INDIAN ORGANIC AGRIBUSINESS... @ THRESHOLD OF GROWTH

Papers Presented at
INDIA ORGANIC 2007 SEMINAR

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Foreword

Looking at the development of organic agriculture and marketing initiatives across various states in India, it is clearly visible that the Indian organic movement is today at the '**threshold of growth".** I say growth as this is the most encouraging and factual development in the Organic sector in India. There is a tremendous development during the last three years in the private sector, and more is required from the policy intervention and the Government of India level.

Events to raise awareness among the prospective Indian organic consumers like the INDIA ORGANIC TRADE FAIRS have made their impact and the emerging of several organic stores and outlets is a vital proof for the same. Organic products must be made more easily accessible and affordable in India to accelerate this movement further.

With this backdrop, **India Organic 2007,** the third edition of organic trade fair and seminar in India is organised by the International Competence Centre for Organic Agriculture at the ICAR NASC Centre, New Delhi. The National Centre for Organic Farming and APEDA are the co organizers along with a host of other sponsors. The success of the event is enhanced manifold by several other programmes like seminars, workshops, farmers' interaction and food festivals.

In addition to the main goal of creating a marketing platform for organic producers, input suppliers and service- providers, equally important was the intention of providing a platform for sharing knowledge and experiences. As the whole organic movement in India is in its formative years, efforts for promoting information sharing have great value. Gathering together the information shared and churning it properly to further disseminate it becomes especially important, when the first hand practical information and invaluable thoughts are shared on different aspects of the nascent organic sector.

The vast amount of experiences to be shared during the seminar relating to different aspects of organic enterprises, have been organised and presented as full submitted papers by the editors under seven chapters in this report. As compared to last year though we have reduced the number of sessions, the quality of speakers and topic has been greatly enhanced. In addition to seminars, several workshops have also been organised and full papers of these workshops are also presented in this publication. It is a remarkable endeavour by the ICCOA team and I wish to personally congratulate the editors, Mr Manoj Kumar Menon, Mr Tobias Eisenring and Dr Annadanaa. I hope readers recognise the potential of growth in the market for organics in India and resolve to establish flourishing local organic agribusiness.

President
ICCOA

Message

It gives me immense pleasure in writing a few lines about the "Publication on FULL PAPERS of the India Organic-2007 Seminar and Workshops", that was organized concurrently with "India Organic-2007" trade fair by ICCOA and FiBL.

In this third edition also, the trade fair, the food festivals, the workshops and the seminar (in the previous year it was called the 'Congress') has attracted growing interest and fanfare, which signals the growth of the organic sector across the world, and particularly in India.

The trade fair is already living up to what it is designed for —attracting serious trade. This is evident from the rise in volume and value of trade enquiries generated during the fair. At the India Organic 2006, the Buyer-Seller Meet was a grand success. A large number of participants showed interest to have such meets and ICCOA was able to organise 102 such meets. Of this, 39 B2B meets were held with foreign buyers directly and the remaining ones were between Indian buyers and Indian sellers. Rough estimates suggest that business enquiries generated would be over Rs 85 crore (Rs 850 million). This activity alone is also a great pointer towards the success of a trade show as these B2B meets bring the business value of the fair.

While the trade fair attracted trade, it was very essential also to attract experts, intelligentsia and successful entrepreneurs to speak at a forum and exchange ideas and information. The workshops and seminar serve this purpose and help build bridges between 'those-who-know' and 'those-who-wish-to-know'. It is these bridges, which will help organic sector to cross over and expand to new horizons.

The theme of the Seminar has this very relevant term "@ Threshold of Growth" to emphasise on the growth potential of domestic trade in organics. In our market survey of last year (ICCOA publication "The Market for Organic Foods in India"), we have brought out this fact that the domestic market potential for organic foods is actually around 10 times the value of India's exports!! Now, is this not very interesting? Therefore, the Congress has very significantly focused on the right theme at the right time.

The Publication on full papers runs into over 150 pages and is very well compiled and presented by my co-editors. This publication is different from the previous two proceedings and such improvement is what one could expect from the ICCOA/FiBL team always, and that is what Mr Tobias Eisenring and Dr. Annadanaa have delivered through this Golden Casket of Full Papers. The seven themes in the seminar and workshops are presented as individual chapters.

I once again congratulate this team from ICCOA and the team from FiBL, Switzerland for organizing this publication and seminar efficiently. This will immensely help all the participants of the seminar to cherish the seminar experiences time immemorial and to grasp what they may have missed. I am sure, this will remain a powerhouse of knowledge in the organic sector, hence I have called it the **Golden Casket of Full Papers.**

Thank you.

Manoj Kumar Menon
Executive Director

November, 2007

Acknowledgements

India Organic 2007 will be a multifarious event with the trade fair, several workshops and a seminar titled INDIAN ORGANIC AGRIBUISNESS ... @ THRESHOLD OF GROWTH, and an organic food festival. We made our best efforts to tell the world of the fact that India organic agribusiness is poised for the exponential growth phase. Ministers, Planners, Scientists, Exporters, Buyers, Sellers, Farmer Leaders, NGOs, Consultants, Input Manufacturers etc. will express their opinions and exchange experiences. We wish to thank all these people in advance, whose names cannot be written individually here, but who will come and share their thoughts with us during these four days.

So many people around to opine with but without written text, makes the task of writing a proceeding very difficult. We also wish to provide more and first hand information for the benefit of the participants, hence decided to present full papers from authors. Though we had sent the instruction to all speakers, all have not submitted the same quantity of text. We wish to thank all the contributors who sent in their full papers. This style of presenting the information to be shared at the seminar and workshop is a deviation from the usual practice of bringing out a proceedings. This change we have adopted as the previous two years proceedings never reached the participants in time.

Last but above all, colleagues at ICCOA, Mr Suresh KT, Mr N. Muralidhara, Ms Swarnambigai, Ms Lakshmi, Ms Rashmi Mole and Mr Prashanth deserve to be named here for their hard work in organising the events during India Organic 2007 trade fair, workshop, seminar and food festivals, which provided the platform to speakers to share information. Thank you colleagues for your time and efforts.

Manoj Kumar Menon
Tobias Eisenring
Seetharama Annadanaa

November, 2007
Bangalore

Introduction

Encashing the Exponential Growth Potential of the Indian Organic Agribusiness

Manoj Kumar Menon, Tobias Eisenring and Seetharama Annadanaa

Organic farming is not about just farming minus chemicals. It is actual about our agricultural traditions and practices, local seeds, regional values, environment, animal welfare, communities, sensible energy use, soil and water conservation and more. It is also about you and your family, your health and your welfare. Importantly, it also about the farmer, his livelihood, his food productivity and security.

Before 19th century, most food in the world was organically produced using organic manures and human and animal power (1). Mid-nineteenth century saw the production of superphosphate fertilizers in UK (2), followed by IC engine tractor in 1910 is the USA (3) and around the same time Habers process for ammonia synthesis led to nitrogenous fertilizers and around the same time insecticides and herbicides were discovered (4, 5).

Modern agriculture has been of great help in alleviating hunger from the world, because world population more than doubled itself during the last half of the 20th century; it increased (6) from 2.5 billion in AD 1950 to 6 billion in 2000. It is predicted that world population will again double itself by the end of 21st century and will touch the 12 billion mark (2). Most of this increase in population has been, and will be, in the developing countries in Asia, Africa and South America. Modern agriculture with all its components has thus to stay to ward off hunger from developing countries. India's own achievements in agricultural production after the **Green Revolution** in mid-1960s, has been exemplary and mainly due to increased use of the components of modern agriculture, namely fertilizers, pesticides and farm machinery (2). Food-grain production in India more than doubled itself during the post-Green Revolution period with virtually no increase in net cultivated area. It increased from 95 million tonnes in 1967-68 to 209 million tonnes in 1999-2000 (140 ± 1 million ha, 7). Nevertheless, overuse of pesticides, especially in vegetables and fruits, resulted in residues above safety levels (8,9), and this brought to attention the ill-effects of modern agriculture; even drinking water was not spared (10).

The Japanese farmer and philosopher Masanobu Fukuoka practised and promoted natural farming throughout the world and has followers in India also (2). His book, *One-Straw Revolution* (11), has been widely acclaimed. The formation of the International Federation of Organic Agriculture Movements (IFOAM) in 1972, gave an international framework for discussion and codification of internationally recognized principles of organic farming (2). A large number of terms are used as an alternative to organic farming. These are: biological, ecological, bio-dynamic, organic-biological and natural agriculture (2).

Global Scenario

Organic is the fastest growing sector of food industry with global sales projected to surpass US $40 billion mark in 2007. Exceptionally high market growth rates are leading to undersupply in various regions because organic food supply is not keeping pace with demand. The North American and European regions are most affected by supply shortages. American organic food producers and retailers are importing organic products from four cornres of the world. European organic food producers are investing in organic farming projects in third world countries to lock-in supply of organic products. The largest increases in organic food production

have been in Asia, Africa and Latin America. All three regions have reported triple-digit growth in organic farmland since 2000. Although production of organic foods has become global, the proliferation in organic standards is fragmenting the organic food industry. Fresh produce is the leading organic product category. Apples, oranges, carrots and potatoes are typical entry points for consumers buying organic products. Their fresh nature appeals to consumers seeking healthy and nutritious foods. Dairy products and beverages are the next most important organic products (Organic Monitor).

The global organic foods and beverages market is projected to exceed US$86 billion by 2009, reflecting a CAGR of over 17% during 10-year analysis period. The enduring health benefits offered by organic foods is expected to sustain the prosperity of market into distant future. The global organic food and beverage market is delivering strong double-digit annual growth as health and well-being moves up high on consumer's priority list. Outbreak of recent food scares, rising awareness of long-term health impact of pesticidal residues in food, unhealthy ingredients such as carbohydrates, fat, calories and hydrogenated oils, and use of genetically modified organisms (GMOs) in food products, among others, have all turned the spotlight on organic foods, which are today given the status of a health food. North America and Europe between them collar over 80% of the world market for organic foods and beverages (Global Industry Analysts, Inc.).

The USA is the largest market for organic foods and beverages in the world, projecting to reach sales of over US$ 43 billion by 2010, as stated by Global Industry Analysts, Inc. Asia-Pacific Region with a CAGR of more than 28% is projected to be the fastest growing organic foods and beverages market. Organic foods are rapidly making inroads into the mainstream food channel and emerging as a global phenomenon. Consumers today increasingly perceive organic produce as healthy for consumption as against the hitherto non-organic supremacy. The organic produce market is largest segment in organic foods and beverages market and is projected to reach sales of US$33 billion by 2010. In addition to health, concern for environment is also driving a sect of consumers towards adopting an organic dietary regime. The non-dairy organic beverage market is also rising due to increased demand for organic juices and drinks.

Non-dairy organic beverage market is set to witness the fastest growth of more than 18.5% during 10-year analysis period. Regulatory authorities across different countries and regions are negotiating equivalencies of organic programmes, wherein each country recognizes, and acknowledges the national organic programmes of other countries as an equivalent to prevailing domestic standards. A radical change sweeping through the industry is a change in image and product positioning. As a newly-regulated industry, organic foods and beverages is entering into an era of stringent regulatory intervention, as each country attempts to discipline its developing domestic organic industry.

Among regulatory issues, product certification and labelling rank as the most important, since they protect the consumers, and the organic farmers alike from fraudulent practices. The organic industry perceives the stringent certification procedure as a crucial step towards strengthening consumer confidence in organics. The industry is one of the few of its kind to welcome governmental intervention and legislations, since the federal seal of approval extends organics a much required shot in the arm in terms of adding authenticity to the category (Global Industry Analysts, Inc.).

Asian Scenario

Generally, organic food production in most Asian countries takes place on a small scale. In all countries, except China, it has developed through NGO - supported projects aiming at local food security, natural resource management, improving livelihoods of smallholders primarily through domestic markets and increasingly by export marketing (12). Commercial engagement in organic products in Asia was spurred by export opportunities for cash crops, particularly tea (12). Market demand in industrialized countries was the driving force behind recent organic developments (12). The countries producing organic foods in Asia are given in Table 1 (13 and ESCAP country studies).

Table 1. Organic food-producing countries in Asia

Country	*Year*	*No. of organic farms*	*Farms (%)*	*Organic cultivated area ha*	*Area (%)*	*Total area (ha)*	*Source*
China	2000			8517	0.002	535559000	W & Y, 2001
Green Food		742					ESCAP
OFDC				20 000			ESCAP
India	1999	304		1711	0.001	18 060 000	W & Y, 2001
Certified	2001			20000			ESCAP
Uncertified	2001			6000			ESCAP
Republic of Korea	1998	1237		902	0.04	2050000	W & Y, 2001
Organic	2000	356			704		ESCAP
Low-input, no pesticide	2000	1060		1032			ESCAP
Malaysia	2000	27		131		7890000	ESCAP, W &Y, 2001
Philippines	1999	9		95		11280000	W & Y, 2001
Trad. Organic crops	2001			275 mio			
Uncertified organic rice	2001			6000	0.2 of paddy		
Sri Lanka	1999	172		550	0.02	2329000	W & Y, 2001
	2001	7500 (+600)		3200 (+140)			ESCAP
Thailand	2001	750	2700	0.013	21175000		ESCAP, W & Y, 2001
Australia	2000	1657	1.4	7654924	1.62	472000000	W & Y, 2001
Papua New Guinea	1995			4265	0.56	760000	W & Y, 2001

Market Development for Asian Producers

International Trade of Asian Organic Products: Organic produce exported to the EU under Article 11(6) originates from a number of countries. However, most developing countries have very few listed import authorizations compared with industrialized countries. These, however, do not provide any indication of volume or value of trade, However, over half of the 1,019 EU authorizations from developing countries are from seven countries, with India, Mexico and Sri Lanka, accounting for over a third of the authorizations. This indicates that there is a great potential for involvement in the export trade to the EU (12).

Intra-Asian Trade with Organic Products: In Australasia, major markets are Japan and Australia followed by Taiwan Province of China; Singapore; and Hong Kong, China. However, in most Asian countries, domestic markets for organic products are emerging as well. These developments open the potential for intra-Asian trade relations. At the moment, imports into Asia mostly come from USA, Australia and Europe. Knowledge of demands in different Asian import countries can guide producer countries in development of their regional markets (12).

Indian Scenario

Currently, India ranks thirty-third in the world in terms of total land under organic cultivation and 88th in terms of the ratio of agricultural land under organic crops to total farming area. With an eye on market, a few states have begun to take organic farming seriously. In 2005-06, India exported organic products worth $228 million. (worldisgreen.com). Organic farming is slowly catching up with Indian farmers and an extensive marketing strategy is needed to sell such produce as there is no dearth of buyers across the globe. The popularity of organic products is dependent on the cost factor (See Box). The markets will come up but only slowly. And that is because at present the price difference between organic and normal produce is high (Economic Times).

Figure 1. SOC stock in different physiographic regions of India, based on 1800 soil samples.

Symbol	Physiographic region	SOC stock (Pg) Soil depth (cm) 0–30	0–150	Area (m ha)
1	Northern Mountains	7.89 (39)[1]	18.31	55.3 (17)[2]
2	The Great Plains	3.281 (18)	10.53	72.4 (22)
3	Peninsular India	3.64 (17)	13.34	54.7 (17)
4	Peninsular Plateau	3.62 (17)	10.11	105.7 (32)
5	Coastal Plains and the Islands	2.24 (11)	10.90	40.9 (12)
	Total	20.99 (100)	63.19	

[1]Figures in parentheses indicate per cent of total SOC stock.
[2]Figures in parentheses indicate per cent of total geographical area of the country.

The field trials conducted worldwide, including India, have proved wrong the myth that organic farming leads to lower yield. The Tamil Nadu Agricultural University', Cometatore, in a study on organic cultivation of green chilli is a case in point, where it produced better yield and quality. Likewise, University of Agricultural Sciences, Dharwar, Karnataka, found more viability in organic cultivation of groundnut and Frenchbean. Punjab Agricultural University, Ludhiana, found use of organic inputs produced better rice yields. In rainfed agricultural systems, organic farming produces consistently better yields says, Dr Mangala Rai, DG,/CAR, New Delhi: Even the World Bank admits: "Farmers in developing countries who switch to organic agriculture achieve higher earnings and a better standard of living, according to a series of studies conducted in China, India and six Latin American countries by the International Fund for Agricultural Development". What's lagging behind is government policy. On one hand, success of organic agriculture demonstrated by Vandana Shiva's Navdanya, the Kheti Virasat Mission

In the last two events, **India Organic 2005 and 2006,** we brought out the proceedings only. As a innovation and constant improvisation, ICCOA is known far, this year the seminar series has a publication of full papers from all speakers.

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in Punjab, Uttaranchal Organic Commodities Boards, Maharashtra Organic Farmers' Association, Spices Board and other agencies have forced the Ministry of Agriculture to set up a National Centre for Organic Farming. However, in terms of policy it continues to know to pesticide, fertilizer, agri-machinery, biotechnology and seed lobbies. Chemical agriculture is subsidised, organic agriculture is not. It has been left to the Ministry of Commerce to lay down standards for organic certification and for state governments to promote organic agriculture (*The Hindu*).

Status of organic food production in India (2005-2006)

Total production	2,89,934 MT
Total quantity exported	11,637 MT
Value of total export	Rs10,487 lakh
Total area under certified organic cultivation under certification	2.55 million ha, including forest area

Source: APEDA, New Delhi.

Conclusion

The nation-wide survey of consumers (14) also showed that there is an environment of distrust in quality of food available to the Indian urban consumers. So today they have a compelling reason and also reasonable affordability to buy organic food ingredients, if it was easily available. Thus, supply, rather than the demand, is the larger issue today, even though on a quick note, one also hears complaints of non-availability of markets.

Such limitations will remain until enough quantity is produced to enable trade and retail marketing in organic products as a profitable business. In domestic organic market for food, general assumption is that most consumers are positively inclined towards organic foods. The major barriers to their increased consumption of organic foods are perceived to be the price and availability. The notion that a certified organic product will draw trust of consumers and sell by itself, especially in the Indian market conditions, will be wrong. The experience of the EU and other organic markets indicates that one of the characteristics common to many successful organic marketers was considerable effort they put into organizing their supply chain. Solving the supply side issues involves more than simply expanding production or putting more products on the shelf. The focus of organic shopkeepers/retailers would be on securing supplies of consistent quality and quantity across a diverse product range. Strategies to achieve this include supporting the conversion to organic production, to encourage the pooling of produce from small farmers into larger consignments and arrange supplies from different regions of the country.

India Organic 2007 Seminar

This years seminar series has been aptly titled as **"Indian Organic Agribusiness...@ Threshold of Growth"** reflecting the nature of the organic movement in India poised for exponential growth. Though the movement is poised for growth, there are several issues that still need a lot of attention. Some of these areas have been picked as themes for Sessions; Policy, Standards and Certification, Organic for Mitigating Health Hazards, Marketing; Domestic and Exports, Value-Addition and Processing, Organic Agri-Horti-Aquaculture and lastly Organics MADPs. Based on the response for the call for papers and in addition inviting specific speakers for the event, we have ensured we have a balanced mix of national and international experiences to be shared among participants.

CHAPTER 1

Policy

Organic Agriculture Going Mainstream

A.K. Yadav, Director, National Centre of Organic Farming, Department of Agriculture and Cooperation Goverment of India, Ghaziabad, India

Organic agriculture has grown out of the conscious efforts by inspired people to create the best possible relationship between the earth and man. Since its beginning the sphere surrounding organic agriculture has become considerably more complex. A major challenge today is certainly its entry into the policy-making arena, its entry into anonymous global market and transformation of organic products into commodities. During the last two decades, there has also been a significant sensitization of global community towards environmental preservation, assuring of food quality. Ardent promoters of organic farming consider that it can meet both these demands and become the mean for complete development of rural areas. After almost a century of development organic agriculture is now being embraced by mainstream and shows a great promise commercially, socially and environmentally.

