villages, while Confirel refines the sugar further. However, the farmers have to meet strict requirements regarding foreign matter and moisture content.

While the originally envisioned exports to France were not as successful as anticipated, Confirel is now expanding its export to Japan and Taiwan, Domestic demand as well as exports is increasing steadily. There could be soon a shortage of supply.

⁴⁹ Khieu Borin, 1997. The Sugar Palm Tree as the Basis of Integrated Farming in Cambodia, <http://www.fao.org/ag/againfo/resources/documents/frg/conf96pdf/khieu.pdf>

⁵⁰ <http://www.confirel.com/>

Quality Control

Confirel is very particular about the quality. The sugar is carefully checked before buying. Additional laboratory tests are conducted in the factory.

To assure a high quality Confirel undertakes several checks at every stage of the production to ensure the quality of its products. Besides visual and tactile check (shape, taste, texture) Confirel analyzes samples in its own laboratory. In addition these checks are complemented through laboratory analysis by the Pasteur Institute of Phnom Penh and the National Laboratory of Control.

GERES Cambodia

Another actor in the business of high grade palm sugar is GERES with the Vattanak brand. GERES set up an 'eco-social entrepreneurship' to promote and generate market demand for the products that are manufactured using environmentally friendly, and socially viable technologies developed and implemented GERES Cambodia and other organizations in Cambodia.

In 2005, GERES Cambodia introduced the concept of a highly efficient wood-burning stove for palm sugar production. The first simple, cheap model, known as "Vattanak", has the advantage of reducing wood consumption while offering combustion quality exceeding European standards. Moreover, the smoke produced is not so thick. Such energy efficiency has economic repercussions (savings on wood and better quality sugar), making the stove popular with small producers.

The stoves were produced and sold by small companies, but GERES provided a loan to the palm sugar producers. The stoves are sold for \$75.00. The families have to pay \$ 5 down payment while the balance is covered through loan by GERES, payable in cash or kind. Most families supplied sugar to GERES to pay the loan.

Since 2007, GERES Cambodia has been distributing Vattanak stoves and training producers to install, maintain and use them. The objective for 2009 is to disseminate at least 150 stoves throughout the country.

At the same time, work has been ongoing for some years to professionalize the sector with a view to doubling producers' income and establishing sustainable management of fuel. Commonly 6 kg of fuel wood is needed to produce one kg of palm sugar. Improved stoves

bring about 20 percent fuel savings. Improved stoves come with a roof to assure better hygienic conditions.

GERES chiefly markets sugar received as payment for the improved cooking stoves which were sold to small sugar producer. GERES is cooperating with 124 families It is buying price for sugar of good quality for 3,300 Riel per kg, while the market price is 2,150 Riel per kg. In 2010 about five metric tons were traded.

SAHAKREAS CEDAC (SKC)

SAHAKREAS CEDAC ventured into the palms sugar business about five years ago. One important sales argument is that apparently many traders of palm sugar in Cambodia use the chemical sodium hydrosulfite to bleach palm sugar as customers prefer sugar with a lighter color. Traders or producers usually mix 100 grams of this chemical into 100 kg of palm sugar, (one part in one thousand). Elsewhere the consumption of sodium hydrosulfite contaminated food is considered a health hazard. The Thai Food and Drug Administration, based on its Public Health Notification No 84 (B.E.2527), for example, does not permit the use of sodium hydrosulfite in foods.

During the recent years, together with DATe and GERES Cambodia, CEDAC has joined efforts in supporting palm sugar producers to improve their production, particularly the energy efficiency of the processing. The efforts also addressed the marketing of the product in order to enhance their living conditions⁵¹.

During 2010, SKC bought 10.7 metric tons from 35 families from Kampong Speu Province. The sugar is sold under the Natural Agri Products label.

⁵¹ Him, K and Tong C. 2009. Improving Living Conditions of Palm Sugar Producers through Improved Processing Technology and Marketing, CEDAC, www.cedac.org.kh/fieldnote9.pdf

Pepper

Pepper has been cultivated in Cambodia at least for about a thousand years, though it is not clear when pepper cultivation began. However, there is evidence that pepper was known during the Angkor civilization. The Chinese explorer Zhou Daguan first made mention of pepper being grown in Cambodia way back in the 13th century. Plantation type cultivation probably only started in the late 18th century after the sultan of Aceh, Indonesia, burnt his pepper plantations as it became clear that he was losing the war against the invading Dutch army. He did not want to leave this wealth to the enemies.