Organic Agriculture in India

Since January 1994 "Sevagram Declaration" for promotion of organic agriculture in India, organic farming has grown manifold. A number of initiatives at Government and Non-Government level have given it a firm direction. While National Programme on Organic Production (NPOP) defined its regulatory framework, National Project on Organic Farming (NPOF) has defined the promotional strategy and provided necessary support for area expansion under certified organic farming. Total area under certification process is increasing steadily. It has grown more than 10 fold from 42,000 ha during 2004-05 to more than 5.38 lakh ha in 2006-07. Status of area under certification process in some important states is given in Table 1.

Table 1. Total Area under organic certification process in some states in India (2006-07)

State	*Certified (C) Area (ha)*	*Under Conversion (IC)*	*Total*
Andhra Pradesh	5,561.17	4,925.9	10,487.1
Gujarat	7,102.31	658.51	7,760.8
Himachal Pradesh	69.03	9,507.7	9,576.7
J & K	32,541.79	0	32,541.8
Karnataka	8,735.06	2,976.78	11,711.8
Kerala	11,631.93	3,112.73	14,744.7
Maharashtra	41,390.48	72,238.44	11,3628.9
Madhya Pradesh	87,536.03	59,875.81	1,47,411.8
Orissa	66,625.42	7,959.69	74,585.1
Rajasthan	15,034.26	9,833.97	24,868.2
West Bengal	7,332.75	3,191.36	10,534.1

India Emerging as a Largest Organic Cotton Grower

As in organic management, multiple cropping systems have been given preference over mono-cropping, it is difficult to assess the area under certification for individual crops. Depending upon the market, climate and requirement of the region, different crop combinations are being managed with one or two major crops and others as inter or companion crops. Cotton is single largest crop under organic management with an output of 142,714 tonnes during 2006-07. Pulses, soybean (mainly as intercrops among cotton), rice, wheat, oilseeds and coarse cereals are other important crops. Cotton is being grown mainly in Madhya Pradesh, Maharashtra, Orissa and Andhra Pradesh. Spices are predominant in Kerala, while tea and coffee are important crops under organic management in West Bengal and Tamil Nadu. The production of different certified organic commodities during 2006-07 is given in Table 2. With a production of more than 1.42 lakh tonnes of organic cotton, India has probably achieved the status of largest organic cotton grower in the world. Majority of cotton so produced is processed in India and is being exported mainly as textile. All such textiles are sold/ exported under the brand "Made from certified organic cotton".

Table 2. Total production of different crops under certified organic management

Commodity	*Production (tonnes)*
Rice	44,132
Wheat	28,224
Other cereals and millets	31,820
Pulses	45,518
Soybean	43,077
Other oilseeds	25,308
Cotton	1,42,714
Spices (including chili, ginger and turmeric)	1,863
Tea / coffee	11,070
Fruits and vegetables	10,670
Sugarcane	3,613
Other crops / herbs, medicinal plants and guar gum	1,02,772

National Project on Organic Farming

Under NPOF Department of Agriculture and Cooperation, Government of India has initiated systematic promotion of organic farming in a project mode in specified areas. The project is being operated by National Centre of Organic Farming and its six Regional Centres. Capacity building through service providers, human resource development through training and demonstrations, financial support to organic input production industry, technology development, awareness creation and market development are some of the important strategies being implemented under the NPOF. More than 400 Government and Non-Governmental agencies are working under the project. More than 300 farmers' groups, each comprising 1,500 farmers have started functioning to bring about 200,000 ha land under organic certification process. Till September 2007, more than 2,11,000 farmers have been registered under the scheme and more than 85,000 ha cultivated land has been brought under certification process. With support to many organic production units, a capacity has been created to produce 5,000 tonnes of vegetable market waste compost, 3,000 tonnes of biofertilizers and 78,000 tonnes of earthworm culture. About 1,848 trainings organized under the project have benefitted more than 37,000 trainers, extension professionals and farmers. Besides, more than 4,100 demonstrations have been conducted and support has been provided for establishment of 232 model organic farms throughout the country.

Under FAO and Department of Agriculture and Cooperation's TCP project, organic package of practices for 20 important crops for Maharashtra, Tamil Nadu, Uttarakhand, West Bengal and North-Esatern states have been prepared. These packages are available in the form of 5 books and are also available in pdf documents in soft copies. These documents can be downloaded from www.fao.org. Under the same project, strategy has also been defined to introduce an alternative certification system, known as Participatory Guarantee System (PGS). Nation-wide infrastructure for its operationalization is under way.

Future Prospects

Although India has traditionally been a country of organic agriculture, growth of modern scientific, input-intensive agriculture has pushed it to wall. With increasing awareness about safety and quality of foods, long-term sustainability of system and only hope for rainfed-resource poor farmers, organic farming has emerged as an alternative system of farming which not only address the quality and sustainability concerns, but also ensure a debt free, profitable livelihood. Within a short span of five years, organic farming has grown from a controversial niche subject to a mainstream agriculture. It has grown at a rate of nearly 200% during last two years and is likely to grow by more than 100% in the next five years. Institutional mechanisms and Governmental support have ensured its sustained growth during Elevent/Five Year Plan. But to keep the hopes of these farmers, efforts are necessary to link them to market. For this, efforts and needed on the same scale, as has been initiated for increasing the area.

Organic Agriculture – An Efficient Pathway to Sustainability in the Context of Climate Change and Biodiversity Loss

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Key Words: Agro-environmental policy, high-value markets, sustainability

Abstract

Organic agriculture providing ecological benefits, is environmentally sound and an interesting way to mitigate climate change and to coping with unpredictable weather events and changes. The productivity of organic agriculture is high, especially under less favourable growing conditions and water shortage. Based on organic systems, food production can be further intensified (ecological intensification instead of industrialized intensification) by research addressing soil fertility, nitrogen production via legume-rich rotations, ecosystem goods and services and low input breeding strategies. Organic agriculture increases livelihoods in rural areas and makes producers less dependent from bulk commodities in food trade. It could become an important indicator for allocating resources in national and international programmes addressing sustainability.

By producing food, farmers can improve or degrade the environment they depend on. Organic agriculture is a system that uses less intensive practices. It is, therefore, expected to deliver far more ecological goods and services than conventional agriculture, even in its modified forms such as integrated farming or minimum tillage. Furthermore, organic agriculture efficiently reduces environmental risks by not using some potentially damaging technologies of intensive agriculture such as pesticides, herbicides, synthetic nitrogen fertilizers, GMO crops or veterinary antibiotics and anthelminthics. The ecological goods and services of organic agriculture are reviewed in El-Hage Scialabba and Hattam (2002), Shepherd *et al.* (2003) and Stolze *et al.* (2000).

In broad terms, organic agriculture can be described as increased diversification on both farm and regional scale. It is a system that leads farmers and rural communities to economic independence from expensive agricultural inputs through their use of participatory seed-breeding systems; natural biocontrol agents; soil fertility management through recycling, nitrogen fixation and green manure; and habitat management as a prevention strategy against pests, diseases and weeds.

Currently, only 31 million ha of world's reported agricultural land of 4'940 million ha (approximately 0.63%) are certified organic agriculture. Most of this land is located in Australia, Europe and America, but organic agriculture is currently growing fast in Asia and Latin America as well. About 64% of certified organic land is permanent grassland (pastures and meadows), 14% arable crops, 5% permanent crops (fruits, vine, olives, berries) and 5% various crops. From 12% of organic land area, no information is available.

Due to a fast growth of consumers demand, sales of organic foods hit 40 billion $ in 2006, with almost equally big markets in Europe (21 billion) and USA (18 billion).

Sustainability is the overarching aim of world-wide agro-policies on national, trans-national and global levels. Various concepts for agricultural production compete with each other for offering best solutions that are economically-viable, environmentally-sound, and socially-responsible, *e.g.* organic agriculture, integrated

production or targeted technologies which reduce negative impacts on environment like no tillage cropping with GMO crops resistant to broad-spectrum herbicides.

But till today, question of how sustainable these different approaches are, has remained controversial. Pimentel, *et al.* (1995) calculated a loss of nearly one-third of world's arable land to erosion during last 40 years with an ongoing loss of more than 10 million ha per year. Bellamy, *et al.* (2005) found massive losses of carbon in soils across England between 1978 and 2003. Their estimates ranged from 0.5 to 2 g soil carbon/ kg soil/ year with all but 8% of investigated cropland affected by erosion – a factor the authors identified as the main reason for losses in soil carbon and therefore in soil fertility. The World Conservation Union IUCN saw 70% of all red list bird species and 49% of plant species endangered by intensive agriculture (IUCN, 2000).

Ecological Performance and Environmental Impacts of Organic Agriculture

Environmental and ecological benefits are among the strengths of organic farming – and are the main reasons for consumers' preference for organic products. State support for organic farming in context of agri-environmental programmes in some countries is based on the evidence of environmental benefits, and the OECD does use the share of organically managed land as an indicator of 'environment friendliness' of a country (OECD, 2001).

On the basis of long-term on-station comparisons (plot experiments), field and farm comparisons (pair, small and large sample comparisons) and on the basis of landscape comparisons and large-scale modelling of quantitative and qualitative data from habitats of conventional and organic farms, we have quite a comprehensive understanding of ecological and environmental impacts of different farming systems:

Pollution

Nitrogen leaching rates in organic arable fields are reduced by 35-65% compared to conventional or integrated ones (Drinkwater *et al.*, 1998; Stolze *et al*, 2000). Residues of synthetic herbicides and pesticides in soils, surface and ground water do not occur as their use is completely banned. In a 28 year field experiment in Switzerland, active matter of sprayed pesticides in organic arable crop rotation is only 10% of that of identical integrated and conventional crop rotations (Mäder *et al.*, 2002). In the organic crop rotation, copper, plant extracts or bio-control agents were used, in the integrated and conventional crop rotations, herbicides and pesticides in compliance with IPM standards.

Decline in Soil Quality

Several European, USA, Australian and African studies show higher organic-matter content, higher biomass, higher enzyme activity, better aggregate stability, improved water infiltration and retention capacities and less water and wind erosion in organicall-managed soils compared with conventionally-managed ones (Edwards, 2007; Fliessbach *et al.*, 2007; Marriott and Wander, 2006; Pimentel *et al.*, 2005; Reganold *et al.*, 1987; Reganold *et al.*, 1993, Siegrist *et al.*, 1998). Most recent studies show that organic cropping with shallow ploughing is as good as no-till cropping in prevention of soil erosion and improvement of soil structure (Teasdale *et al.*, 2007; Müller *et al.*, 2007).

Decline of Biodiversity

Diversity is an inherent quality of organic agriculture. At farm level, it is practised in diversity of farm activities and in field as diversity in crop rotation. Organic farms cannot be operated in long run with strongly simplified crop rotations. This is a phenomenon of conventional farms or, of badly managed organic farms which usually cease to work organically after 4 or 5 years.

On field level, diversity is result of very specific organic fertilization, weed, disease and pest management techniques. Biodiversity is an important driving factor for stability of agro-ecosystems (Altieri, 1999). The establishment of an organic production system requires consideration of such aspects as landscape complexity, to ensure that sufficient semi-natural landscape elements are present, serving as sources of natural enemies that could be attracted by conservation of biocontrol methods (*e.g.* planting hedges, sowing weed strips, installing beetle banks) (Zehnder *et al.*, 2007). Soil quality management (*e.g.* amendment with compost), tillage practices (*e.g.* conservation tillage), host plant resistance, crop rotation, and intercropping are important additional measures, aiming at lowering the risk of pest and disease outbreaks.

It is therefore of crucial economic interest to organic farmers that they enhance diversity at all levels because organic weed, pest and disease management would fail without high diversity. Organic farming has moreover been shown to promote more species and abundance of organism groups than conventional farming (Hole *et al.*, 2005; Bengtsson *et al.*, 2005), especially a greater species diversity and density of insects, plants, soil macrofauna, and soil microfauna. Nonetheless, some taxa are not significantly affected (Fuller *et al.*, 2005; Gabriel and Tscharntke, 2007) and require special measures on organic farms as well. An overriding determinant of biodiversity may be habitat diversity, rather than management practices (Weibull *et al.*, 2003).

The potential of genetic diversity at crop level for stabilizing low input farming systems and for their adapting to environmental changes is theoretically understood but far from being practically used. Kotschi (2006) considered genetic diversity of plant crops as a fundamental resource for adaptation and therefore crucial for stability of food supply. As robustness or the resistance to environmental stress is a multi-genetic characteristic, *in-situ* conservation and on-farm breeding is likely to be more successful than genetic engineering. There are many very small initiatives of plant and animal breeders in the context of organic farms scattered all around the world. These initiatives urgently need political, scientific and economic support.

Water Shortage

In organic farming, water use is likely to be more efficient because of better rain infiltration and higher water retention rates (Siegrist *et al.*, 1998; Lotter *et al.*, 2003). In Rodale experiment in Pennsylvania, corn and soybean yields were highest in organic plots in dry years. In a broad acre experiment in province of Tigray in Ethiopia with 2,000 farmers, yields increased through composting and organic farming techniques, mainly thanks to better water conservation capacity (Edwards, 2007).

Fossil fuel Shortage

Basically, organic agriculture is only approach to food production that strives to be independent of fossil energy. Globally, 90 million tonnes of fossil nitrogen (IFA, 2007) or 90 million tonnes of fuel (1% of global consumption) could be spared by a conversion to organic agriculture. In addition, many organic farms replaced fuel for tractors by agro-diesels.

How well Does Organic Agriculture Cope with Climate Change Scenarios?

Organic farming does not offer a comprehensive strategy to adapt to or to mitigate climate change.
Positive factors regarding climate change are:

- Organic farming techniques such as shallow ploughing, recycling of livestock manure onto arable cropland, composting techniques, integration of green manure, catch and cover crops as well as diversified cropping sequences reduce soil erosion considerably and lead to increased formation of soil humus. Compared to stockless conventional systems, annual sequestration rates between 400 kg and almost one tonne of CO_2 ha have been measured (Fliessbach *et al.*, 2007; Pimentel *et al.*, 2005).

- Higher soil organic-matter content as well as higher diversity at landscape, farm, field, crop and species level might help organic farmers better to adapt to locally and globally more unpredictable weather conditions.
- The banning of nitrogen derived from fossil fuel and its replacement by leguminous and organic nitrogen recycled from manure reduces $C0_2$ emissions considerably.

Negative factors regarding climate change are:

- Difficult crops under high input conditions such as potato, rapeseed, some vegetables, wines etc. are not efficiently enough protected against epidemic diseases by organic prevention and control measures. These crops have a higher global warming potential (GWP) per yield than conventional ones.
- There are conflicting goals as between animal ethology (e.g. free range systems for ruminants) and reduction of methane emissions.
- Restricting artificial inputs, with intention of safeguarding the authenticity, the naturalness or high quality of foods (*e.g.* synthetic amino acids in animal feed, synthetic enzymes in processing) might not lead to very efficient energy utilization.

Organic farming is highly relevant when it comes to developing mechanisms for sustainable land use, better adaptiveness to climate change and low emission food systems. Improved technologies in organic agriculture, triggered by research activities, make organic agriculture a preferred option for agriculture to reduce the global warming potential of food production and to better adapt to climate change.

New challenges: Coping Successfully with Changes and Unpredictability

Adaptivness of agricultural systems become especially important to cope with climate change. The Intergovernmental Panel on Climate Change (IPCC, 2001) defines adaptation to climate change as "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities." This definition puts emphasis on importance of farmer knowledge for adaptation to climate change, especially as its impact is very site-specific (local) and all scenarios are very complex and unpredictable in many aspects. Therefore, Borron (2006) looked specifically into farm "community knowledge as a form of adaptive management."

Traditional skills and knowledge have been neglected in intensive agriculture although now they are being partly recaptured by integrated pest management. However, organic agriculture has always been based on practical farming skills, observations, personal experience and intuition. Knowledge replaces or reduces reliance on inputs. This knowledge is important for manipulating complex agro-ecosystem, for breeding of locally adjusted seeds and livestock, and for production of on-farm fertilizers (compost, manure, green manure) and inexpensive nature-derived pesticides. Tengo and Belfrages (2004) described such knowledge as a "reservoir of adaptations".

Agricultural production systems that emphasize resilience, resistance and site-specific adaptation to changing soil and water conditions, such as organic systems, are potentially well positioned to maintain production in the face of climate change.

Ewel (1986) describes soil organic matter as "warehouse of most of the nitrogen, phosphorus, and sulphur potentially available to plants, is the main energy source for microorganisms and is a key determinant of soil structure". This underlines the importance of findings concerning organic agriculture and soil fertility described in subheading 2.

Organic agriculture that preserve soil fertility and maintain or even build up organic matter in soils are definitely well-positioned to maintain productivity in drought, irregular rainfall events with floods, and rising

temperature. Soils under organic management retain significantly more rainwater thanks to "sponge properties" of organic matter. This was described for heavy loess soils in a temperate climate in Switzerland (Mäder *et al.*, 2002) where water infiltration capacity was 20-40% higher in organically managed soils than in conventional ones. Pimentel *et al.* (2005) estimated the amount of water held in organic plots of Rodale experiment in upper 15 cm of soil at 816, 000 litres/ha. This water reservoir was likely the reason for higher yields of corn and soybean in dry years. Lotter, *et al.* (2003) found that water capture in organic plots was approximately 100% higher than in conventional plots during torrential rains. This reduced the risk of floods significantly, an effect that could be very important if organic agriculture were practised on much bigger areas.

An additional strength of organic agriculture systems is their diversity at all levels including crop, fields, whole rotations, polycultures, farm activities (greater mix of different branches), and landscape on farms. The high diversity of organic farms provides many ecological services that enhance farm resilience tremendously. Positive effects on pest prevention have been proven by Zehnder *et al.*, (2007), Wyss *et al.*, (2005) and Pfiffner *et al.*, (2003). Similar effects of diversified agro-ecosystems on diseases and better utilization of soil nutrients and water (Altieri and Nicholls, 2006) are likely to occur. Good quantitative data are not found because such experiments are very difficult. However, it can be concluded that organic systems are very adaptive to climate change.

The Problem with 'Low' Productivity

Critics of organic agriculture emphasis low productivity of organic farming, arguing against the positive impacts of this method regarding sustainable use of natural resources. The American agronomist, Norman Borlaug, awarded the Nobel Peace Prize for his contribution to Green Revolution, especially for his research at the International Maize and Wheat Improvement Center, Mexico, expected the land used to produce the same amount of food to increase by 1.1 billion ha (plus 75%) when based on organic agriculture (The Economist, 2006).

Such claims are not substantiated by scientific evidence and ignore important facts.

- Organic agriculture is a very productive form of agriculture, methodically pursuing agro-ecological intensification strategies to increase and safeguard yields. Except where compared to very intensive cash crops in favourable site and climate conditions, organic agriculture enhances food productivity considerably and is not expected to decrease world food production (Badgley *et al.*, 2007; Pretty *et al.*, 2003, Halberg *et al.*, 2006).
- The **Green Revolution** was accompanied by tremendous negative impact on natural resources that form the basis of future productivity (soil erosion, losses of biodiversity, of ground and surface water quality). This decline has not yet been stopped in modern industrialized agriculture.
- Organic agriculture has tremendous potential for further ecological intensification, beyond current standard-setting and certification procedures. This potential will be targeted in this research vision.

Research Challenges

The intensification of agriculture in the second half of the last century was accompanied by negative impacts on soils, the ecological quality of natural and semi-natural habitats, quality of ground and surface waters and diversity of natural and agricultural organisms.

Successful future strategies have to cope with multi-functionality, and will have to find trade-offs between different services agriculture is expected to deliver and legal or voluntary quality requirements with respect to environment, ecology and animal welfare. In this regard, organic agriculture already represents an optimised convergence to theoretical 'best practice'. The weakness of organic agriculture so far is its productivity and

the stability of yields. Therefore, organic agriculture is an excellent starting point for further research and development on agricultural productivity and therefore an efficient approach to an ecologically and environmentally sound intensification of farming systems.