Several spice importers consequently turned to Cambodia's Kampot region. Kampot pepper was first grown on the island Koh Tral (Phou Quac) which belonged for during the time of the French protectorate to Kampot province. Production reached more than 8000 tonnes a year by the year 1900. The volume dropped to about 3000 tonnes a year by the 1950s but the product was of exceptional quality, making Kampot the pepper of choice in top French restaurants. Kampot pepper was considered the world's finest and most expensive "Black Gold".

Tragically, the five years of Khmer Rouge terror and the ensuing civil war put an end to most of the pepper production in Cambodia. Only, in about 1998, former growers started to resume the production of pepper in the region.

Currently, about 150 families are growing pepper around Kampot. The production is still only about 20 tons a year and it will take years for output to rebound fully.⁵²

Kurata Pepper

Mr. Hironobu Kurata came to Cambodia as a volunteer aiming to contribute to an improvement of the educational sector. After some time, when exploring business ideas, he became aware of pepper. Eventually in 1997, he met a pepper farmer in Koh Kong Province who had maintained his plantation from pre-war days, and promptly formed a business partnership with him.⁵³

For Mr. Kurata, Koh Kong pepper is identical with Kampot pepper since it is grown in the same climate, it just the neighboring different province. However, pepper grown away from

⁵² <http://www.smh.com.au/travel/home-of-aroma-20100211-nuju.html>

⁵³ http://www.lizledden.com/wp-content/uploads/2008/04/pp-life_dr-pepper_jan-08.pdf

Cambodia's coastline is quite different, according to him. Since pepper cultivation has already a history of more than 700 years, Kurata believes that it does not need any new technology to grow pepper and the growers consequently keep on the traditional way of cultivation. While his high quality pepper is now exported to Japan and most recently to a business in Denmark, the pepper sells also in various local outlets.

Kurata cooperates with three farmers in Banteat and Tathong Village Dangpeng commune, Srer Ambil district, Koh Kong province. The total pepper plantation area covers 10 hectares. A part of it was planted recently; another part will be planted soon. For the forthcoming harvest (2011), about dried 6,100Kg of organic pepper is expected.

While many pepper farmers prepare seedlings in bags, the farmers cooperating with Kurata plant the cuttings directly in the soil. They use cow manure, bat dung and compost to maintain the fertility of the soil. To control pest and diseases, they use botanical or natural pesticides.

After harvesting the pepper spikes are dried on the farm, than threshed. The pepper corns are spread it out in the sun and dried for 4 days more, draw it, and keep in the sack. In Phnom Penh, Kurata continues the processing. The pepper corns are soaked in boiling water, dried, sorted and finally packaged.

Kampot Pepper

Quite some attention has been given to the revival of Kampot Pepper and the registration as geographic indication (GI) in 2010. In the 1990-ties some farmers in Kampot province began to resume the production of pepper. Currently, about 129 farmers are member of the Kampot Pepper Promotion Association (KPPA).

The geographical indication's *Book of Specifications of Kampot pepper* disallows the use of chemical fertilizers and pesticides. Kampot pepper producers consequently do not apply chemical fertilizers, According to Sok Sarang of CIRDI; the farmers say it would have negative effect on the plants. To manage soil fertility, pepper producers use natural fertilizers such as cow manure and bad manure.

Concerning the control of pests and diseases, the book of specifications advises the pepper producers to use natural means. However, in case of inefficiency of natural means for pest control, pepper producer may use the chemical insecticides, only those Class II and III (classified by World Health Organization WHO) which were blue and green color. Currently

most of the Kampot pepper farmers use chemical pesticides to prevent pest damages and to protect their pepper plantation.