Ecological intensification is possible via a better and more efficient exploitation of natural resources, improved recycling techniques and intensive use of ecological goods and services. It highly depends on knowledge of stakeholders and relies on powerful information and decision tools. Ecological intensification is characterised by cooperation and synergies and not so much by competition and elimination. Ecological intensification is expected to find very efficient, completely new and powerful ways in order to secure food production.

Ecological intensification, e.g. strongly address huge nitrogen pools so far not or inefficiently exploited for food production. Conventional intensification is partly triggered by nitrogen from fossil fuel. Currently, 90.86 million tonnes of nitrogen is used worldwide, produced with 90 million tonnes of fuel or gas (IFA, 2007). A much bigger potential of nitrogen production, namely consequent integration of leguminous plants into all arable crop rotations, is only partly used by conventional farms. Models of scientists from Michigan University showed that by only using non-productive gaps in arable crop rotation with leguminous plants, 140 million tonnes of nitrogen could be produced in addition to what is available today (Badgley *et al.*, 2007). Such an approach to meet nitrogen demand of agriculture would require a complete redesign of crop rotation with complex successions of cash, cover and catch crops (Thorup-Kristensen *et al.*, 2003), would revolutionize soil tillage techniques and machinery and would bring new cash crops and feed stuff on market and into livestock diets. The supply of agriculture with leguminous derived nitrogen would improve all ecological aspects of cropping systems in a considerable way (Crews and Peoples, 2004).

Other approaches to ecological intensification comprise the exploitation of ecosystem services via clever habitat designs (Altieri *et al.*, 2005), use of novel smart breeding technologies (QTL, SNP *etc.*), the combined use of sensor, GPS and information technologies and decentralised animal and livestock breeding strategies with high adaptivness and flexibility of varieties and breeds to environmental and climatic changes.

Conclusions

Organic production systems can make important contribution to food supply stability and farmer livelihoods by establishing soil fertility, providing diversity and, therefore, resilience to food production systems in light of many uncertainties of climate change. They contribute positively to food stability in terms of fertile and well-structured soils, improved water retention, protection of biodiversity with beneficial side-effects on phyto-medical stability and nutrients, and water-use efficiency.

Agricultural production methods specifically adapted to microclimates, production of diverse products, and cropping methods emphasizing soil carbon retention are most likely to withstand climatic challenges and contribute to food stability, particularly in those countries most vulnerable to increased climate change.

Organic agriculture is emphatic about making use of farmer and farmer-community knowledge, particularly about farm organization, crop design, manipulation of natural and semi-natural habitats on farm, use or even selection of locally appropriate seeds and breeds, on-farm preparation of natural plant strengtheners and traditional drugs and curing techniques for livestock, innovative and low-budget technology. It is unique in modern agriculture that a food production system is so strongly based on adaptive management.

The deficits of organic agriculture that are mainly related to lower productivity and yield losses have been recognized. However, deficits should not be exaggerated. The massively lower yields, more than 20-30% compared to conventional agriculture, occur only in cash-crop-focused production systems and under most favourable climate and soil conditions. Such deficits highlight needs in current international and national research activities. European countries, leaders in organic agricultural research, spend approximately •50 million per year on specific problems of organic food and farming (Lange *et al.*, 2006), supplemented with

roughly •4 million per annum by the European Commission. This represents less than 1% of total food and agriculture research. Organic agricultural could be model for ecological intensification and become a very interesting vision for further research programmes and should therefore be given priority in national research programs:

- Highly improved management of soil organic matter, warehouse of nitrogen, phosphorus, and sulphur, main energy source for microorganisms and key determinant of soil structure and soil moisture.
- 100% on-farm production of nitrogen through new farm and crop sequence designs and through highly improved soil tillage techniques.
- Redesigned mixed farms for closed nutrient and organic matter cycles and environmentally–sound production systems (multicropping, agroforestry concepts *etc.*).
- Ecological habitat management as a key to more resilient and locally adapted farming systems (improved landscape, farm and field designs, crop rotations, buffer zones and diversified habitats in and around crops, attraction of naturally occurring pest predators and parasitoids by semi-chemicals and pheromones and other highly specific signals like methyl salicylate in dispensers or by planting companion pants producing such messenger compounds, as well as natural mechanisms and elicitors inducing resistance in plants *etc.*)
- Energy autarchy on sustainable farms.
- Improved combination of soil conservation techniques like organic farming and no or minimum tillage.
- New on-farm breeding concepts for crops enhancing genotype-environment-management interactions and using smart breeding techniques like markers and genome wide selection.
- New on-farm breeding concepts for livestock enhancing genotype-environment-management interactions and using smart breeding techniques like markers and genome wide selection.
- Novel technologies in the context of sustainable farm designs (robot, sensors, GPS, information and nano technologies).

Organic agriculture is a very interesting trade-off between ecology, economy and social responsibility. It generates additional livelihoods in rural areas and relies on active stakeholders. It presents an efficient pathway to sustainability in food production. It could be used as an indicator for allocating national or international development resources to climate change adaptation (e.g. Adaptation Fund) or to measure progress in implementing climate or biodiversity-related multilateral environment agreements (such as already done in 2010 targets of the Convention on Biological Diversity).

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Stockholm Convention on Persistent Organic Pollutants (Pops): Bridging Gap Between Ratification and Conversion to Organic Farming*

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Abstract

In India, organic farming is not just a business 'niche', but a way of life evolved over thousands of years. It is home to some of the most ancient and innovative techniques for non-chemical pest management. However, over-emphasis on **Green Revolution** paradigm, originating from-large manufacturers and supported by the government, have resulted in a rapid decline in the use of non-chemical alternatives. In 1980s, integrated pest management (IPM) strategy was introduced to reduce chemical-use without compromising yield. However, if evolutionary (organic) and revolutionary (chemical) farming have diametrically opposing effects on agro-ecosystem, could they be truly combined to achieve a golden mean as proposed by the IPM philosophy? More recently, 'evergreen' revolution and hi-tech agriculture are projected to be the only solution to feed India's growing population. On the other side of the spectrum, organic farming has systematically proven to be a more sustainable option. Regardless of whether organic farming is looked at as a niche, or as a mainstream option, transition to organic is a challenging task, and would be possible only if a sincere effort is made from national policy to the grassroot level. India has conjured up comprehensive 'Organic Standards' with a separate 'India Organic' logo in an attempt to create a forward-linkage (ie. marketing of organic produce). However, it has left a huge gap in backward-linkage, that is, research, education, and extension in organic farming. Ratification of the Stockholm Convention on persistent organic pollutants (POPs) is merely a small step towards reducing chemical-use in agriculture, and a holistic conversion to organic would need a much larger effort that strengthens the entire backward linkage. Reasons for continued resistance to and hurdles faced for adoption of non-chemical alternatives that form a part of conversion process are explored by analyzing policy, research, education, governance, and resource management.

Adopting eco-friendly alternatives in all processes including agriculture is a need felt by most of developed nations. Carbon credits, the Montreal and Kyoto Protocols, use of non-CFC or such indices are some examples. Many nations have accepted such initiatives due to compliance required by market in developed world, which are spelt in principle and reflected in policy statements. In agriculture and industries, the Stockholm Convention is one such index for reducing and eliminating the use of persistent organic pollutants (POPs).

By signing the Stockholm Convention on POPs in May 2002 and ratifying it in January 2006, India has accepted the principles of using non-toxic and non-persistent chemicals in agriculture and industry. Global ban on the dirty dozen POPs, which include eight agricultural pesticides (aldrin, chlordane, dieldrin, endrin,

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heptachlor, mirex, toxaphene, benzene hexachloride BHC, DDT, dioxins, furans, and polychlorinated biphenyls (PCBs), is merely the first step to reduce the use of POPs. However, additional POP candidates including Endosulfan, Monocrotophos, Lindane, etc. have already been brought under the scanner by various organizations. A recent survey indicated that benzene hexachloride (BHC) is only POP used in sizeable quantity among farmers surveyed in Maharashtra (Madhyam, 2007), while DDT is still widely used for malaria vector control. Although use of currently banned POPs in Indian agriculture is only restricted to BHC, three candidate POPs mentioned above are widely used, wherein a total of 12,321 tonnes of technical grade Endosulfan, 4,295 tonnes of Monocrotophos were produced in 2002 (Statistical Abstract of India, 2002), and 484 tonnes of Lindane were produced in 2000-01 (Vijgen, 2006). India continues to be among the top five producers and consumers of these pesticides despite several reports on their deadly effect on human and environmental health (NIOH, 2007).

Philosophy and practice of organic farming includes non-chemical pest management. Thus, most logical culmination of the Stockholm Convention is converting to organic farming practices. The government's recent rhetoric about the importance of organic farming in Indian agriculture is neither backed by substantial monetary allocation, nor has it reduced emphasis and spending on Green Revolution inputs. In Tenth Plan a paltry sum of Rs 157 crore (merely 0.9% of Rs 16,250 crore spent on fertilizer subsidy alone) was explicitly allocated for organic farming (Ministry of Information and Broadcasting, 2007). Pesticides are often given the credit for increasing crop yields during Green Revolution. However, use of pesticides has stagnated between 80s and mid-90's and even reduced significantly in the past decade. Thus, the Stockholm Convention on POPs, which may further reduce the use of toxic pesticides, should be looked at as a spring- board rather than an obstacle in economic progress of the country. India would be able to bridge the gap between ratification of the Stockholm Convention and de-toxification of agriculture only if the government leaves behind the hangover of Green Revolution and makes a quantum shift towards organic farming.

Discussion

Recently, Indian politicians and bureaucrats have been voicing increased skepticism about the economic viability of agriculture, to the extent that rural youth are being told to quit traditional farming and get industrial jobs or get into more profitable agro-enterprises such as 'cutflower' and 'ornamental' plant production or large-scale horticulture. Looking at the recent economic boom in the country, politicos have even suggested that growing food is not the farmers' job, it is the government's responsibility for which it may import food when necessary.

This is justified that thousands of jobs have been created in urban areas due to rapid industrialization. The rural population has decreased from 82.5% in 1971 to 77.1% in 2001 (Statistical Outline of India, 2006-07), and possibly to 70% by 2006. The contribution of agriculture to net domestic product has reduced from 49% in 1960-61 to 22.6% in 2005-06, while agricultural growth rate in registered a mere 2.6% as compared to 9.2% in industrial and service sector during 2006-07. Hence, agriculture has become a non-issue as far as the national economy is concerned. The rural working population has increased from 149 million in 1971 to 310 million in 2001 (Statistical Outline of India, 2006-07). Therefore, budget allocation for agriculture sector should increase in relative terms.

During last 45 years, agro-chemicals (fertilizers and pesticides) have suddenly become an 'integral part' of Indian agriculture. This was largely a result of industrial revolution which led to large-scale manufacture of agro-chemicals, for which buyers were needed. This is where farmers came into the picture. This need was fulfilled by educating the under-developed and developing nations in that direction, influencing their policies to favour a larger consumption of agro-chemicals. For most developing countries, use of Ggreen Revolution inputs was not affordable, so a large amount of subsidies were offered. Without subsidies, Green Revolution agriculture in no part of the world (even developed countries) fits the current definition of 'profitability'.

It is true that Green Revolution led to a tremendous increases in crop yield and gross value added by agriculture (Fig. 1). However, returns to investment on inputs (excluding land cost and labour) actually decreased from Rs. 7.50 in 1971-72 to Rs 5.00 in 2004-05 for every rupee spent (Statistical Outline of India, Tata Press). This suggests that Green Revolution solved the problem of food scarcity at the cost of farmer's profitability. Farmers borne 'external-cost' burden that accrued due to negative marginal returns to investment. The objective of national food security was achieved by pauperizing farm labour resources. This happened as foodgrain prices fell due to increase in production and the policy of keeping food-grain prices depressed.

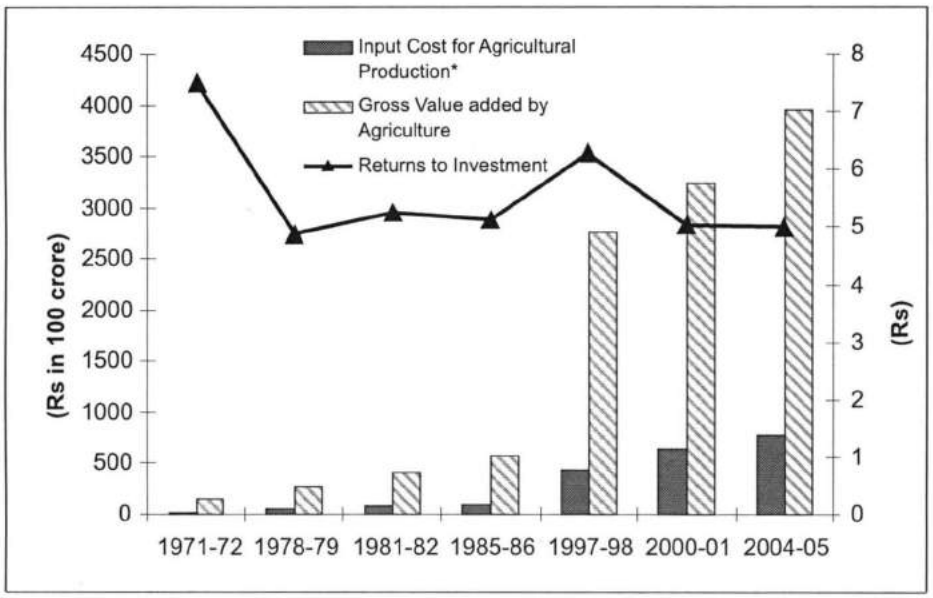

Fig. 1 Trends in input cost, gross value added, and returns to investment of agricultural production during the Green Rvolution era (1971-72 to 2004-05).

Source: Outline of India (Tata Press).

Note: Input costs include seeds, organic manures, chemical fertilizers, pesticides, repairs of fixed assets, irrigation charges, electricity, market charges, and diesel oil. Input costs do not include cost of land and labour.

The fertilizer subsidy initiated in 60s increased to Rs 4,400 crore in 1990-91 and again which reached a whopping Rs 16,250 crore in 2005-06 (Dutt and Sundharam, 2007) despite large-scale salinization of fertile lands and poor or even negative input-output ratio in Punjab, Haryana and other states. Despite all this, policy-makers have continued to increase subsidies inputs, arguing that India's productivity for paddy, maize, groundnut, etc. is well below the world average because consumption of fertilizer in India is a mere 96.6 kg/ha as compared to South Korea (400 kg/ha), Japan (340 kg/ha), Netherlands (275 kg/ha) (Dutt and Sundharam, 2007), and that of pesticides 570 g/ha as compared to 2,500 g/ha in USA and 3,000 g/ha in Europe (Krishna *et al.*, 2003; Singhal, 2000). The experience over the past 45 years indicates a natural trend towards stagnation and even reduction in pesticide use (Kolanu and Kumar, 2003), which suggests that by and large, dryland farmers (60% of total net area sown) do not use pesticides. The productivity of so-called irrigated and

input-intensive crops cotton (321 kg/ha) and paddy (2929 kg/ha), account for 48 and 28% of national pesticide consumption respectively, is well below the world average (584 kg/ha and 3845 kg/ha respectively) and less than half that of China.

The prudence of low-input efficient agriculture over high-input inefficient agriculture is evident as of Vidarbha farmers. The unreasonable increase in use of agro-chemical inputs in Vidarbha (a region formerly known for its cash crops and rich farming economy) resulted in farmer suicides, while in Konkan, where farming is still done at a low-input or subsistence level, no suicides occurred. We must hasten to add that we are not therefore supporting low-input subsistence farming, but 'efficient' farming based on optimal use of limited local resources.

Even if relative subsidy for N, P, and K fertilizers is more balanced in future, and the problem of spurious and sub-standard pesticide trade is curbed, can we realistically expect to double the national average yields even for our most well-irrigated and input-intensive crops simply by further increasing the quantities of agrochemicals used? This leads us to another question: do we really need to double agricultural productivity?

At present, foodgrain stocks available with the Food Corporation of India (FCI) stand at an all time high of 62 million tonnes, whereas annual requirement for ensuring food security is only around 20 million tonnes. Despite surplus, an estimated 200 million people are underfed and 50 million on the brink of starvation, resulting in starvation deaths (Goyal, 2002). Even though it has become obvious that food scarcity has more to do with food inaccessibility rather than low productivity, our national policies are still leaning strongly towards further increasing productivity, ignoring the fact that one-third of stored surplus foodgrains rot in our godowns each year. Despite this state of affairs, some eminent scientists believe that a 'gene' revolution or 'evergreen' revolution is the only answer to meet the food demands of 1.343 billion citizens in 2020. However, an analysis by Developed Nation suggests that even if agricultural production grows at the same rate as it did during the 90s, production will outweigh the demand by 2020 for rice, wheat, coarse cereals, pulses and milk.

India has about 140 million ha of net area sown out of which, only 0.076 million ha area is certified organic (Bhattacharyya and Chakraborty, 2005), and maybe another million hectares of agricultural land are organic by default. Leaving aside the land that is organic by default for a moment (since this number is not expected to change significantly), merely 76,000 ha (0.05% of the net area sown) has actually been 'converted' to organic in the past 10 years or so. If one considers the best case scenario where area under organic management increases at the rate of 25% per annum up to 2020, it will amount to a mere 1.38 million ha or 1% of the net area sown. If the land which is organic by default, is added, the total becomes 2.38 million ha (about 1.7% of the net area sown). Thus, skeptics of organic farming who are concerned that India's food security may be threatened if organic movement gains momentum need not be alarmed. This projection also shows the kind of gigantic effort that will be needed if we were to bring a significant area (5% of net area sown) under organic management which can go a long way towards fulfilling our obligation towards the Stockholm Convention on POPs and reduce agro-chemical pollution. But, has anything changed in the past 20 months ever since India ratified the Stockholm Convention?

Hurdles

- Rather than leaving behind the decisions taken by past governments that favoured the Green Revolution and moving forward towards a cleaner, more efficient, and more profitable way of farming, the government is still not changing its defensive stance and has a neutral or even skeptical attitude towards organic farming. It has not realized that the Green Revolution is over and efficient farming is the way for future, and has not made the necessary changes in fiscal policy, research, education, or extension.

- For the past 15 years, the government has promoted IPM as a 'golden mean' between chemical and organic farming, and has attributed declining trends of pesticide consumption to successful implementation of IPM programme. But IPM is even more complicated than purely biological control since it requires thorough knowledge of both biological and chemical pest management, and entails combined or alternating use of chemical and biological inputs where margin for error is very small. Studies by FAO have reported that unreliable quality of some bio-brands (which reduces overall credibility of the concept as a whole), short shelf-life and specialized transportation needs, inadequate availability of biological control agents, and effectiveness only under favourable agro-microclimatic conditions are some of the major hurdles in propagation of biological control in India (Kolanu and Kumar, 2003). If those practising purely biological control are facing such hurdles, then those implementing IPM must also be facing the same hurdles, which, to a large extent, have not been overcome. So, is the IPM programme being implemented in the way it should be? And could the declining use of pesticides in the recent years be due to their naturally proven ineffectiveness and economic non-viability rather than due to successful implementation of IPM programme as claimed by some experts?
- The government is merely promoting organic farming 'in principle' but has not provided adequate funds for enterprises that raise biological control agents (that cannot be produced on farm), facilities for their storage and distribution, training of extension agents for understanding this new and complex technique, enabling on-farm production of inputs such as manures and botanical pesticides by training farmers, improving the means available to extension agents to effectively transfer the knowledge to farmers, etc.
- Research has become too specialized and lacks a multidisciplinary approach that takes a holistic view of complex interrelated processes involved in farming.
- In the Green Revolution era, farmers have become accustomed to buy ready-made solutions for their farming needs and have lost the ability to understand the farm ecosystem and make efficient use of their time, money and natural resources the way their fathers or forefathers did. This idle and over-simplified approach towards farming is magnified in resource-rich areas where cost and therefore input reduction is not a compelling factor.
- Consumers have become totally disconnected from the process of food production, and are not concerned with the way in which their food is grown. Most of them are not even aware about issues such as pesticide residues in agricultural commodities and their toxic effects on human health and the environment.
- The recent trend of corporate or contract farming is yet another hurdle for changing towards sustainable agriculture. Corporate farming encourages larger farms that can produce greater quantities of agricultural commodities at the lowest possible cost, year after year. Thus, hand-weeding will be substituted by herbicides, local or even hybrid seeds will be replaced by herbicide tolerant GMOs, bullocks will be replaced by tractors, and cow manure will be replaced by fertilizers. This will further pauperize small and marginal farmers and increase the rate of farmer-suicide in future. This prediction can be proved wrong by shifting to a proactive, budget-supported organic farming mode.
- Information on alternatives to chemical pest management is scattered, and some of these alternatives are instinctive adaptations while some involve the use of local materials or substances that are available only during a specific season. These alternatives could be effective and useful in areas that are in the immediate vicinity, but they may not be appropriate for general application throughout the state or country.