The farmers encounter several pests, among them *Diconoris hewetti*, White louse, *Apogonia cambodjensis*, *Hypomeces squamosus*, *Parasa lepida* (Cramer), and Termites. In addition to this there are also diseases such as root rot.⁵⁴

Kampot pepper producers have only the certificate of GI (Geographical Indication) certified by ECOCERT SA, France. 14 companies, cooperatives and traders who are also members of the Kampot Pepper Promotion Association buy, package and sell Kampot pepper. The quantity of Kampot pepper produced, packaged and sold in the market in 2010 is about 10 tons.

Memot Pepper

The largest, but lesser known pepper growing area is the Memot district, Kompong Cham province. 350 farmers, located mainly in Dar Commune grow pepper on about 337 hectare in a conventional manner.

The production is about 2300 tons annually. The yield with 6-8 tons per hectare is significantly higher than in other countries like Vietnam with 2.5 – 3 tons hectare and Indonesia or Malaysia with 1 ton/ha.

Leader of the Dar Memot Pepper Farmers' Cooperative visited the farmers cooperating with Kurata Pepper (Koh Kong) as well as pepper farmers in Kampot. Especially after participating for the first time in the Congress of International Pepper Community in Kochi, India, last November 2010⁵⁵, leaders of the cooperative became aware of the high quality requirements in the international market. Likewise they have learnt about the growing demand for organic pepper and are interested to experiment with organic cultivation practices.

⁵⁴ Information by Sok Sarong of the Cambodian Institute for Research and Rural Development (CiRD)

⁵⁵ <http://www.peppertrade.com.br/IPC2010/38ipc-final.htm>

Fruits

Similarly the vegetable sector, the fruit sector in Cambodia by far cannot supply the needs of the population and the supply is dominated by imports from Vietnam and Thailand.

Throughout Cambodia most fruit trees in farm yards do not receive chemical inputs.

However, so far there are only two organic fruit plantations known to COAA.

Plantation of Mr. Schier and Mr. Nob Ty

The plantation in Ang Sala Village, Prey Angkumh commune, Bavet City, Svay Rieng Province was started as a private development project by Peter Schier who represented the German Konrad-Adenauer Stiftung in Cambodia for several years and Mr. Ty as of the end of 1997. It was initially intended as a mango tree seed bank on a 5,000 square meters plot with 200 2-3-year old mango trees of 20 improved mango varieties from Cambodia and Southeast Asia. The first seedlings came from a small tree nursery collected and in one characteristic Phnom Penh

After an initial management failure, Mr. Schier involved Mr. Ty as a plantation manager who expanded organic fruit plantation to about 18 hectares which was previously covered by rice fields. Part of the investment was the digging of drainage canals as well as the drilling of several wells. In the beginning Schier and Ty types had experimented with other kinds of fruit trees. Most turned out not suitable for the area. The rather poor soil Svay Rieng is best suited for the plantation of mangos.

Today the plantation has approx. 3,000 mango trees about 30 different varieties. The most important varieties are Keo Lomeath, Keo Chen, Khieu Savoeu, Nam Dokmai, Koh Rodoeu, Reth, Keo Pongmoan (Cambodian hen's egg mango) and Tek Khmum (Cambodian honey mango.) There are also some exotic varieties from India, the Senegal and Kenya, such as the smell or Durian-mango (*Mangifera odorata*) or the Indian honey mango.

The plantation contains a smaller number of Jackfruit, Kamping-Reak and various Citrus trees, but the yield is hardly sufficient for marketing. Schier and Ty are also proud to have the rare Cambodian Citrus variety *Kruit Plier*. This fruit has a very sour juice which is used in some areas to prepare meat, fish and seafood dishes.

The trees are fertilized with compost, cow dung and commercial organic fertilizer. To control pests and diseases, natural substances are applied.

Part of the plantation is a private turtle protection project which was established in 1999: The refuge of 2,500 square meters was established around a bomb crater from the Vietnam War. The plantation has also fish ponds not considerable. Currently, the project is still running in red deficit; however the owners are optimistic that in foreseeable future the plantation will yield sufficient mangos to cover the costs.

Schier observed that changes in climate cause a significant problem. If the dry season does not start distinctly, mango trees do not produce enough flowers completely fail to flower. Since an organic business cannot use chemical flower inducers, such events can be quite damaging.