Recommendations

For bridging the huge gap between ratification of the Stockholm Convention on POPs and its implementation in the form of organic or sustainable agriculture, following actions are recommended:

- Effective non-toxic alternatives for candidate POPs such as Endosulfan, Monocrotophos, and Lindane should be developed on a priority basis.
- Government should officially accept and implement the policy of organic farming. Fertilizer subsidy should be phased out in the next 10 years, and the available funds should be used for promoting animal husbandry on all agricultural farms, ensuring fodder-security, and making alternative fuel sources available for cooking so that 33% of the dung currently wasted as fuel can be used as organic manure.
- Part of subsidy could also be given to bio-industries which manufacture products that cannot be made on the farm. However, on-farm production of organic inputs should be genuinely promoted and backed by a larger share of subsidy.
- Research should be re-oriented towards agriculture as a heterogenous system of various inter-dependant components rather than focusing or overspecializing on individual elements. Research should be focused towards making farming economically-viable as an 'enterprise', rather than merely increasing the yield of particular crops.
- If true potential of IPM is to be realized, the entire chain of biological control from production, quality control, distribution, sale, and extension needs to be substantially improved. Otherwise, use of true IPM might remain restricted to specific situations where its use is well-defined, targeted, and implemented as a collective effort. [For example, recent initiatives by a few leading researchers to control the African snail infestations using poison baits by guiding the farmers and encouraging them to take a combined and synchronized effort is a good example of how well-planned and well-anticipated actions can control an otherwise devastating pest with minimal adverse impact on the environment. Such initiatives rather than being 'sporadic' goodwill efforts by a handful of innovative researchers should be rewarded and promoted by the government].
- Farmer-evolved alternatives to chemical pesticides need to be documented using trained personnel. In addition, farmers themselves should be trained to document the recipes andmethods they have adopted. As there is large variation in different farm-ecosystems, one needs to analyze them as such, specifying pre-requisite conditions for assured positive results. The verified methods need be standardized and should be checked for quality.
- When a larger number of farmers start using botanical extracts, natural populations of such plants will be reduced. Hence, strategies for re-planting such plant species in anticipation of above mentioned problem should be formulated.
- Subsidy should be given for sustaining the farming enterprise during 3-year conversion period, and organic certification should also be subsidized. Additionally, just like carbon credits, organic farmers should be given 'pesticide credits' in the future.
- Extension staff needs to be better trained, adequately equipped and well-paid, since this seems to be the weakest link in the transfer of knowledge from lab to land.
- Consumers should be educated and made aware of the hazards of pesticides in food. The choices they make while buying food will influence the way in which food is grown.
- Besides, farming should be made sustainable by declaring groundwater as a public rather than private asset, socially-equitable access to all sources of water must be ensured along with increasing the irrigation efficiency, and soil fertility must be re-built by increasing organic manure input and crop rotations, these being among the most essential elements of sustainable farming.

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Need for Policy and Strategy for Organic Milk and Dairy Products in India

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Key words: Dairy development, food chain, technopak, organic milk, policy, quality assurance systems

Dairy development has been spectacular, in India during the past four decades so much so that milk is now the number one agricultural commodity, contributing to our GDP. The advances made in Indian agriculture simultaneously have made us a force to reckon with in the international food production scenario. However, high-input agriculture practised in the Green Revolution and Operation Flood have also left some undesirable environmental side-effects such as soil degradation and water contamination, leading to harmful chemicals/ biologicals in our food chain, including milk.

Year 1999 was a monumental year in global dairy development scenario. During the year, India overtook USA as the largest milk-producing nation in the world. The stage for this was set by Dr V. Kurien way back in 1950s and 60s when he started and successfully ran the Kaira District Milk Producers' Union at Anand in Gujarat. The National Dairy Development Board (NDDB) was set up in India in 1965 with the aim of replicating the success story at Anand in other parts of India. The rest, as they say, is history!

The milk production in India was 100 million tonnes in 2006-07, the total global production was 644 million tonnes in 2006. The milk production in India is in the hands of millions of small and marginal farmers, while contribution of organized dairy farms is negligible. The milk production pattern is summarized below:

2007	
▪ Total milk production:	100 million tonnes
▪ Total no. of dairy farmers:	70 million
▪ Average supply to DCS:	2.0 lpd/farmer-member in Karnataka
2003	
▪ Total number of cows:	185 million
▪ Total number of buffaloes:	98 million
▪ Average milk production:	6.5 lpd/crossbred cow
▪ Average milk production:	1.9 lpd/indigenous cow
▪ Average milk production:	4.5 lpd/buffalo

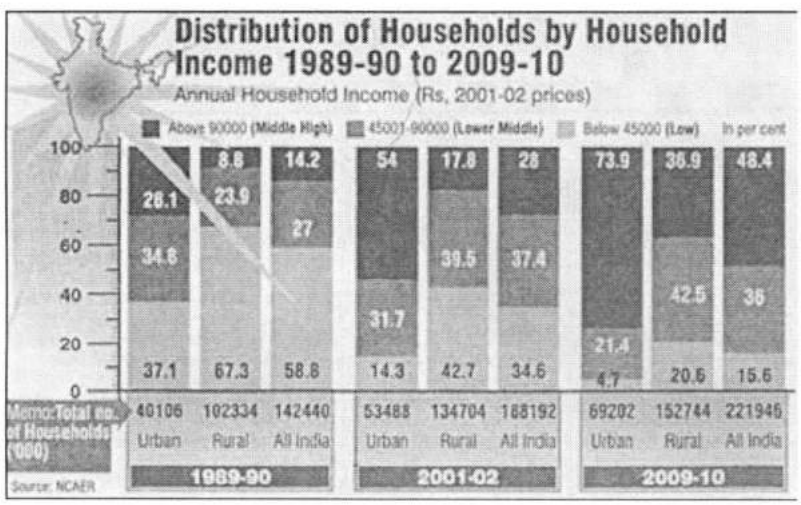
It becomes apparent that milk production in India is distributed over millions of small and marginal farmers and landless rural labourers. This results in major challenges in ensuring supply of quality inputs, quality control of milk and obtaining feedbacks for milk processors. Surprisingly, sensible systems have been put in place for these activities. Cost; benefit analysis of more rigourous quality assurance systems, including TQM are being constantly assessed and improvements done depending upon the end use for which the collected milk is to be utilized.

In such a situation, getting the vital documentation done and inspections arranged for organic milk production in place is a major challenge. Strategies tailor-made for this kind of environment have to be

devised. Policy support at the governmental level could also play an important role since cost of agricultural extension and certification of organic milk at the initial phase could be prohibitive. The costs would come down once there is a significant improvements in volumes.

Milk production in India has been growing at a CAGR of 4.0% during last 20 years. The market for liquid milk, however, has been growing at 2%, making more milk available for dairy product manufactures and to export of dairy products. The income levels, especially in the urban areas is steadily rising, creating more and more demand for milk and milk products.

In metros and other large cities, the rise in income levels is even more spectacular. The double income no kid (DINK) and double income single kid (DISK) families are becoming more the norm than exception. The concept of wellness and health foods has made quite a dent in the psyche of urban well-to-do families. The perils of some of "modern methods" of food production have been quite well understood and people are ready to accept naturally-produced foods, especially staples like milk, cereals, pulses and vegetables. While some headway has been made with regard to organic fruits and vegetables, no effort worth has been made in organic milk and dairy products in India. Organic milk can be a great marketing success if handled carefully under these circumstances. Let us look at some demographics to substantiate this claim.



Source: **Indian Market Demographics Report 2002** (to which the reader is referred for definitions and details of sample design)

Further, KSA Technopak, a major firm of consultants focusing on retail sector made some startling discoveries. Some of their findings which they did for estimating the market for luxury branded goods in India have relevance to demand estimates for premier food items like organic milk and dairy products. Let us take a look at some of the figures worked out by them.

India's Urban Population

About 10% rich consumers (28 million) which represent the top of the pyramid. Further classification of this category is 1 million luxury consumers, 6-7 million very affluent consumers, 9-10 million mid affluent consumers and 11-12 million mass affluent consumers.

About 40% (112 million) middle class consumers, which includes a 40 million upper middle class consumers and 72 million upgraders.

About 50% (140 million) consumers comprise the bottom of pyramid.

Compare this to similar studies conducted ten years back by NCAER, a reputed market and economic research organization, is given below:

India's Consuming Class - 1996

Table Estimated households by annual income		*TableI II Structure of the Indian consumer market (1995-96)*				
Annual income (Rs) at 1994-95 prices	*No. of households (million)*	*Annual income (Rs) at 1994-95 prices*	*Classification*	*Number of households (million)*		
				Urban	*Rural*	*Total*
<25,000	80.7	<16,000	Destitutes	5.3	27.7	33.0
25,001-50,000	50.4	16,001-22,000	Aspirants	7.1	36.9	44.0
50,001-77,000	19.7	22,001-45,000	Climbers	16.8	37.3	54.1
77,001-106,000	8.2	45,001-215,000	Consumers	16.6	15.9	32.5
>106,000	5.8	>215,000	The rich	0.8	0.4.	1.2
Total number of households: 164.9 million		Total number of households		46.6	118.2	164.8

Source: National Council of Applied Economic Research (NCAER). The above presentation has been slightly modified by IndiaOneStop.Com

A comparison of these two sets of data clearly demonstrates growing affluence in the country, especially in urban areas. This affluence is associated with consumption of high value FMCG including food items. Add to this the fact that the concept of wellness through consumption of health foods is gaining ground in urban India and you have the perfect recipe for marketing success of organic milk and dairy products.

Conclusion

In spite of these advantages, positioning of organic milk would also be quite crucial. Milk is the ideally balanced natural food especially for toddlers. The presence of any residual chemical pesticides, hormones and antibiotics in milk consumed by infants is quite undesirable, even if they are within legal limits. Thus, there is a strong case for initiating steps for production of organic milk as an ethical issue as a commercially-viable agri-business option.

Once organic milk production takes roots in the country, there could be excellent opportunities for export. India has quite a good track record as exporter of dairy products since the 1990's and this could be extrapolated to organic milk. With India's pre-eminent position in dairy sector of Asia, there could be good opportunities for export to Asia and middle-east.

The foregoing facts make a strong case for working out a strategy tailor-made for the prevailing conditions in India. The Government of India and apex bodies like ICCOA should work out a strategy paper which also includes proposals for policy initiatives that would be required to implement the strategy. The cooperative dairy sector which has operations reaching deep into the rural hinterland of India needs to be actively involved in the process.

System Comparisons between Organic, Biodynamic, Conventional and GMO's in Cotton Production and Organic, Biodynamic, Conventional Systems in Soya and Wheat in Central India

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Abstract

Over the past 5 years, the organic cotton production in India has grown many folds. In the conventional cotton arena the genetically modified cotton is growing at an unprecedented rate. Considering the above factors it was considered necessary to carry out a 'System' comparison in which the four systems can be compared. Further the research hopes to answer the larger questions

- Put the discussion regarding the benefits and drawbacks of organic agriculture on a rational footing;
- Help to identify challenges for organic agriculture that can then be addressed systematically;
- Provide physical reference points for stakeholders in agricultural research and development and thus support decision-making and agricultural policy dialogue at different levels.

At the farmers level the following outcomes are expected:

- What happens to yields of the crops when you stop using fertilizers and pesticides ?
- What happens to the pests when you don't use fertilizers and pesticides?
- How do the crops grow when only FYM or compost is used?
- Can we effectively control pests in the organic and biodynamic systems using a range of botanical sprays ?
- Are the biodynamic preparations like BD 500, 501 and Cow Pat Pit (CPP) effective?
- What are the costs of cultivation of the different systems that we are comparing?
- What are impacts on the quality of the produce in the different systems ?
- What are impacts on the soils of the different systems?

Introduction

BioRe works in the Central Indian State of 'Madhya Pradesh' the farmers associated are located in the Nimar valley (200-300 mts above sea level) which spreads along the Narmada river, bordered by the Vindhyas in the North and the Satpura Range to the south. The valley is part of the central Indian cotton belt.

Farming systems in the region are cotton based, cotton is grown in rotation with cereals (wheat, maize, and sorghum), pulses (soybean, pigeon pea, chickpea, moong bean and other food crops such as chilli, onions.)

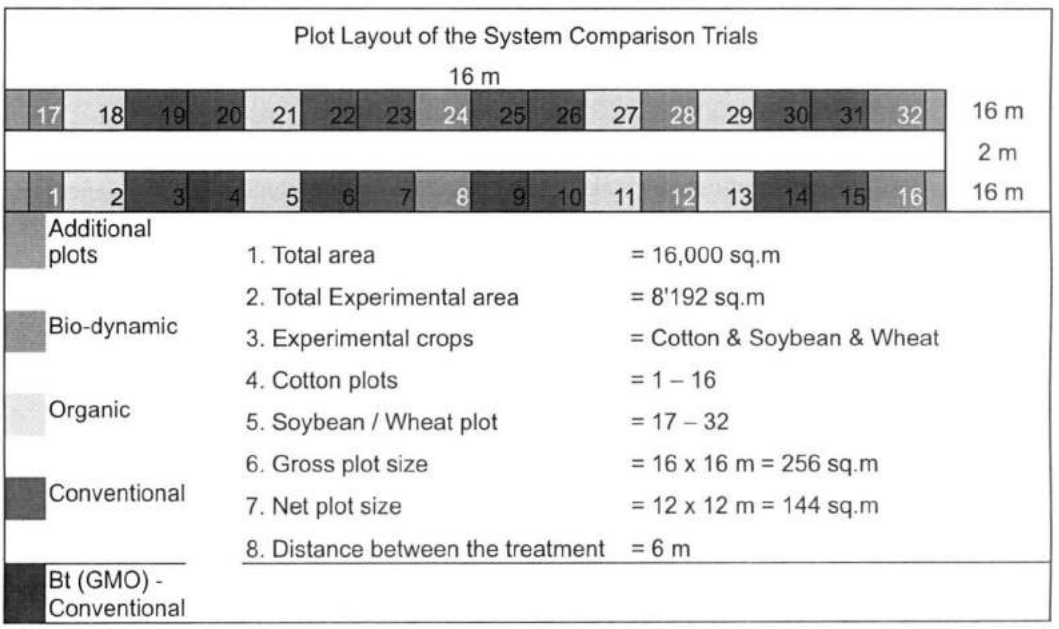
A pilot project was initiated in 1991 with a few farmers on 15 acres. Remei AG – a Swiss Company developed partnerships with manufacturers to produce a whole range of quality, fashionable, ecological-social garments made of BioRe's organic cotton. In the year 2007 BioRe is working with 7,890 farmers spread over 460 villages.

Background

BioRe has been very keen to understand the impacts of organic farming, and with this intention a two year study was carried out with the active collaboration with FIBL where it showed the organic cotton system managed to achieve similar or marginally higher yields that the conventional cotton and a 10 to 20% reduction in production costs. This study was an agronomic data monitoring of 60 conventional and 60 organic farmers. As a logical step to the study it was felt that a long term system comparisons trials would be extremely useful. This study plugs in very well with FiBL's intention off establishing a network of long-term comparisons of farming systems to investigate the contribution of organic farming to 'enhancing food security, combating poverty and conserving tropical ecosystem'.

Materials and Methods

One of the first things that had to be done to put the above aims into reality was to purchase a plot of land, which would be suitable for the purpose, and what was critical in the selection was the question of homogeneity of the plot. Here is the layout of the plot where the trail is being conducted:



The crop rotation of all the systems has been based on the most common rotation in the area, *i.e.*, cotton – wheat – soybean – wheat. Cultural practises reflect the local practices of the area where the trials are based. Detailed protocols of crop observation, soil sampling, monitoring of pest and diseases *etc* have been established with the active colloboration of FiBL.

The trials commenced in the year 2007 in the months of May and June and the current status is that the harvesting of cotton has started. However the following observations of the crops taken during the growing period are worth sharing.

Agronomic Observations (Cotton)

	Observations 53 days	80 days			As on 1.10.07			
Treatments	*Plant Ht.cm*	*Dia. of main stem*	*Pin-head squares*	*No.of branches*	*Average Yield (kg/ha)*	*Input Cost (Rs/ha)*	*Labour Cost (Rs/ha)*	*TotalCost (Rs/ha)*
Dynamic	48.43	1.27	41	20	449	7492	5334	12826
Organic	47.00	1.38	46	21	474	8689	4872	13561
Conv.	50.35	1.39	50	20	677	14516	3294	17810
BT (GMO)	54.23	1.55	67	21	808	16307	3369	19676

Conclusions

The trials are in their first year and the first harvests of cotton are still ongoing and the costs are not frozen yet. However, from the above data one can infer that the BT cotton has given 80% more yield as compared to the biodynamic treatment, on the cost front the BT cotton is costing (in comparison to the biodynamic treatment) 54% higher.

Agronomic Observations (Soya)

Observations at 60 days of 10 sample plants					
Treatment	*Plant population per mt. row length*	*Fresh wt.of plants without nodules & soil*	*Air dry wt.of plants without nodules & soil*	*Number of nodules*	*Fresh wt.of nodules*
Bio-dynamic	19.30	237.25	169.25	313.25	3.00
Conventional	17.10	211.63	115.75	282.63	2.63
Organic	19.40	210.00	106.00	249.75	3.00

Conclusions

The results of the soya are really interesting in that the bio dynamic and the treatment stand outs, especially in the nodule count, the harvests are to start shortly and then we shall have the full results.

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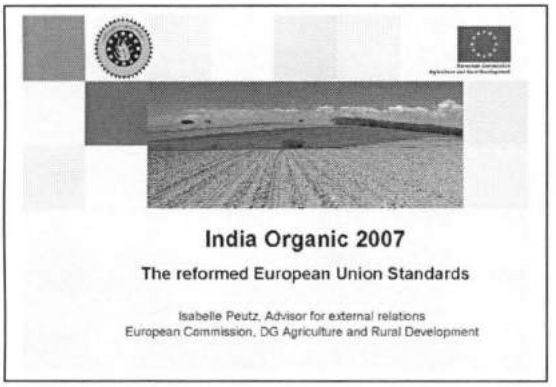
CHAPTER II

Standards and Certification

The Reformed European Union Standards

Isabelle Peutz, Advisor External for relations, aspects European Comission, Belgium



Changes; equal treatment operators

- Flexibility;
  - adjustment to structural, geographic, climatic constraints, and constraints on availability organic inputs
- Decided centrally by EU or Third Country authority

New Organic Production Regulation

- Transparency, communication
  - By definition of objectives, public goods rendered explicit
- Simplification
  - By reduced level of detail
- Changes
  - Mainly structural, most technical standards remain
- Implementing rules before 2009

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Legal References

- Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91, OJ L 189, 20.7.2007, p. 1
- Council Regulation (EC) No 1991/2006 of 21 December 2006 amending Regulation (EEC) No 2092/91 on organic production of agricultural products and indications referring thereto on agricultural products and foodstuffs, OJ L 411, 30.12.2006, p. 80–87
- Commission Regulation (EC) No 956/2008 of 26 June 2008 amending Regulation (EEC) No 94/92, as regards the list of third countries from which certain agricultural products obtained by organic production must originate to be marketed within the Community (Text with EEA relevance), OJ L 173, 29.6.2006, p. 41–44
- Commission Regulation (EEC) No 94/92 of 14 January 1992 laying down detailed rules for implementing the arrangements for imports from third countries provided for in Regulation (EEC) No 2092/91 on organic production of agricultural products and indications referring thereto on agricultural products and foodstuffs, OJ L 11, 16.1.1992, p. 44–46
- Council Regulation (EEC) No 2092/91 of 24 June 1991 on organic production of agricultural products and indications referring thereto on agricultural products and foodstuffs, OJ L 198, 22.7.1991, p. 1–15
- Website address, http://ec.europa.eu/agriculture/qual/organic/index_en.htm

No changes

- GMOs; ban remains, reliance on GM labelling
- Pesticides; current list, future review
- Controls; accreditation

International Control Systems – A Boom or Bane for Small and Marginal Farmers

Selvam Daniel, Country Representative, ECOCERT, India

Internal Control Systems – a boon or bane for small and marginal farmers?