Fruit plantation of Mr. Seak Heng

Mr. Seak Heng owns a 90 hectare orchard planted with durian, rambutan mangosteen, mango, jackfruit and custard apple. The orchard is managed by his son Mr. Poleak Chhay. It is located in Kilo 10 village, Arak Thnot commune, Steung Trong district, Kampong Cham province.

To fertilize the fruit trees cow and chicken manure as well as bat manure are applied. In addition Mr. Chhay uses soiled fish, rice ash, residues of fish, crab and shrimp processing. Also soybean residues, rice straw, Siam weed as well as several kinds of effective microorganisms are applied to the orchard.

To control pest, natural pesticide consisting of yam (*Dioscorea hispida*), derris (*Derris elliptica*) and strychnine and other poisonous plants are used. To manage diseases on the trees, Mr. Chhay uses wood oil and several kinds of resins as well as effective microorganisms. To support flowering and fruiting, Mr. Chhay applies effective microorganisms derived from papaya, banana, jackfruit, mango and other kinds of yellow fruits.

A few considerations and suggestions

This report aims to shed some light on the situation and potentials of organic agriculture and food processing in Cambodia. It is hoped that this account will contribute to a discussion how the organic sector in Cambodia can be strengthened.

Initially a few points, which became apparent during the process of information gathering and writing may be highlighted here.

1. It became clear that only a smaller part of the operations are certified either by international certifiers or by COrAA. Especially many organic rice farmers are not certified by a third party. For the vegetable sector the situation is more difficult as many still use some external inputs such as seeds and 'organic fertilizers' which are not permitted by COrAA's Organic Standards.

Concerning vegetable growers considered in this report, most of the production could be considered chemical-free, but does not meet the organic standards. One problem is the use of commercial 'organic fertilizers'. These are commonly produced from residues from conventional farming or derived from municipal waste which might contain several pollutants such as heavy metals. In many cases, the producers face substantial difficulties to achieve a full conversion to organic in the near future.

In view of the common practices of conventional vegetable farmers who often use highly hazardous pesticides without understanding the instructions and being unaware of the risks the application entails for themselves as well as for the consumers, the encouragement of chemical-free vegetables may have priority over organic production. It would be important to certify that the respective farmer produces vegetables without the use of synthetic pesticides and fertilizer, possibly on COrAA's chemical free-standards.

So far, COrAA's Chemical-free Standards has not been utilized as it focuses on the production of a single crop in an otherwise conventional farm. It could be considered to review this standard to accommodate whole farms of chemical-free growers which cannot readily comply with the organic standards.

2. Especially the situation for organic rice illustrates that there are many organic producers, who, in absence of buyers for organic rice, have to sell their produce to the conventional market. Moreover, there are thousands of rice farmers who could

easily qualify as organic growers if they could be connected to consumers who appreciate organic rice. However, the capacity of the existing market channels cannot absorb the already existing produce.

This is an unfavorable condition as previously certified farmers became disappointed and tend to discontinue the internal control system (ICS). In the absence of incentives many farmers might go back to the old ways of production. The success of the organic cashew sub-sector might encourage similar endeavors in the rice sector.

Consequently, the aim is to find partners with long-term interest in the organic rice sub-sector. The managements of modern rice mills with contacts to the international market should be contacted to discuss with them opportunities in the organic rice sector. Once interested companies have been established, dormant or defunct organic rice producer association could be assisted to become partners in such ventures. Among the different concerns, most farmers' association certainly will require help to revive or improve their internal control system.

3. Cambodian rice farmers still plant a wide range of traditional varieties, among them also floating rice varieties. Some of these varieties have rare and distinct characteristics and could potentially be sold as 'boutique' rice. Support to farmers cultivating floating rice could also help to stem the shift from the cultivation of floating rice to receding rice which is commonly grown by using high yielding varieties in combination with synthetic fertilizers and pesticides.
4. There is a possible synergy between organic rice and palm sugar production. Sugar palms commonly grow in or near rice fields. As the organic rice sub-sector could significantly expand once trading achieves a larger scale, so could the production of organic palm sugar from palms that grow in organic rice farms. So far, the certification of organic palm sugar has been limited to areas outside of farming areas (wild collection.) Yet, if enough rice farmers in one village or a cluster of villages are certified, they could consider selling palm sap or sugar as certified organic as well.
5. While it is possible to provide data (although often only estimates) on the available quantities of organic products as well the prospects for each sector, it is much more difficult to predict the markets for organic products. Several value chains of conventional products have been carefully studied to provide a basis for development interventions to improve the status quo through various measures. On the other

hand, distributors of organic products have to rely on guessed estimates concerning the number of consumers interested in organic products⁵⁶

Probably, so far no comprehensive study has been conducted on what Cambodian urban consumers expect from food producers: What do they know about certain issues such as chemical residues or organic production? How much are they willing to pay for certified food? Hence, it may be worthy to explore options how a better knowledge of consumers' worries and wishes as well as the demand for distinct categories of food could be obtained.

6. Similarly, there are no studies on export markets of organic rice worldwide available. So far the development of exports of organic rice has relied on personal contacts and interests by foreign companies to diversify their supply. In view of the potentials of Cambodian farmers to produce organic rice, a study analog to IFC's study on the cashew subsector⁵⁷ would be of great help to inform interested players.

On the whole, the results show that organic and chemical-free farming is feasible and helps to employ more people in the countryside and generate additional income. However, often the productivity of the farms needs to be significantly enhanced to make operations economically viable. As the experiences, especially of the cashew sector show, farmers benefit from the access to knowledge and from being coached in their operations.

⁵⁶ see for example: Hul Reaksmey and Sturrock, T. 2011. Cambodian organic farmers pressed, experts say, Cambodia Daily, January 14, 2011, page 31

⁵⁷ International Finance Corporation (IFC), 2010. Prospects for Cambodia's Cashew Sub-sector, Cambodia Agribusiness Series – No. 1

Distributors of organic and chemical-free food products

Naturae (Asia Bio)

#83, Street 240, Phnom Penh

Offers imported organic products, including body care offer premium quality organic products to our customers, Cambodians and Ex-patriots alike.

www.asiabio.asia/

Natural Garden

N° 213B, Trasak Paem (St. 63) 12302 Phnom Penh

Shop delivering fresh vegetables from own farm and various suppliers. Offers also butchery and charcuterie and wines from France and Australia

Khmer Harvest

#17Eo St.51 (Pasteur) Phsar Thmei 3, Phnom Penh

Producer of organic crops and provides safe and healthy food. Khmer Harvest is aiming to become exporter as well. Farm is located just 13 km away from the center of Phnom Penh city.

<http://www.khmerharvest.com.kh/>

PUAC shop

No 88-90 Eo, St 360,
Sang Kat Boeung Kang Kong III,
Phnom Penh,

<http://www.puac.info/>

SCL - SAHAKREAS CEDAC Ltd⁵⁸

Headquarter, warehouse and shop at

N°. 06, Street 570 12152 Phnom Penh

SCL runs 7 additional shops in Phnom Penh

<http://www.skcedac.com.kh/>

⁵⁸ For more information in English see also

[http://www.organic.moc.go.th/upload/SpeakerPresentation/5\)%20Cambodia%20-%20Bun%20Penhpheak.pdf?Mode=1&pGroup=05](http://www.organic.moc.go.th/upload/SpeakerPresentation/5)%20Cambodia%20-%20Bun%20Penhpheak.pdf?Mode=1&pGroup=05)