Dr. Selvam Daniel

Country Representative – ECOCERT - India

Constraints Faced Due to Internal Control Systems

- Contracted farmers of one ICS are not able to sell to another project.
- The farmers has to comply with the pricing structure declared within the common marketing system. She/he has no other alternative.
- The project does not easily give no objection for the farmers who want to shift to another ICS.
- There is no proper termination clauses in the farmer's agreement. Farmer do not have any proper exit procedures.
- The discontented farmers do not have proper grievance addressable procedure within the ICS.
- When farmers of two projects are overlapping and when these projects are certified by two different certification agencies, then, due to conflict between the two projects, the farmers produce are not purchased by both the projects.
- When farmers want to break away from ICS and go for individual certification, the projects are not co-operative in declaring the organic status and submitting the required documentation to enable individual certification.
- When a project becomes commercially unviable and they close down commercial operations, the farmers produce are not purchased and the farmers are not allowed to join other projects or re-organize themselves into a new projects.

Why Internal Control Systems?

Internal control systems are a control mechanisms for a common marketing system involving training, internal inspections based on an internal organic standards which is a part of an ICS manual.

ICS is required for:-

- Establishment of common marketing system for a group of small and marginal farmers.
- For having an efficient quality control- by assuring the responsibility of maintaining the organic integrity.
- For achieving a sizeable and economic quality for marketing.
- For cost effectiveness in certification.

Constraints Faced Due to Internal Control Systems

- When clusters of farmers within a group want to re-organize and go for separate certification, it is not possible.
- The project when decide to switch certification agencies or break a certification period, the farmers have no say in the decision made by the project.

Advantages of Internal Control Systems

- Having an uniform or desired quality according to market requirements.
- Efficient supply of quantities required.
- Better traceability and product control.
- Cost effectiveness in certification.

Possible Solutions ??

- Contract should have a proper exit procedures.
- Exit procedures should be a part of internal organic standards as well as ICS manual and should clearly explain issues related to joining other groups or getting individual certification.
- Participation of the farmers in the decision making process should be increased and be more democratic and transparent.
- Farmers should be involved in deciding on the following
  1. Admittance of new farmers
  2. Deciding on the results of the internal inspections
  3. Price fixation and purchase policies
  4. Exit of farmer
- Restructuring of legal structures: At present, most projects are contracted farmers group with processing units and exporters. This should be restructured into farmers group getting certified separately and processors and traders getting certified separately.
- Organic plus fair trade

International Organic Standards and Certification Aiming at Global Harmonization

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Key words: Certification, guarantee, standards

The IFOAM Organic Guarantee System assures organic integrity internationally. In rapidly growing environment of marketing and trade of products claiming to be "organic," IFOAM provides a market guarantee of integrity of organic claims. The Organic Guarantee System (OGS) unites the organic world through a common system of standards, verification, and market identity. It fosters equivalence among participating certifiers, paving the way for more orderly and reliable trade.

The IFOAM Organic Guarantee System enables organic certifiers to become "IFOAM Accredited" and for their certified operators to label products with the IFOAM Seal next to the logo of their IFOAM accredited certifier. Accreditation is based on certifier's compliance with IFOAM norms.

IFOAM Accreditation Program

The IFOAM Accreditation Program is a service offered to certification bodies. The IFOAM accreditation is awarded to certification bodies that use certification standards that meet the IFOAM Basic Standards. Secondly, certification body itself must demonstrate compliance with the IFOAM Accreditation Criteria.

Key players in the IFOAM Accreditation Program are IFOAM, the International Organic Accreditation Service (IOAS) and the IFOAM Accredited Certification Bodies (ACBs). The IFOAM accreditation is carried out under contract by the International Organic Accreditation Service Inc. (IOAS), a US-based organization. The IOAS accepts and reviews accreditation applications, conducts site evaluations, and grants IFOAM accreditation to compliant applicants.

The Accredited Certification Bodies have implemented a Multilateral Agreement (MLA) amongst themselves. The MLA creates multilateral equivalence at the level of Accreditation Criteria and IFOAM Basic Standards. Implementation of MLA streamlines certificate acceptance among certification bodies, and thus helps to support and ensure orderly market transactions and trade. As an initiative that is administered by the ACBs, the MLA also supports objectives of IFOAM Organic Guarantee System.

IFOAM Norms

The first two pillars of Organic Guarantee System are IFOAM Basic Standards for Organic Production and Processing (IBS) and IFOAM Accreditation Criteria for Certification of Organic Production and Processing (IAC). Together they are called the IFOAM Norms.

The IFOAM Basic Standards address the principles, recommendations, and required baseline standards that guide operators in producing their organic crops, maintaining organic integrity in further handling and processing of organic commodities. The IFOAM Basic Standards have been developed to comply with the ISEAL Code of Good Practice for Setting Social and Environmental Standards. The IFOAM Accreditation Criteria are based on International ISO norms for operation of certifying bodies. They are additionally devel-

oped to reflect particular circumstances of certifying organic production and processing. The IFOAM owns and develops these documents.

The IFOAM Norms have an impact beyond the IFOAM Organic Guarantee System. The IFOAM's Basic Standards and Accreditation Criteria are generally respected as the international guideline from which national standards and inspection systems may be built; and they have been used as a reference by standard-setters and legislators in national and international arenas. Within the Organic Guarantee System, IFOAM provides a mechanism for approval of other standards that are consistent with the IFOAM Basic Standards.

The other pillar of IFOAM Organic Guarantee System are national or regional certification standards approved by IFOAM as being compliant with IFOAM Basic Standards. Together all approved regional or national certification standards constitute IFOAM Family of Standards. The acceptance of national or regional certification standards facilitates the accreditation of certifiers considerably. That is, certification bodies applying an approved regional or national standard only have to demonstrate compliance with IFOAM Accreditation Criteria (IAC).

IFOAM Seal

The IFOAM Seal is a market-oriented mark of compliance with the IFOAM Norms. The seal may be used on products that are certified by IFOAM Accredited Certifiers. This mark ensures wholesalers, retailers, and consumers that a product and its producers are organically certified within the IFOAM Organic Guarantee System. The IFOAM Seal used on products is implemented through a contract signed between an Accredited Certifier and the IOAS, and a corresponding contract between an ACB and its certified parties.

Revision of IFOAM Organic Guarantee System

Currently IFOAM is revising its system aiming to create more access to it, facilitate trade, and enhance collaboration in integrity and development of organic sector worldwide. Recognizing that organic sector now includes governments and intergovernmental organizations as well as organic market participants and civil society, IFOAM is redesigning the OGS to accommodate and enhance participation of all committed interested parties. The revised Organic Guarantee System (OGS) will be more accessible to interested parties and will offer additional services in line with developments in the organic sector over the last decade.

The Revision of Organic Guarantee System was mandated by the 2005 IFOAM General Assembly. In its motion, General Assembly established following objectives for revised OGS. They are to:

- draw a distinct line between organic and "not organic"
- safeguard the integrity of organic production and certification
- provide sufficient oversight mechanisms to maintain trust between parties involved
- facilitate global acceptance of organic products certified under different systems
- be a platform for cooperation between the affected parties.

Part of Revision is a complete revision of IFOAM Basic Standards to be transformed in the IFOAM Benchmark for Standards. All IFOAM members and other stakeholders are invited to comment on the second Revision of IFOAM Benchmark for Standards. The invitation to comment including instructions for making comments can be downloaded from the IFOAM website, deadline being 13 December.

International Harmonization

As a leader of international organic movement, IFOAM seeks to remove obstacles to the development of organic markets worldwide. In 2002, IFOAM teamed up with FAO and UNCTAD to sponsor a conference on

harmonization in organic agriculture. Shortly thereafter the International Task Force on Harmonization and Equivalence in Organic Agriculture (ITF) was born to carry forward the ideas from the conference. The ITF is a consortium of individuals from public and private organic sectors, which aims to find solutions to trade barriers that have arisen from all different organic standards and requirements for certification worldwide. Inherent in Vision of the ITF is that both government and private sectors will make changes that can enable all the systems of standards, accreditation and certification to work together more harmoniously. The private system of norms (standards and certification requirements) and accreditation at international level is the scope of IFOAM's Organic Guarantee System. Therefore, IFOAM recognizes both responsibility and opportunity to change its system in ways that fulfill and complement the results and recommendations of ITF.

Organic Certification and Standards

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Organic agriculture is based on the commitment of farmers and processors to work according to set standards and regulations, which define the organic production system. Further, organic agriculture is based on transparency to make the production system comprehensive and reliable. Organic certification addresses a growing demand worldwide for organic foods. It is intended to assure quality and prevent fraud.

For consumers, "certified organic" serves as a product assurance. The certification is essentially aimed at regulating and facilitating the sale of organic products to consumers. It can be defined as a procedure in which a certification body assesses a farm or company and assures in writing that it meets the requirements of organic standards.

There are nearly 395 organizations worldwide offering organic certification services. Most certification bodies are in Europe followed by Asia and North America.

Organic Certification and Standards

Who or What can be Certified?

- Individual farmers and small holder groups
- Seed suppliers
- Food processors
- Retailers and restaurants
- Inputs used on organic farm
- Wild harvesting
- Animal Husbandry
- Export/import.

Advantages of Certification

- Organic certificate is a tool to reach the regulated markets
- Quality assurance
- The certification label with certifying company's logo is an added advantage for marketing
- Prevents misuse of term organic
- Better price to producers.

Requirements of organic certification varies from country-to-country, and generally involve a set of production standards for growing, storage, processing, packaging and shipping, that is the entire production chain.

Organic Standards

Standards or regulations define the production methods and not the product quality. These are minimum requirements which are continuously developed and cannot be assured to be the best practice. Organic standards may be from Government, eg. National Standards for Organic Production (NSOP), USDA NOP, Regula-

tion EE No.2092/91, JAS organic standards or even framed by private bodies like Naturland and approved by competent authority.

In some countries, certification is overseen by government, and commercial use of the term organic is legally restricted. Certified organic producers are also subject to the same agricultural, food safety and other government regulations that apply to non-certified producers.

There are mainly 4 important aspects to quality control system. They are namely inspection, standards, accreditation and certification.

Inspection: It is an on site visit conducted by an inspector to evaluate and verify the production process based on farmers or processors' documents.

Accreditation: Authorized bodies regularly evaluate certification programmes in order to make sure that the certification programme is competent to carry out inspection and certification and is functioning properly. There are nearly 12 different accredited certification bodies functioning in India.

Labelling: It is also an important part of certification, as it assures consumers that the organic foods they purchase are produced, processed, and certified to meet the respective organic standards.

In order to make organic certification successful while transactions are carried out, there are certificates of inspection (meant for export)/ transaction certificates (for domestic transaction) issued by the certification body. Such certificates are issued by the certification body upon the request of operator as a proof of product quality and quantity being transacted to the buyer.

Constraints in Organic Certification

- The conversion period or minimum time interval for a farmer to be certified as organic from the last use of synthetic fertilizers/ pesticides.
- As such with very few literature available on actual organic agricultural production methods, especially for effective pest and disease management, certification which comes in secondary is not much of importance to farmers.
- The cost of individual certification is expensive for small and medium farmers.
- Difficulty in organizing groups under small holder group certification with regard to proximity and homogenous nature of crops cultivated.
- Maintenance of documentation of daily activities.
- Limitation to access the organic standards and to understand the same in a local language.
- Marketing constraint after achieving organic certification.

Conclusion

However in spite of these constraints, organic movement is proceeding at a stealthy pace and certification too is gaining sufficient momentum as the benefits are being slowly reaped by those who initially took the chance and moved forward.

CHAPTER III

Organic for Mitigating Health Hazards

Organic Foods and Health Issues

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In India, organic farming is quite nascent. Most of the government agencies and research organizations have not yet started to look at organic as a viable alternative. Most of the debate, as on today, is restricted to the economic viability of organic *vis-a-vis* high chemical inputs-based intensive farming. One of the most important factors, pesticides residues in food products, that is pushing organic agenda worldwide, has also not yet become a cause of concern. There is an ever-increasing evidence that "toxins in food have been causing irreparable damage to health and are also the cause of many illness. But in India, this issue is still being debated in the media only and Government is yet to take this up with any seriousness.

In this chapter, an attempt has been made to compile evidences based on international references and also conclusions are being drawn on the basis of Indian Food Heritage.

Why Organic Foods?

Proponents of organic farming, over the years have started to make a long list of reasons as to "Why do they consider organic to be a better alternative." Whether all of them are true or not or proven through scientific studies, still in a market-oriented economy their belief and understanding has a very important role. Most of them have been listed through market surveys conducted by independent market research agencies. Of the 13 reasons, 7 are related to health issues.

1. *Organic food tastes better:* Maximum number of consumers after switching over to organic have continued to consume organic foods, because they like the taste of organic foods. Further, they say that since organic farming starts with nourishment of soil, which leads to nourishment of plants, which in turn ensures full and complete growth of food outputs that gets reflected in better taste.
2. *Organic food production helps protect future generations:* They have been informed through media and have started to believe that average child receives approximately four times more exposure than an adult, to many widely used cancer-causing pesticides in food. Food choices made in family and community determines our children's health - not only now but also into future.
3. *Organic food is free from artificial additives:* Over the years, consumers have started to believe that since organic food does not contain food additives, it cannot cause health problems such as heart disease, osteoporosis, migraines and hyperactivity. Similarly, use of antibiotics, anti-microbial, hormones and other growth-promoters are prohibited in organic production, it is safe to consume organic foods. In animals also, they are not permitted to be treated with many veterinary drugs or chemicals, they are also safe. The use of synthetic chemicals as preservatives, colourings, antioxidants etc. is also prohibited in the processing of organic foods.
4. *Chemical residues are missing or very low levels in organically produced food:* Many studies conducted indicate that most conventionally farmed foods have residues pesticides and other chemicals. Over 400 pesticides are routinely used in conventional farming and residues are often present in non-organic foods. About 30 per cent insecticides, 60 per cent herbicides and 90 per cent fungicides cause cancer. These chemicals can also lead to nervous and endocrine problems. Many pesticides and herbicides were registered long before extensive research linking them to cancer and other diseases

could be established. Many are endocrine disrupting chemicals (EDCs). Using chemicals to deal with crop pests creates the same problem as indiscriminate use of antibiotics against germs. The germs get tougher and nastier over time, because antibiotics influence their evolution, killing susceptible organisms and selecting resistant ones. It is the same with pesticides and pests in the some places where pesticides have been used longest and heaviest, patterns of insect predation on food crops are now worse than they were before farmers started using insecticides. Organic growers have pest and disease management strategies that do not use artificial and toxic chemicals.

5. *Organic food has lower nitrate levels:* The use of soluble chemical fertilizers has resulted in high nitrate concentrations in many conventionally grown foods, especially in fruits and vegetables. The leaching of fertilizers has also resulted in high nitrate levels in some drinking water systems around the world. The nitrate content of organically-grown foods is usually significantly lower than in conventionally-grown produce. High nitrate levels in foods and drinking water are converted to carcinogenic nitrosamines. Nitrates have been shown to impair the ability of blood to carry oxygen, and may pose a risk of methemoglobinemia.
6. *Organic food is not irradiated.* Many food products are irradiated to kill microbes affecting the is shelf-life. It is also done especially when foods are sent to distant markets. It is believed that irradiation causes irreversible changes, even at the molecular levels. It is not yet known whether these changes adversely affect the quality of food or not but since organic foods are not permitted to be irradiated they are as naturals they can be and not altered at all.
7. *Organic food has higher level of nutrients:* There is now plentiful research findings that show organic food is far superior in vitamins, minerals and nutrients.

To begin with, most of the consumers of organic food switched over to organic due to contamination issues and environmental concerns. A growing number of consumers, and especially those suffering from chronic illness, are also switching to organic food production once again for the same reasons.

A key motivation for consumers is a simple belief that at least organic foods do not cause any harm to them. As yet consumers do not see any direct benefit as a positive attribute for organic foods. To them, "Is it true that there are positive health benefits to eating organic food?"

Better Nutrients Status in Organic Food

Research organizations and official food agencies around the world are unanimous in claiming that there is no evidence of a nutritional difference. It is true that there have been more than a hundred studies comparing the nutrient content of organic and non-organic foods and results are inconclusive. But this is more, because majority of these studies have been conducted with pre-determined conceptions and also done by those who could not be considered beyond any doubts.

As yet scientific studies to conclusively prove either way has not been available. But a careful and thorough review of science comparing organic and non-organic foods reveals that, available evidence does indeed support the consumer belief and claims by organic food industry that their food is safer, more nutritious, and better than non-organic food.

Official food composition tables, including data compiled by the US Department of Agriculture, reveal that since 1940s mineral levels in fruits, vegetables, meat and dairy products have declined substantially in conventional foods. The artificial fertilization associated with conventional crops produces lush growth by swelling produce with more water. On a kilogram-to-kilogram basis, organic food has more "dry matter" (i.e. food). Partly because of this (and for other reasons too), there are higher levels of nutrients in organic produce.

Virginia Worthington, an American Nutritionist, has confirmed that, differences can be enough to help achieve recommended daily allowances for certain nutrients from organic foods that are otherwise not available. It is also believed that nutrients, many of them are antioxidants, are higher in organic produce because crops rely more on their own defenses in absence of regular applications of chemical inputs. Evidence is emerging that confirms this expectation. Higher levels have so far been found of lycopene in organic tomatoes, polyphenols in organic potatoes, flavonols in organic apples, and resveratrol in organic red wine.

There is 52 per cent more ascorbic acid, or vitamin C in frozen organic corn than conventional corn, and 67 per cent more in corn raised by sustainable methods - a combination of organic and conventional farming. Polyphenols were significantly higher in organic and sustainable marion berries compared to conventionally-farmed ones.

A three-year study in Italy indicates higher levels of polyphenols in organic peaches and pears, and about 8 per cent more ascorbic acid in organic peaches. There is more salicylic acid in organic vegetable soup than in non-organic one. Salicylic acid is responsible for the anti-inflammatory properties of aspirin, and bolsters the immune system. The organic produce contain 10-50% higher nutrients than conventional produce. Organic foods are a simple way to reduce an individual's toxin burden of pesticides and food additives, increase their nutrient intake, and perhaps alter the consumption patterns away from less healthy choices.

Food Heritage and Organic Foods

The food products typically have qualities that are derived from their place of production. They are influenced by soil, water, microclimate, local ecology, food habits and production / preparation techniques. The special characteristics or quality of such agricultural produce and foods are embedded in traditional, cultural and environmental heritage of particular geographical location. Human society has lived by consuming only locally-grown foods. It is sure, that our ancestors lived in more difficult conditions. In those days, a few commodities that too all grown locally, could meet all their day-to-day nutritional requirement. It also enabled them to continuously evolve into better and better human beings. This clearly proves that naturally-grown foods, forming food heritage in an area, does contain all nutrients.

While artificial inputs have enabled cultivation and production of many new or exotic or non- traditional food products in new areas, their ability to deliver same taste and nutrients level is quite doubtful. That is why many food products grown in their traditional areas / geographical regions, when cultivated in another areas, do not have the same quality characteristics and market acceptance. Basmati rice grown in a traditional region, when compared with the same variety- seed stock, cultivated in any other place has failed to match the quality with quality of the original. There are hundreds of such examples the would over.

This also is an indication that while artificial inputs can ensure production, they may not be able to provide the same quality characteristics including nutrient contents. Organic production methods do provide positive encouragement to local crops, varieties and production practices.

In many healthcare and treatment management systems, practised through the centuries, management of food used to be an integral part of overall treatment. For many common ailments, treatments only required changes in food. In many cases of serious illness, many medicines as herbs were prescribed with particular types of foods only. This also proves beyond any doubt that food not only has an important role in healthy human beings, but can also provide for treatment and cure for diseases.

Some Question Marks?

While on one hand, more and more evidence gives credence to benefits of organic foods, there are still many, who do not believe so. Many of them are also from medical sciences backgrounds. Some common objections, observations and comments are briefly explained.

More Nutritious: According to them, organic foods are certainly not more nutritious, nutrient content of plants is determined primarily by genetic characteristics. Mineral contents in foods may be affected by mineral contents of soil, but this has no significance in overall diet. If essential nutrients are missing from soil, plants do not grow. If plants grow, means essential nutrients are present.

Safer: Many "organic" proponents suggest that their foods are safer because they have lower levels of pesticide residues. In some situations, pesticides even reduce health risks by preventing growth of harmful organisms, including molds that produce toxic substances. In USA, the FDA has set tolerance levels in foods and conducts frequent "market basket" studies wherein foods from regions throughout USA are purchased and analyzed. About 60% of fruits and vegetables had no detectable pesticides. Only 1.2% of domestic and 1.6% of imported foods had violative levels (1997). Its annual Total Diet Study has always found that America's dietary intakes are well within International and Environmental Protection Agency standards. Do pesticides found in conventional foods pose a health threat? Does the difference in pesticide content warrant buying "organic" foods? *Consumer Reports* equivocates: "For consumers in general, unsettling truth is that no one really knows what a life time of consuming the tiny quantities of foods might do to a person. The effect, if any, is likely to be small for most individuals, but may be significant for population at large." But the editors also advise, "No one should avoid fruits and vegetables for fear of pesticides; the health benefits of these foods overwhelm any possible risk." Manfred Kroger, a Quackwatch consultant and Professor of Food Science at The Pennsylvania State University, has put the matter more bluntly:" Scientific agriculture has provided Americans with the safest and most abundant food supply in the world. Agricultural chemicals are needed to maintain this supply. The risk from pesticide residue, if any, is minuscule, is not worth worrying about, and does not warrant paying higher prices". According to some, the pest control methods relying on use of toxic plants though natural may also prove to be as harmful to human beings as chemical toxins are in the absence of any scientific study for harmful effects of plants based pesticides, they cannot always be assumed to be safer alternatives as compared to chemical pesticides.

Tastier: "Organically-grown" foods are not inherently tastier than conventionally-grown foods. Taste is influenced by freshness, which may depend on how far the products must be shipped from farmer to consumer. What kinds of locally-grown fruits and vegetables are available varies from community-to-community. Whether they are organically-or conventionally-produced is unlikely to make any difference. In early 1990s, Israeli researchers made 460 assessments of 9 different fruits and vegetables and no significant difference in quality between "organic" and conventionally-grown samples. The *Consumer Reports*' study found no consistent differences in appearance, flavour, or texture.

Better for the Environment: Many buyers of "organic" foods believe that extra money they pay ultimately benefit the environment by encouraging more farmers to use "organic" methods. But doing this cannot have much effect because "organic" farming is too inefficient to meet the world's food needs. Moreover, dividing line between organic and conventional agriculture is not sharp because various practices are not restricted to one or the other. In organic farming, composting methods can always be following practices, that may not withstand the scrutiny according to environmental standards and food safety requirements.

Special Health Benefits: Many offbeat practitioners recommend organically-grown foods as part of their alleged treatment regimens, according to them it is quite questionable.

Conclusion

Organic Sector as yet has not evolved into big businesses. Inputs production and marketing for organic farming is never likely to become even reasonable size businesses. It will, therefore, be very important that organic producers and consumers should come forward to conduct scientific studies, that can establish the credentials for organic foods. It is very important that systematic efforts are made to establish the benefits of organic foods, beyond any doubts. This will require sponsorships and patronage at highest levels of Government.

Organic – Promoting Global and Personal Health

Mike Brook, M.D., Organic Partners, UK

'Its official – organic is better for your health' was the headline in The Times of England only two weeks ago. The article reported on the largest study to date, a US $24 million two year survey on the health benefits of organic as against non-organic food. Of course it is always good to have what you know confirmed by the boffins, but it is indeed good for organic.

In the many surveys concerning why people choose organic, the main reason expressed is, almost always, 'its better for my health'. What they mean are two things – first that organic food is free of contamination from fungicides pesticides, herbicides and a whole host of chemicals that have been developed, supposedly to increase yields, improve cosmetic quality and reduce costs, and second, that it is more nutritious.

Modern science has spawned not only the technological developments that have impacted on the way we grow food; it has shown us what is understood in all spiritual traditions - that man, animals, plants and soil, in fact the entire universe, is interconnected and indivisible. Every action causes an effect, every effect causes other things to happen; how we grow our food has consequences that go way beyond the effects on our personal health. It defines our relationship with nature and our fellow beings, affecting the health and sustainability of our planetary systems.

I have here two bananas; one of them produced organically, the other not. I'm no banana expert so I can't comment on any varietal differences but as you might guess, I would choose the organic one. Why? Even though I do not intend to eat the skin, which may have protected the fruit to some extent, I know that conventionally produced bananas are treated with systemic pesticides – and that a banned and particularly nasty chemical, Nemagon (DBCP), is still being used against nematodes in most commercial banana plantations.

But if I am concerned about my health, what about the health of those that work in the banana plantations who apply these chemicals? The banana and plantain family is the fourth most important staple crop in the world, being critical for food security in many tropical countries; each year over 70 million MT are produced, India and Brazil being the largest growers (though India's production is primarily consumed domestically).

In plantations, the owners spend more money on chemicals than they do on their workforce. In addition to the DBCP, at least four are classified as 'extremely hazardous' by the World Health Organization (their strongest classification) and are often sprayed from planes, a method that is incapable of accurate distribution. Effects include birth defects, damage to liver and kidney, sterility in male workers, depression, respiratory problems, damage to the eyes, cancers and skin infections. This is not hearsay – a landmark decision was announced earlier this month when six Nicaraguan workers were awarded damages amounting to $3.2 million.

These chemicals not only affect the plantation workers themselves who are rarely offered adequate protective clothing or given training in how to use the equipment; those working in the pack-houses under hot and humid conditions often suffer the same problems. Here bunches of bananas are floated in large baths of chemical nutrient solutions which bulks them up but also renders them liable to attack from fungus. Hence each bunch is individually treated with fungicide at the cut end as a sealant. As you can imagine the fungicide does not only remain where it was applied.

Unfortunately that is not the end of the story as pesticide contamination inevitably finds its way into water courses. Toxic chemical residues abound in the soil, water, sediment and fish in adjacent areas.The intensive production of bananas places huge demands on the water courses and poses threats to those downstream

using the water for drinking, meal preparation and washing. Water used in the packing shed is sometimes recycled for use by workers and their families living on the plantations. And although I am talking here about bananas, all conventionally produced crops pose similar threats.

It is not surprising then, given the problems associated with hazardous chemicals at the using end, that they are dangerous right at the start of the supply chain. The manufacturing of agrochemicals is itself a dangerous process as demonstrated by the disaster of Bhopal, the effects of which are still with us today. Chemicals that have been banned in some countries are 'dumped', often under the guise of aid, in developing countries where standards are not as stringent. The potential danger, especially where there has been inadequate labeling, is then further compounded by careless storage leading to further pollution incidents, with drastic consequences for surrounding land and water courses.

However it is not always helpful to dwell on the 'fear' approach to food production as a means of promoting organic principles; although this has its place, it does not begin to address the underlying issues about our relationship with the earth which I indicated at the start of my talk. Organic farming is about understanding, being sensitive to, and enhancing, natural systems. It is strange to think that only 60 years ago natural farming methods were the norm, the conventional farming of the day; so powerful has been the marketing activity of the agri-pharmaceutical companies that there is virtually nowhere on the planet that it has not reached. From my own experience as a traveler to some fairly remote places in search of producers and collectors of medicinal plants, it is simply not true that the farmers are too poor to afford agro-chemicals – if they really are too poor, the companies will have persuaded the government to subsidise them.

So rather than continue with the dangers to health of conventional farming, I would like to address the positive aspects of organic farming. And where better to start than the soil. The soil is teeming with life – at least it is in organically farm land and it is unsurprising that the founders of the leading UK organic farming organization, established in 1946, named it the Soil Association. You do not need to be a soil scientist to know a healthy soil when you see it. Much of the life therein is invisible to the eye, but the earth worms are not, and the smell, feel, colour and moisture retaining properties of a healthy organic soil are unmistakable. Synthetic fertilizers do not feed the soil – composts, manures and rotations do. If we liken soil fertility to a well, organic farming seeks to maintain and enhance the level of water whereas the conventional approach has been to develop ever more sophisticated extraction techniques.

The role of mychorrhiza in building fertility has only relatively recently been discovered. Finer than the smallest root hairs, mychorrizal mycelia give rise to a greater resistance to disease, such as those caused by microbial soil-borne pathogens and are more resistant to the effects of drought. These effects are almost certainly due to improved water and mineral uptake in mychorrizal plants.

A living soil is a healthy soil is a stable soil; without that stability, soil can be subject to the ravages of wind and rain, inducing erosion and, at worst, desertification.

Just as healthy food is a pre-requisite for a healthy body, so is healthy soil for a healthy plant. This is not to say that healthy plants will not be attacked by insects and pathogens, but organic farming supports the plants efforts towards building immunity.

To return to the banana. Not only do I have here some fruits, but I can also show a rather remarkable synthesized extract which contains all of a bananas nutrients. What makes this product so exciting is that it is scientifically assured to match the nutritional profile, so one is no longer dependent on the random element of fresh banana selection. Furthermore, it is convenient, quick to eat, and can be eaten on the move, without having to think about the disposal of that irritating skin. What's more, there will be no requirement to be involved in the tedious business of farming, and putting up with all the vagaries of weather, pest and disease. No labour to pay, minimal transportation, and the ability for the manufacturer to have complete control of the supply chain.

We have, quite rightly, an innate trust of nature but I am concerned that we are in danger of losing it along with instincts to know what is good for us. Once gone, we will have no choice but to believe what we are told – and no way of knowing that what I have described as a banana substitute is in fact a lump of washing powder.

We know instinctively that the whole is greater than the sum of its parts. We cannot break down the complexities of plant compounds found in food to its constituents anymore than we can assess soil fertility solely in terms of Nitrogen, Phosphorous and Potassium. We are becoming increasingly disassociated from our food and its means of production to the point where in a recent UK survey more than 50% of 6-9 year olds did not know where milk came from. As I watch my neighbouring farmer spraying deadly chemicals on to land which is to be used for food production I know instinctively that this can't be right.

There still remains one major element of health, in fact the most important goal of health, to be addressed – survival. This is not the place to discuss whether 'organic' can feed the world – though given the dominance of conventional agriculture for the last 40 years and its apparent failure, a new approach, especially with regard to food distribution, is clearly needed. Beyond the health hazards already indicated, conventional agriculture could not function without the use of cheap fossil fuels which are fast diminishing. We now live in a world where for the first time in our history oil resources are on the decline and we have in fact reached 'peak oil'.

Sustainability, and hence survival, is the very essence of organic philosophy and energy usage on organic farms is typically 20% – 40% lower. Not only is agriculture based on fossil fuels unsustainable, but also its usage is a major contribution to climate change, the ramifications of which seem to get worse with every new study that is published. This is clearly beyond the scope of today's presentation, but yet again the indicators that organic agriculture is a much smaller contributor to global warming than the chemical approach.

Finally, since this session of the conference is largely geared to looking at food production, I must point out that organic philosophy and standards cover not just food production but almost every aspect of our lives – aquaculture, textiles, processing, medicines, forestry, wild-collection, cosmetics, livestock, fruit, ethical trade, agricultural inputs, and manufacturing in all its diversity. A health benefit is implicit in the organic approach to all these.

However, important though it is, organic philosophy is about more than good health. It addresses the fundamentals of all aspects of our management of the environment. 'Organic' is about working with nature rather than against her. Our planet is an organism in its own right and to look after it, we must become aware of the interrelationship of all living species.

I hope you will agree that 'organic' does not just 'mitigate health hazards' – it is a holistic, systems approach to the health and survival of the planet and all the beings, great and small which inhabit it.

Potential of Organic Agriculture in Mitigating Health Hazards

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A diet of fresh fruits, vegetables, nuts, and grains sounds healthy, BUT, how that food is farmed makes a big difference.

Freshly-grown fruit is one of nature's healthiest and tastiest foods. A piece of fruit, be it an apple, pear, orange, cherry, strawberry or other, is a compact container of natural vitamins, sugars, enzymes and other components that are essential for healthy operation of human body. According to the Bible, the body is the temple of the Holy Spirit, so it is vital to protect our physical health, as this impacts our mental and spiritual well-being. Dieticians affirm that a diet consisting mostly of fresh, properly-grown fruits and vegetables, along with small amount of protein-derived from non-meat sources such as whole grains, is a detoxifying, cleansing diet that will provide all necessary ingredients for vigorous growth and metabolism while reducing risk of cancers and other problems that come from diets high in meat, poultry, processed foods, and dairy products.

Unfortunately, the Agrifood Industry has harmfully changed our eating habits And more and more fast and junk foods have been eaten, as more chemicals have been used in agriculture. There is a rise in diabetes, heart disease, obesity and other health problems that are directly tied to food we eat. Commercial, conventional agriculture is a big cause of this problem. The typical commercial fruits orchard produces fruit that have less nutritional value, flavor and safety than those grown using high-quality inputs. Commercial non-organic agriculture uses poisons, inferior fertilizers and poor quality control methods. Fruit is sprayed with chemicals, picked early, often coated with wax or other preservatives, stored and shipped in refrigerated compartments, and then placed in stores.

Our affluent, "instant gratification" society has conditioned us to expect an abundance of exotic foods and fruits that are not in season — and they must be cheap as well! Peaches should glow, apples should shine, and watermelon preferably should have no seeds. This unrealistic expectation of "bigger and better" demands that farmers move from traditional varieties and hybridize to produce ideal specimen for market. Breeding favours varieties that produce high yield and have a long shelf-life, sacrificing flavor and nutrition. Each year huge fresh produce is disposed of that do not meet the aesthetic standards of competitive wholesale markets. Tomatoes should be rosy red, but not soft enough to be bruised in transport, so they are picked green to withstand repeated handling along the chain from grower to customer. Then they are artificially ripen, resulting in a fruit that has not developed its natural sugars, essential for health. Phytonutrients are usually synthesized during maturation of plant. Thus "green harvesting" deprives fruits and vegetables of these. Fruits and vegetables harvested before maturity and transported distant places contain little or no vitamin C by the time they show up in supermarket. This nutritional depletion is the tradeoff we get if we expect to have summer fruits in winter and vice-versa, since these are transported across the country to meet our demands. Indeed, methods used in commercial agriculture have actually decreased the nutritional value of many fruits and vegetables. The sole agenda of agriculture and food production industries is to make massive profits

regardless of harm to human and ecological health. In current food and agricultural environment, where profits are good, and more and more people are eating artificial foods, fast foods and junk foods, it is no surprise that agribusiness industry is using a huge amount of poisons to grow crops. Synthetic chemicals (such as herbicides, pesticides, and/or fast acting inorganic fertilizers) applied in or around crops interrupt or destroy microbiotic activity in soil. Once the microbiotic activity in the soil has stopped, the soil becomes merely an anchor for plant material.

Conversely, organic farming philosophy, reliant on natural processes beneficial to farm as a whole ecosystem, enabled damaged soils to renew and provide better plant nutrition. Many people are aware that food grown according to organic principles is free from exposure to harmful herbicides and pesticides, but that is only one small aspect of organic agriculture. A larger part of organic agriculture involves the health of soil and ecosystem in which crops are raised. Organic farmers recognize that healthy, vibrant and live soils, and ecosystems significantly benefit crops. Natural and undisturbed soil is alive with organisms that exist in harmony with native plant life and inorganic minerals that provide substrate to soil. Therefore, Organic Agriculture is a holistic production management system, which enhances agro-ecosystem health, utilizing both traditional and scientific knowledge. Organic agricultural systems rely on ecosystem management rather than external agricultural inputs[a].

Why Organic Food is a Better Choice?

Organically-grown fruits and vegetables obtain nutrients from healthy soils. The farmers manage pests through ecological means. Compared to their conventionally-grown counterparts, organic food products are:

- lower in water content, reserving higher nutrient density.
- richer in iron, magnesium, vitamin C, and antioxidants.
- more balanced with essential amino acids.

Organic livestock operations aim to optimize the health and welfare of animals by ensuring a high quality, balanced diet and an environment that meets their behavioural and physiological needs. Organically-raised animals have better overall health, reduced risk of contracting or carrying diseases, such as Bovine Spongiform Encephalopathy (BSE) and lower ratio of saturated to unsaturated fat.

In organic food processing, chemical aids, irradiation, harmful additives, flavourings and enhancers are prohibited, while application of heat and pressure is minimized. Organic produce has consistently been rated to have better flavour and texture than non-organic produce. Moreover, organic foods have enhanced nutritional quality. For example, increased amounts, of vitamin C in organic foods increase the effect of vitamin E, folic acid, and iron in our body. A predominantly organic diet[1]:

- reduces toxic chemicals ingested;
- avoids GMOs [Genetically Modified Organisms] totally;
- reduces amount of food additives and colourings
- increases amount of beneficial vitamins, minerals, EFAs [essential fatty acids] and antioxidants consumed
- appears to have the potential to lower the incidence of common conditions such as cancer, coronary heart disease, allergies and hyperactivity in children.

Present study emphasizes the harmful ill-effects of synthetic chemicals (used extensively in conventional agriculture) on the health of people, wildlife, soil and ecosystem and demonstrates potential of organic agriculture in mitigating these health hazards.

Agro-Chemicals and their Harmful Effects

Pesticides

Pesticides are chemical substances used to kill or control pests. Some occur naturally but majority used in agriculture is synthetic chemicals. Their use increased after the Second World War in an attempt to increase food production. Pesticides have many harmful effects on people and the environment. They can affect the levels of wildlife in our environment. They are toxic to species deemed as pests but can also harm or kill beneficial species which can have a knock-on effect on entire ecosystems. Pesticides can also adversely affect human health through short-term occupational poisoning or chronic long-term illnesses. Some substances which may be harmless in isolation may be lethal in combination with others. Many studies[b] show that most conventionally farmed foods have pesticide and other chemical residues. Repeated tests show that many of these foods can carry a cocktail of synthetic poisons. Repeated exposures to cocktails of small amount of synthetic chemicals produce a range of adverse health effects. A recently published study[c] shows that as little a one-tenth of a part per billion of one commonly used herbicide can damage reproductive systems.

In addition, many scientists believe these exposures of minute quantities of agricultural chemicals are very significant for children. Peer-reviewed, published research has demonstrated that many of these types of chemicals are known to disrupt the hormone, nervous and immune systems. The escalating increase of certain types of cancers such as lymphoma, leukemia, breast, uterine and prostate cancers are linked to agricultural and other synthetic chemicals. Similarly, a good body of scientific research also links these chemicals to dramatic increases in autoimmune diseases such as asthma and chronic fatigue syndrome, and non-Hodgkin's lymphoma has gone from being one of the rarest to one of the fastest growing cancers among people exposed to agricultural chemicals.