Persons contacted for this report

Name	Position	Company/Organization	Location
Bou Sitha	Project Coordinator	International Volunteers of Yamagata (IVY)	Svay Rieng
Chhorn Ravouth	General Manager	Confirel Co., Ltd.	Phnom Penh
Goossens, Christophe	Adviser to PUAC	Aide au Développement Gembloux	Phnom Penh
Kurata Hironobu	CEO	Kurata Pepper	Phnom Penh
Matsuura, Ayumi	Project Manager and Country Representative	International Volunteers of Yamagata (IVY)	Svay Rieng
Mauv Vandara	Agriculture livelihood coordinator	PNKS(Ponleu Sdey Sang Kheum)/ Life of hope	Prey Veng
McNaughton, Andrew	CEO	Mekong Rain Natural Foods Co., Ltd.	Phnom Penh
Neak Tharen	Director	Natural Garden	Phnom Penh
Nicewinter, John Paul	Marketing Coordinator	Eco-Biz, GERES	Phnom Penh
Nielsen, Karen W.	Enterprise Planning Advisor	Wildlife Conservation Society (WCS) - Cambodia Program	Phnom Penh
Nob Ny	President	Srer Cheng Organic Agriculture Development Cooperative	Chum Kiri district, Kampot province
NobTy	Farm Manger	Mango Farm, Bavet	Bavet, Svay Rieng
Chhay Poleak	Manager	Seak Heng , Fruit plantation	Phnom Penh, Kampong Cham
Pou Sovann	Executive Director	Srer Khmer	Phnom Penh
Schier, Peter		Mango Farm, Bavet	Berlin
So Don	President	Stung Sen Agriculture Development Cooperative	Kampong Thom province
Sok Sarang	Project manager	Cambodian Institute for Research and Rural Development (CiRD)	Phnom Penh
Sophan Kanhchana	Project Officer	NGO Forum	Phnom Penh
Sour Pounlok	Business Development Assistant	SAHAKREAS CEDAC	Phnom Penh

References

2007. Cambodia SME Development in Selected Agri-Sectors, Sector analysis and Value chains, Chapter 6, Rice
- An, Kimheng, 2009, Factors Effecting Farmers' Adoption of Organic Rice Cultivation in Cambodia, Case Study of Damrei Romeal Organic Rice Federation Cooperative in Tramkok District, Takeo Province, Tokyo University of Agriculture and Technology Graduate School of Agriculture
- CEDAC-NAP Bulletin, 2010. CEDAC team evaluates support to organic rice producer groups. CEDAC, Phnom Penh
- Crotin, Florent, 2010. Analysis of Organic Rice Production in Cambodia with an Approach in terms of Payment for Environmental Services: An example of effective PES for development facing contextual issues, VetAgro SUP, Campus Agronomique de Clermont.
- EIC, 2007, Export Diversification and Value Addition,
http://www.undprcc.lk/ext/aptii_export_diversification_2007/Cambodia%5CStudies%5CExport%20Diversification%20and%20VA_Table%20of%20Contents.pdf
- Gradl, Christina, 2005 SRI Rice Marketing Initiative Marketing Strategy, Discussion Paper,
<http://srmarketing.org/resources/SRI-Rice-Marketing-Strategy-Paper.pdf>
- Hor Kimsay, 2011. Cambodia's Cashew Industry: A future with great potential, Economics Today, Vol. No. 78, p.19
- Imamura, Mai, 2010. Determinants on Market Channel and Sustainable Rice Farming of Small Farm Households in Cambodia: A case of Organic Market Development by a local NGO. MSc thesis, Development Economics Group, Wageningen University.
<http://edepot.wur.nl/146727>
- International Finance Corporation (IFC), 2010. Prospects for Cambodia's Cashew Sub-sector, Cambodia Agribusiness Series – No. 1
- Meusinger, Anna, 2009. The current status of chemical free vegetable producers in Cambodia, DED and CEDAC
- Naturland, 2000. Cashew nuts, Organic Farming in the Tropics and Subtropics, Exemplary Description of 20 Crops, p.1.
<http://www.naturland.de/fileadmin/MDB/documents/Publication/English/cashew.pdf>
- Prom Tola, 2010. PUAC Impact Study, Peri-Urban Agricultural Centre, (PUAC)
- Psilos, P and Charlesworth, P, SNV, 2009. Linking Smallholder Cash Crops to the Tourism Sector Project Design submitted to SNV, (Netherlands Development Organisation)
- Rosenkranz, Jörg, 2005. Market Study for Organic and Fair-trade Rice, CDRC, Pursat Cambodia
- Scheewe, Winfried, 2009. Organic rice value chain: Producer Groups as a key to successful marketing, DED.
- Slayton, Tom, 2009. A Road Map for Cambodian Rice Exports, unpublished



Cambodian Organic Agricultural Association

(COrAA)