Whereas organic farming systems rely on prevention rather than cure, and the incidence of pest and disease damage in organic systems is reduced using a number of fundamental practices. Organic advocates state that natural pesticides are a last resort, while growing healthier, disease-resistant plants, using cover crops and crop rotation, and encouraging beneficial insects and birds are the primary methods of pest control. A detailed scientific analysis of organic fruits and vegetables, showed that organic foods have significantly less pesticide residues than conventionally-grown foods.

Organophosphates

The most dangerous chemicals used in farming such as organophosphates [pesticides] have been linked with a range of conditions such as cancer, decreasing male fertility, foetal abnormalities, chronic fatigue syndrome in children and Parkinson's disease[2,3]. A study [4] (2001) demonstrated that children fed organic diets experienced significantly lower organophosphorus pesticide exposure than those fed conventional diets.

Pesticides and Cancer

Women with breast cancer are 5-9 times more likely to have pesticide residues in their blood than those who do not [5]. Previous studies have shown that those with occupational exposure to pesticides have higher rate of cancer [6, 7, 8]. The apparent link between hormone dependent cancers, such as those of breast and prostate, may be via endocrine disrupting chemicals [compounds that artificially affect hormone system] such as 2,4D and Atrazine (both herbicides).

Effects of Pesticides on Children

Children may be particularly susceptible to pesticide residues as they have a higher intake of food and water per unit of body weight than adults and their relatively immature organ systems may have limited ability to detoxify these substances [9]. In children aged 2-4 living in Seattle and eating conventionally farmed fruits and vegetables concentrations of pesticide residues were higher up to six times compared with those eating organic food[4].

Food Additives

Food colourings and additives can cause a range of health problems in adults and children. The tartrazine (yellow food colouring E102) and other additives have been linked to allergic reactions, headaches, asthma, growth retardation and hyperactivity in children[10-13]. Although, about 300 additives are permitted in conventional food, only 30 are allowed under Soil Association Standards. Some additives found in organic food are added for legal reasons including iron, thiamine (vitamin B) and nicotinic acid (vitamin B3) in white flour, and various vitamins and minerals in different types of baby foods. Use of antibiotics, antimicrobials, and hormones or other growth promoters is prohibited in organic food production. Where animals are treated with veterinary chemicals, they are not allowed to be sold as organic. Similarly, use of synthetic chemicals as preservatives, colourings and antioxidants is prohibited in processing of organic foods. The following are specifically banned in organic processed food:

- Hydrogenated fat, which is linked to heart disease, is banned under organic standards.
- Phosphoric acid, which is a highly acidic ingredient used in cola drinks, can leave the bones brittle and porous and lead to osteoporosis.
- Reported reactions to aspartame, most widely used artificial sweetener, include headaches, nausea, diarrhea, convulsions and seizures.
- Monosodium glutamate, which is thought to be responsible for dizziness, headaches and asthma attacks.
- Sulphur dioxide which can often cause problems in people who have asthma.

Essential Vitamins and Minerals

Deficiencies in certain vitamins and minerals can lead to a variety of symptoms including muscle cramps and depression [14]. The organic vegetable soups, contain almost six times as much salicylic acid as non-organic vegetable soups. The acid helps combat the hardening of arteries and bowel cancer and is responsible for anti-inflammatory action of aspirin. It is naturally used in plants as defense against disease. Organic crops have statistically significant higher levels of vitamin C and essential minerals such as calcium, magnesium, iron, chromium and phosphorous. Spinach, lettuce, cabbage and potato have particularly high levels of minerals [15].

Antioxidants

A high antioxidant intake reduce incidence of coronary heart disease and some cancers. Such antioxidants include certain vitamins (vitamin E and beta-carotene) and substances known as phenolics, which help to mop up harmful free radicals implicated in cancer. Many of them are produced by plants in response to environmental stresses, such as insects or competing plants. They are protective compounds that act as a plant's natural defense and also have protective properties in human and animal health. The research indicate that pesticides and herbicides disrupt production of these protective compounds. Good soil nutrition increases the levels of these natural compounds that have anti-cancer, immune-boosting and anti-aging properties. Generally,

organic crops are not protected by pesticides. The Danish researchers have found that organic crops contain 10-50% more antioxidants than conventional ones [16].

Essential Fatty Acids

The essential fatty acids (EFA), omega 3 and conjugated linoleic acid (CLA) play an essential role in metabolism [chemical changes which take place in our body to utilize food and eliminate waste materials] and especially in prevention of coronary heart disease and high blood pressure[17-19]. Omega 3s also reduces the risk of neurological disorders including depression [20-22] and ADHD (Attention Deficit Hyperactivity Disorder) in children [23-28]. Furthermore, CLA helps prevent cancer and degenerative changes in walls of arteries [29,30], enhances growth promotion and reduces body fat[31,32]. Forage based diets [a diet based on fresh or dried food as opposed to processed feed] form the basis of organic livestock production systems and have the potential to decrease saturated fat concentration and to increase concentrations of omega-3[33,34] and CLA[35,36] in beef. Milk taken from animals fed on a forage-based diet also displays improved levels of EFAs, including CLA and omega 3[37].

Nitrates

Use of soluble chemical fertilizers results in high nitrate concentration in many conventionally-farmed foods, especially in fruits and vegetables. Leafy vegetables can have highest concentration. The leaching of these fertilizers also results in high nitrate levels in some drinking water systems in the world. High nitrate content in food and drinking water can be converted to carcinogenic nitrosamines. Nitrates can impair the ability of blood to carry oxygen and may pose a risk of methemoglobinemia, a condition that can occur in infants and adults with a diminished capability to secrete gastric acid. A rise in pH in their digestive system allows bacteria to proliferate, increasing the transformation of nitrate to nitrite. When nitrite is absorbed into bloodstream, it oxidizes iron in hemoglobin of red blood cells to form methemoglobin, which lacks oxygen-carrying ability of hemoglobin. In severe cases, this can be one of the causes of blue baby syndrome. However, in most cases, symptoms would be tiredness, lethargy and a general feeling of being unwell.

The nitrate content of organically-grown crops is usually significantly lower than conventionally-grown products. Nitrate levels in organic food are 15% lower. There is a link between levels of nitrates in vegetables and gullet cancer, which has trebled over the last 20 years and claims more than 3,000 lives a year. They believe that an increase in use of nitrate fertilizers since World War II may be one of the main reasons for the rise in this type of cancer.

Impacts on Health

Commercial agriculture's reliance on chemicals, genetic engineering, monoculture cropping, land devastation and petrochemical-based machines and fertilizers does not just harm human health, it also harms entire ecosystems and all organisms.

Impacts on Farmers' Health: Conventional farmers use massive amounts of chemicals on crops to prevent disease and pest predation, yet their own health is prone to chronic illness and disease. In 2004 [38], according to a group of Canadian doctors, there is nervous system disorders, and adverse reproductive effects on farmers and their children due to occupational exposure to agricultural chemicals. Should we support a system that expects farmers to sacrifice their own health in order to provide for our needs?

Impacts on Wildlife & Ecosystem: Pesticides and herbicides used in commercial agriculture harm ecosystems and wildlife directly and indirectly. Wildlife can become sick or die when exposed to many types of agrochemicals. Bird eggs and young birds in nests may be exposed during spraying operations. Wildlife

made sick by pesticides may neglect their young, abandon their nests, and become more susceptible to predation and disease. Pesticides and herbicides harm wildlife when quantity or quality of their habitats is reduced due to use of poison. For instance, insecticides that drift into a stream can kill aquatic invertebrates and reduce food supplies for ducks or fish. When herbicides are sprayed on wildlife habitats, valuable vegetative cover is reduced. Species that live in or around places where agricultural chemicals are used are exposed to insecticides when they eat chemical residues on plants or in insects. Wildlife in fields or that enter fields soon after an insecticide is sprayed are harmed by inhaling vapour or when insecticide contacts their skin or eyes.

Many insecticides used by agribusiness cause wildlife deaths; these include dimethoate (Cygon) and diazinon. Most insecticides and miticides are highly toxic to wildlife. These are: formetanate (Carzol), methomyl (Lannate), chlorpyrifos (Lorsban), oxamyl (Vydate), and methidathion (Supracide). The toxicity of these insecticides to wildlife is similar to insecticides known to immediately cause wildlife deaths. Wildlife that has not fully recovered from a previous exposure to an insecticide is more likely to die if they are exposed again. Commercial non-organic growers use chemicals to kill bacteria, nematodes and fungi. These chemicals are called nematocides, fumigants, bactericides and fungicides. Some of these chemicals are highly toxic and remain in food chain for a long time. These chemicals have been implicated in the death of beneficial soil life, such as earthworms, as well as poisoning of birds and mammals. Commercial growers use paraquat (Gramoxone), which is moderately toxic to birds and highly toxic to embryos when applied directly to eggs, and which has health effects that harm humans. Paraquat, pendimethalin (Prowl), oryzalin (Surflan), and sethoxydim (Poast) have moderate to high toxicities to fish.

Impacts on Soil Health: Chemicals and other agribusiness techniques results in dead soil. Most corporate farming is conducted on once-rich soil that has now become toxic, devoid of life, and marginal. Beneficial soil microbes, enzymes and other factors present in healthy soil on organic farms has been killed. Soil on corporate farms has zero nutrient value and is as dull and lifeless as rock wool.

Conventional Agriculture Practices: A Culprit to Climate Change

On the one hand, conventional farming system has been proved a curse to ecological balance, human health and general well-being, while on the other, it is responsible for Global Warming, the most pressing and dangerous threat to life on earth today. Conventional agricultural practices contribute 20% of global greenhouse gases emissions, the gases which are the main cause of global warming, carbon dioxide, nitrous oxide and methane. Clearing forests for fields (deforestation), burning crop residues, submerging land in rice paddies, raising large herds of cattle and other ruminants, fertilizing with nitrogen, tilling practices and/or using irrigation to increase yield, all release greenhouse gases to atmosphere. Agriculture is responsible for about 50% of human-related methane emissions and 70% of nitrous oxide emissions. Synthetic fertilisers are largest source of carbon dioxide emissions in agriculture and the single largest source of nitrous oxide emissions in world. The production of fertilizer is an energy-intensive process which uses fossil fuels as a raw material (mostly methane). This results in the emission of a large quantity of carbon dioxide and nitrous oxide. When fertilizer is applied it emits more nitrous oxide. Fertilizers also acidify the soil, requiring the regular application of lime by farmers. The production of which in turn produces more carbon dioxide. Fertilizers also have the effect of suppressing the soil microorganisms that breakdown methane in atmosphere. By reducing soil oxidation rates, fertilizers cause there to be more methane in atmosphere than there would otherwise be. In addition, fertilizer use replaces the use of organic matter in farming which maintains soil carbon level. This has probably been a major part of agricultural contribution to climate change. Inorganic fertilizers cause plants to produce small root systems. This means less carbon is built up in soil than would be the case otherwise, promoting an on-going net loss of carbon from farmland soils as ploughing causes CO_2 emissions.ss

Conversely, main climate change benefit of organic farming is its non-use of inorganic fertilizer. Organic farming reduces fossil fuel energy use (especially nitrogen fertilizers), increases carbon content of agricultural soils, increases soil methane oxidation rates, reduces transport thus plays a major role in combating climate change. This way, organic farming cuts down the cost on fertilizers, micronutrients, pesticides and irrigation. As a result, overall cost of production is reduced and farmer gets more returns with less investment.

Conclusion

Good nutrition is vital for maintaining health and preventing disease. Because organic foods are high in nutritional quality and quantity, and have no or low residues, they can play an important role in promoting human health. A responsible approach to our diet must consider all the factors that contribute to our food production and that include fair payment for produce and sustainable farming practices that benefit, not harm our planet. Conventionally-grown foods cost less because their hidden costs are passed on to consumers and the environment. These hidden costs include creating synthetic inputs, resulting pollution from spreading them, and long-term health effects of pesticide residues in our food. Large freight distances add costs to retail price of produce, contributing to air pollution and depletion of our fuel resources. Solutions include buying from local farmers' markets instead of demanding interstate produce and buying organic food. By purchasing locally-grown, organic produce, the consumer supports sustainable methods of land use that result in far less pollution and top-soil loss than does conventional agriculture. Quality food can cost more, but this is an investment for our life. For the sake of our health, we should adopt a simpler diet with fewer processed or packaged items and focus on nutritionally complete foods, whether they be grown in our own backyards, in a community garden, or on organic farms.

It has been demonstrated that organically-produced foods have lower levels of pesticide and veterinary drug residues and, in many cases, lower nitrate contents. Animal feeding practices followed in organic livestock production also lead to a reduction in contamination of food products of animal origin. The facts show that organic food has significant health benefits because it has negligible chemical residues and pathogens, and higher nutritional values compared to conventionally-farmed food. The commercially-produced fruits and vegetables are a bad deal for us and the environment. They are grown in ways that harm the earth and its creatures. They contain fewer vitamins, enzymes and other life-giving components than organic fruits contain. They are infused with chemicals that can harm us.

In view of the colossal harm that our chemical agro-system has been doing to human health and well-being, it is high time that we identify the beneficial facets of organic agriculture and keep at an arm's length those modern agricultural practices which adversely affect ecological health and human health. The issue of natural farming versus chemical agriculture is not about "greenie" politics; rather, it is essentially about stewardship and health — the health of consumers, the health of farmers, and the health of our planet. In long run, organically-grown food is the best bargain for us, the environment, and future generations.

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Effect of Cotton Farming on Health and the Potential Solutions Offered by Organic Cotton Production

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The arguments about which of conventional, GM and organic cotton is best or worse focus on productivity, pesticides and economics. Much is made of the so-called economic benefits of GM cotton, and critics may focus on supposed (if unverified) claims that organic cotton is less productive than its rivals. The health effects of conventional cotton have been known for a while and both GM and organic cotton advocate have highlighted these, particularly around the issue of farmer suicides, which are particularly high in India. Organic cotton has much to offer when it comes to mitigating the negative effects of cotton production on human and environmental health and their many negative social and economic side effects.

This paper briefly examines some of the health effects from cotton production on farmers, their families and rural community as well as some related social and economic impacts, drawing on evidence from author's experiences, particularly in Africa, and will present arguments for health and related social and economic benefits of organic drawn from working with organic cotton farmers in India, Africa and Latin America.

Conventional Cotton

Cotton is an important cash crop for many developing countries. India has some 10 million cotton farmers, growing 8 million ha cotton crop, and producing 13% of the total world's cotton supply per year. These farmers use over 50% of all pesticides used in India, although cotton is grown on less than 5% of land[1].

Textiles and clothing represent a hugely important trade for developing countries (world textiles trade worth US $ 353 billion per year). In Africa, cotton is one of 7 commodities that make up over 60% of agricultural trade, contributing 21% of annual trade.

However, at least 20,000 people in developing countries die every year from poisoning by agricultural pesticides, and 3 million suffer acute or chronic after effects (with a further 200,000 committing suicide using pesticides each year) according to WHO. About 25 million farmers and workers may be poisoned by pesticides every year. The WHO figures are based on medical records, and many deaths probably go unreported due to the cost, or absence of medical services. Many cases may also go unnoticed, recorded for example as 'food poisoning' or even malaria.

Cotton is the biggest user (16%), of insecticides in the world. Many of these are highly toxic pesticides, with those used in developing countries often banned in richer countries. We can safely assume a large number of deaths occur due to cotton crop.

Even in the US market, 7 of the 15 most used chemicals are '"possible," "likely," "probable," or "known" human carcinogens'. One such, Chlorpyrifos causes brain and foetal damage, impotence and sterility. Dichlorvos, a widely used pesticide on cotton, is linked to 18% of all incidences of Wilms tumours in Brazil among children. The body of an average American contains 13 chemical pesticide residues. Of them, chlorpyrifos and methyl parathion, both used in cotton, exceeded recommended safety level standards.

The farmers using pesticides commonly report symptoms in developing countries such as :

'fatigue, muscle stiffness, dry throat, muscle weakness, dizziness, difficulty breathing, insomnia, blurred vision, stinging eyes, flushed face, chest pain, headache, salivation, nausea and itchy skin'.

Ghanaian farmers may spend an average US$54 a year - around 8% of average wages - on medical treatments for pesticides poisonings. These farmers in Ghana also lose around 20 days work a year through pesticides poisonings, costing another US$ 30. The health costs of pesticides on farmers can result in 20-30 days lost work per year, and associated costs of medical treatment, if it is available. Children from villages in cotton-cultivating northern states of India, who are exposed to high levels of pesticides, suffer from poor memory and impaired analytical and motor skills. In 1999, 500 farmers committed suicide in of two months in Andhra Pradesh. Suicides often result from debt when crops fail and debt owed on pesticides cannot be repaid.

Pesticides and Cotton

Cotton is vulnerable to pests, especially when grown as a monoculture. A large quantity of acutely toxic pesticides is used in its production, leading to severe and fatal poisonings of humans and livestock in developing countries.

West Africa

Case studies show rising pesticide costs and disillusionment among cotton farmers. Farmers in Benin tell how insecticide costs rose by 86% between 1999 and 2000. They spent an average of US$97/ha on insecticides in 2001 and many made losses as cotton prices remained almost static. In Senegal, insecticide costs were over US$50/ha for cotton compared with US$25 for maize and US$2 for groundnut, during 2000-01.

In Benin, reliance on cotton has failed to improve food security. Where 90% of households were food secure in 1990, only 3% were by 2001, with 11% (most of whom probably started growing cotton in 1980s) in serious difficulties. The average pesticide cost per hectare basis for cotton farmers interviewed has risen by 80% since 2000, while incomes have stagnated.

Most of the active ingredients used in cotton pesticides in five countries studied are classified by the WHO as Class II (moderately hazardous) for acute mammalian toxicity. One ingredient, triazophos, is WHO Class Ib, highly hazardous.

In order to buy food, poorer farmers often sell cotton pesticides (at less than half what they have to pay the cotton company when cost is deducted from their cotton revenue at the end of season). Selling cotton inputs to traders or better off farmers reduces yield and income, and leads to toxic insecticides being used on food crops. Re-use of pesticide containers for storing water and food is common. Food or drink contamination leads to as much exposure as handling and spraying: during 2000-01. In 2001-02 seasons, food contamination accounted for 68% of poisoning and 74-86% of fatalities in Senegal and Benin. The negative social, health and environmental impacts of current cotton production systems are not incorporated in prices or policy, or systematically monitored.

India

In 2005, 97 cotton farmers in 3 different villages in Andhra Pradesh documented 323 separate incidents of ill health in 5 months 39% of incidents were associated with mild poisoning, 38% with moderate poisoning and 6% with severe poisoning.

Conventional Cotton and Health: Direct Effects

Farmers in Africa often cannot afford proper safety equipment and frequently can not read safety instructions or warnings. For nine-year-old Fleurianne, lack of understanding led to a terrible accident. Fleurianne had

beautiful long hair but, as is common, she caught head lice. Thinking that a product meant to kill insects in the field was safe, Fleurianne's mother used a dilution of Dursban B to wash her hairs. Within minutes, the child was in agony, could not see, and was screaming. Cutting her hairs off and washing her head did not work. Dursban B contains chlorpyriphos, an organophosphate pesticide that was derived from a substance discovered during First World War to be used as nerve gas. Today Fleurianne still sometimes suffers from pain in her eyes, especially in bright sunshine. Her optic nerves or retinas may be permanently damaged.

For many farmers, cotton now barely sustains them economically, and they have to plant as much as possible to try and pay the debts incurred by production costs. This, in turn, leads them to reduce the planting of vital food crops, which reduces the diversity and quality of their diet, especially in poor crop years. It is not surprising that Dr Zonon, Director at Zou Hospital's Paediatric Department in Benin, tells us that malnutrition among children is worse in cotton-growing areas. This is perhaps not just because food is less diverse, but also because chemicals may impact children's ability to digest and absorb nutrients.

Organic cotton farmers report that children born after farms were converted to organic invariably get better grades in school.

Doctors in Benin reckon that many cases go undiagnosed or misdiagnosed as malaria, malnutrition or fatigue. Research suggests some 1 million farmers could be seriously poisoned a year in West Africa, 10% of farmers and workers in cotton-growing areas. Evelyne Atekokale, a Benin farmer who has now converted to organic, reports that she suffered several miscarriages after being exposed to pesticides during pregnancy. To summarise, conventional cotton production affects health in direct and indirect ways.

Table 1. Direct and indirect effect of pesticides on health of farmers and their families

Location/activity	*Incident Vector*	*Direct effects*	*Indirect effects*
Field spraying	• Chemical leakage • Spray drift • Inhalation	• Vomiting, diarrhoea, headaches, dizziness, eye problems • Contamination of food crops • Contamination of drinking water	• Sickness • Miscarriage • Insomnia • Fevers
Storage	• Leakage • Food and drink contamination • Accidental ingestion	• Food poisoning • Diarrhoea • Vomiting • Miscarriage	• Sickness • Miscarriage • Insomnia • Fevers
Transport ation	• Leakage • Spillage	• Food poisoning • Diarrhoea • Vomiting • Miscarriage	• Sickness • Miscarriage • Insomnia • Fevers
Purchase/cost	• Reduced income/ debt • Use on food crops • Side sale of pesticides (used on food crops)	• Reduced food security • Malnutrition • Reduced health care spending	
Other		• Suicide	

The knock on effects of these health impacts are also enormous, with social and economic consequences that also indirectly affect the health of family and community. Reduced incomes, debt, and the emphasis on earning cash to pay for inputs reduce both food grown on the farm and food purchased in, which affects diet. A poorer diet affect the farmers and workers' productivity, the health of women who may be pregnant or nursing, and the health of growing children, which affects their ability in school, should they be able to attend.

Farmers affected by poisoning and unable to work need to replace labour. With money tied up in debt, they are more likely to use family labour as a substitute than paid labour, which means that children may end up working rather than attending school. A community where farmers are in debt and impoverished is a community that is not investing in its own development, especially nutrition, health and education.

Organic Cotton: Good Medicine

Organic cotton directly addresses many of these problems:

- it removes chemicals from farm and home, where they are often stored
- it reduces exposure of people, animals and food
- it removes or reduces debt pressures that reduce food growing on farm and food grown, uncontaminated, is thus healthier
- it reduces exposure and consequent illness of farmers, and also reduces need for children to be used as substitute labour and consequences on their education and health
- children as well as women and men are better nourished

  Indirectly, organic cotton also has many knock on positive impacts as:
- it reduces impacts on health and days worked points to increased productivity
- In an environment with lower production costs and premium prices, farmers have surplus cash which can be invested on healthcare, education, and farm, home and community improvements. The contamination of air and water is reduced or eliminated.
- Evelyne Atekokale can help us conclude – when we interviewed her last, in her third year as an organic cotton farmer, she had her first healthy child nursing. She was looking forward to an end-of-season shopping spree with her friends when they were paid for their crop. Organic cotton benefits small farmers through higher incomes and lower production and healthcare costs. In other words, organic farming is not just good for us, but also for people in developing countries. We can all go from growing despair to growing hope.
- In India, Mr Singh, an organic cotton farmer from Gujurat, near the village of **Moti Badai** describes many benefits from growing organic cotton: comparable or better yields than conventional and lower health risks to himself and his family due to complete elimination of synthetic pesticides.The farm is self-sufficient in food, a strong motivation for the family, who are concerned about the spread of genetically modified seed. They buy only luxuries like sugar from other sources. Income from cotton rose from US$ 8 to US$ 209/care with organic.

In Amla village, Dharyapur Taluk, Amaravathi in Maharashtra, another group of farmers (90% of local cotton farmers are certified organic) are hoping to invest their profits in creation of computer centres (in order to be able to check weather forecasts, seed prices, and technical information on farming), and investment in improving drinking water facilities, and building of medical facilities for community.

The question for future is: can the benefits, for health, education, security, socially and economically, that derive from organic cotton be maintained in a situation where high demand is bringing in larger businesses less used to dealing with questions about how food and fibre is grown, and who may be seeking to put pressure on prices with possible negative effects on emerging benefits. The lessons and impacts from improvements in organic cotton must be communicated and monitored to ensure that organic cotton remains a developmental tool as well as a response to 'Green' concerns.

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CHAPTER IV

Marketing: Domestic and Export

Marketing of Organic Food Products in India: Experience, Issues and Strategies

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Key Words: Distribution, promotion, pricing, policy

Abstract

Market for organic products is emerging as an important opportunity for agricultural development in India (both in policy and practice), as in other parts of the developing world. This chapter analyses the reasons for slow growth of the Indian organic food products market and examines marketing practices in terms of nature of products, pricing, distribution, and promotion including generic promotion. The marketing of such products, which, among other things, is constrained by small volumes, leaves much to be desired. The problems faced by organic food product marketers have also been highlighted with people strategies.

There has been plenty of policy emphasis on organic farming (OF) and trade in recent years in India at various levels since out country is well-placed in organic food production. Organic produce is being seen as a natural choice by consumers, and consequently by producers, in both international and domestic markets due to the problems in supply chain of conventional or mainstream agro-produce. The growing health concerns and increasing non-tariff barriers like Sanitary and Phyto Sanitary (SPS) measures in international market (Naik, 2001), coupled with non-viability of modern farming on a small scale, are key factors behind the move from chemical based to organic production and consumption systems. The OF has become important and necessary in the context of high cost, environment pollution, and need for improving public health, food quality, and food safety (Thakur and Sharma, 2005).

The central and state governments have also identified Agri Export Zones for agricultural exports in general, and organic food products in particular, in some states. Products suitable for local production and processing have been identified. Many facilities and incentives are being offered to encourage production and export of organic products in such zones. Many state governments are encouraging organic farming as part of their agricultural policies. Maharashtra, Karnataka, Madhya Pradesh, Delhi, Gujarat, West Bengal, Orissa, Manipur, Asam, Meghalaya, Sikkim, Tamilnadu and Kerala are such states. Uttaranchal and Mizoram have declared themselves as organic farming states. There are many private companies like Ion Exchange, Mumbai and Agrocel Industries, Mumbai which are into export and domestic marketing of organic produce. Besides, there are many projects supported by international development agencies like ADB, UNDP, GTZ, IFAD, ITC of UNCTAD/WTO, and FAO for promotion of organic farming (Mahale, 2002).

This chapter analyses the status of production of the Indian organic food products and their marketing. It also examines marketing practices in terms of nature of products, pricing, distribution, and promotion including generic promotion. Section two profiles the organic production system in India followed by marketing status of domestic players Section 3 ways to promote domestic marketing of organic products in Section 4.

Status of Organic Food Production in India

Though traditional agriculture, which comes close to organic farming practices, has been practiced in India since time immemorial (6500-7000 BC), modern organic farming that too certified is more recent (since

early 1980s) and export market-oriented (Mahale, 2002). Major organic produces in India include plantation crops (tea, coffee, and cardamom) spices (ginger, turmeric, chilli and cumin), cereals (wheat, rice, jowar, and bajra), pulses (pigeonpea, chickpea, greengram, red gram, and black gram), oilseeds (groundnut, castor, mustard and sesame), fruits (banana, sapota, custard apple and papaya), and vegetables (tomato, brinjal, and other leafy vegetables), besides honey, cotton and sugarcane especially for jaggery (GOI, 2001). But, there is no organic production of meat products like poultry, livestock and fisheries in India as yet. Since October 2001, organic product exports have been brought under regulation and cannot be exported unless certified by a third party certification agency, accredited by the National Accreditation Board whose secretariat is housed in APEDA (under the Ministry of Commerce). This has necessitated the foreign certification bodies to establish local offices in India (Mahale, 2002). A profile of organic crops, areas and producers involved is given in Table 1.

In 2003, 5,661 farms in India were certified as organic. Of the 146 million ha of net cropped area, only a small fraction of 2.6 million has (1.8%) was covered under certified organic. Organic produce (14,000 tonnes in 2002) was only 1.5% of the total and most of it was exported, with domestic sales being only 1,000 tonnes (0.00006% of the total food consumption). There is a little focus on marginal crops/subsistence crops (millets, and coarse cereals). In 2002, there were more than 100 projects in organic production organised by NGOs, Government and private companies and individuals with at least 10,000 small farmers under certification (Garibay and Jyoti, 2005). The potential for organic farming in India is given in Table 2.

There are three types of organic producers in India – traditional organic growers who grow for their subsistence needs, commercial farmers who have surplus and export their produce through different channels, and private companies which either have their own farms or organise large conversion programmes with growers (Ghosh, 2004). Contract farming is assuming importance in organic agriculture in India due to the requirement of steady supply. The contracting agencies, mainly private companies, organise training and certification for contract growers and promise a buy back of produce at some pre-agreed price (Table 3). If the grower pays for certification, owns certificate, and exports directly, she/he can get premium price (50%). On the other hand, if she/he owns a certificate and sells to an exporter, she/he gets a premium of 25-30%. If she/he does not own the certificate, as the agency pays for it, she/he gets only 15-25% premium (Mahale, 2002). Further, within organic, there are variants. For example, part of the paddy is organic, all paddy is organic but subsidized by other crops, agriculture subsidized by non-farming activities, partial fulfillment of criteria/systematic "blending" like conversion period, not all inputs are organic, neighborhood is not organic, chemicals are "necessary evil", and 'if all else fails, we will/may use chemicals' (Balasubramanian, 2005).

Table 1. Organic crops, regions and production organization in India

Organic crop	*Area*	*Producers*
Tea (Orthodox, CTC, Green)	Darjeeling, Assam, Dooar, Nilgiris	Plantations
Coffee (Arabica, Robusta)	Western Ghats, Nilgiris	Plantations and individual small farmers
Spice		
Pepper and cardamom	Western Ghats, Nilgiris	Plantations and individual small farmers
Cloves, nutmeg, mace,	Kerala, Tamil Nadu	Small farmers + farmers' Organizations
Garlic, ginger, turmeric	Throughout India	Small farmers + farmers' organizations

(Contd.)

Organic crop	*Area*	*Producers*
Fenugreek, fennel, cumin, coriander	Throughout India	Small farmers + farmers' organizations
Sesame	Gujarat	Contract farmers
Coconuts	Along all coasts	Small farmers
Fruits		
Apples, pears, peaches	Himachal Pradesh and Kumaon	Small and medium farmers
Mango, bananas, pineapple, papaya	Maharashtra, Madhya Pradesh	Small and medium farmers
Apricots	Himachal Pradesh and Kumaon	Small and medium farmers
Dry Fruits		
Chestnuts	Jammu and Kashmir	Small farmers, one processor
Pear, mango	Kodaikanal	One Processor
Cashew nuts	Pondicherry, Tamil Nadu	Small farmers, few processors
Vegetables		
Potatoes	Kumaon hills	Small farmers
Cabbage	Kumaon hills	Small farmers
Wheat, maize and sorghum	Haryana, Punjab, Madhya Pradesh, Uttar Pradesh, Maharashtra	Farmers and farmers' groups
Rice		
Basmati	Haryana	Medium and big contract farmers
Other varieties	Throughout	Small and medium farmers
Pulses	Throughout	Small farmers
Oilseeds	Madhya Pradesh	Medium and big farmers
Coarse grains	North-east, Gujarat, Orissa	Small farmers
Honey	Forest areas	Individual collectors, NGO organized groups
Cotton	Gujarat, Madhya Pradesh, Andhra Pradesh	Farmers' organizations, contract Farmers, individual farmers

Source: Mahale, 2002.

Table 2. Areas of high conversion potential for organic farming in India

Area	*Crops*	*Rationale*
Himalayan region	Tea, fruits, vegetables, nuts, forest produce	Delicate soils; organic agriculture has made inroads
Western Ghats and Nilgiris	Coarse grains, fruits, vegetables, forest products	Delicate soils, dry land farming and forest collection
Tribal area in lowland: Orissa, Madhya Pradesh	Cereals, pulses, millets	Traditional agriculture, dry land farming
Other dryland areas	Cereals, pulses, millets	Potential productivity not yet reached. Not touched by official research and extension services.
Green Revolution areas: Punjab, Haryana, Western Uttar Pradesh and Tamil Nadu	Rice, wheat, pulses, oilseeds, cotton, cattle	Over exploitation visible, increased chemical inputs and costs of production

Source: Mahale, 2002.

Table 3. Organizational characteristics of organic production in India

Organizational level	*Farmers/workers*	*Examples*
Plantation companies	Plantation workers	Tea companies
Processing/Marketing agencies (public & private)	Contract farmers	UOCB, PAFC, LT overseas, IITC India Organic, Ion Exchange, Agrocel, , Satluj, Sunstar, Dubden Green, Sresta
Interest groups/NGOs	Individual Farmers	Navdanya, Jatan PDS, Key Stone, INHERE
Farmers' organizations	Individual Farmers	TOFA, VOFA
Individual farmers	Individual Farmers	Grewal Farms, BKKF, other medium and large farmers

Source: Mahale, 2002 with updation by author.

Whereas wholesalers and traders, super markets and own shops are major channels in domestic market which is mainly in metropolitan cities, accounting for 7.5% of the total organic production, market channel for export of organic products is export companies, except tea which is produced and exported by tea estates. Major markets for Indian organic products are: EU, USA, Canada, Australia and Middle East Asian countries. Quality production with traditional methods, low use of chemical inputs in mountain and tribal areas, easy availability of cheap labour, NGO interventions, and various types of support provided by governments are main advantages of Indian organic products. On the other hand, high price expectations, delayed delivery, quality restrictions, lack of certification and marketing networks are constraints in marketing organic products internationally (Singh, 2003).

On the other hand, there are no separate markets for organic products in many commodities like wheat in Rajasthan. Thus, market does not offer any incentive for production of organic produce. Other limitations are: lack of government support, many government departments lack information about organic farming, insufficient training and extension for farmers, lack of market information and market access constraints, difficulties with export licenses and organic certification requirements, supply difficulties, lack of consistent quality and regular supply, lack of processing facilities, and lack of organic input such as organic seeds, biofertilizers and biopesticides (Mahale, 2002). But, some agencies have tried to create separate market outlets for organic produce like Maharashtra Cotton Marketing Federation which purchase organic cotton from growers separately for export purposes (GOI, 2001).

Domestic Market for Organic Produce

About 8% of the total organic produce is consumed by domestic market (Raste, 2004). The transition to organic produce consumption has been slow in India, besides emphasis given to food security rather than food safety at policy level, mainly because of lack of focus at marketing end as:

- Large departmental stores give token recognition to organic products by assigning a shelf or two. And even these are rarely well stocked. So, a customer can never get a full range of organic products to serve a complete meal.
- While the NGOs do a yeomen service to organic cause at growers' end, they are not able to link as effectively with customers. Thus, transition to "organic" continues to remain difficult for both farmers as well as end consumers.
- Lastly, organic produce has got identified as an expensive, niche product (Dubden Green website).

The products being sold in broadly organic domestic market are: certified, natural, in-conversion, chemical-free, pesticide-free, eco-friendly, and truthfully labelled organic. In terms of brands, there are both company and retail store brands. The distribution of organic products happens through channels like exclusive stores/ outlets, cooperative buyers' groups (Ghosh, 2004), and corners in conventional shops/outlets for food. Exclusive shops/outlets (Ion exchange, Mumbai/Pune, Nilgiris, Bangalore, Sresta, Hyderabad {shop-cum-eatery}, Jatan, Vadodara, Back to Nature, Dehradun), Organic corners in large supermarkets (Star India Bazaar, and Big Bazaar in Ahmedabad (Sanskruti)), Advance order based sale (Mumbai grahak panchayat, Jatan, Bhai Kaka Krishi Farm (BKKF)), Home delivery (Kheti Virasat, Nabha, BKKF, VV Nagar) and Organic hut (BKKF, VV Nagar) are also emerging as means for promotion as well as distribution and customer relationship building (Fig.1). There are also retail brands in Delhi (Dubden Green with web based sales), Organic food cafés (Navdanya, Delhi's 'Slow food café' as against the fast food outlets), Sales from eatries (Navdanya in Delhi, Seva Café in Ahd), and Corporate-NGO alliance (Navdanya-Nirulas joint branding) besides exclusive traders/ distributors (O&N, Pune). The organic products in Indian markets cost at least/almost double the price of conventional products (Garibay and Jyoti, 2005; and Table 4).

Table 4. Price range of conventional and organic produce in Indian markets

Product	Conventional (Rs/kg)	Organic (Rs/kg)
Rice	15-60	32-110
Wheat	15-25	35-40
Coffee	350-500	475-1000
Tea	250-500	450-1300
Spices	250-800	400-1500
Pulses	25-40	50-75
Fruits	20-100	80-100

Source: Raste (2004).

Major promotional tools include launch of organic brands (24 lettered mantra, Hyd, Vasudha/Navrang, Indore), promotional literature (brochures, pamphlets by corporates/NGOs), participation in organic food festivals/rural exhibitions/melas, relationship building for larger purpose (like Jatan 'not a shop'), outlet level promotion/ 'in shop' promotion, and implicit 'ethical/fair trade' identity.

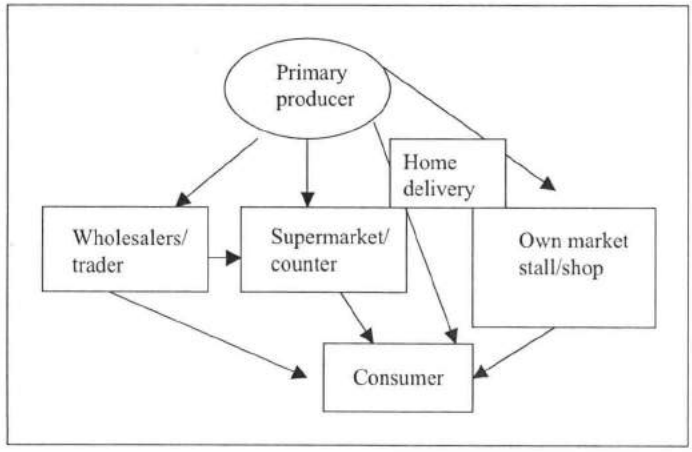

Fig. 1. Distribution channels in domestic organic produce market

Major problems in marketing of organic products are premium pricing, available only in high end shops/ alternative stores, authenticity of produce, lack of policy support, lack of consumer awareness about organic, high retailing overheads due to smaller volumes, costly to maintain separate supply chain, lack of regular availability of supplies, disposal of in-conversion produce, no separate markets for bulk selling like in cotton, high spoilage due to storage problems/contamination/sales returns/repacking (quality loss), contamination, and lack of complete range especially. for institutional sales. Further, a stagnating local market, small volumes limited and scattered product range, irregular supply line, high prices for organic produce, limited number of processed products, lack of domestic and international market information on suppliers, prices and qualities, lack of consumer awareness, absence of Fair Trade Practices, insufficient storage and post-harvest facilities as well as adequate technical knowledge, lack of segregated cold storage facilities for perishable products, unreliable transportation systems, high costs of certification, especially for small farmers, and certification primarily based on documentation, while most small farmers are illiterate weaken marketing of organic produce (Mahale, 2002).

Major factors in the success of organic farmers in Haryana are found to be marketing of vermicompost and contractual marketing of produce (Singh, 2003). The marketing constraints in organic farming at farmer level in Himachal Pradesh in case of 95% farmers included lack of marketing intelligence, lack of right marketing network, and lack of regular supply. Other major problems are lack of effective extension and lack of availability of organic inputs like biofertilisers and biopesticides (Thakur and Sharma, 2005).

Strategies for Domestic Market Development

Domestic Market certification

Certification should address following issues in domestic market:

- Certification geared to local markets – immediate felt need
- Certification that is "scale neutral" – relevant to small and marginal farmers
- Certification that is "inclusive"– does not leave out people who have been cultivating organically through the years
- Certification system that does not handicap small farmers in terms of requirement of maintenance of records and audit trail etc. (Balsubramnian, 2005).

There are also alternative certification systems which can provide easy access to organic markets. These are:

- Teikei system in Japan
- Organic bazaar system in India
- Ecovida in Brazil
- The Certified Naturally Grown System in USA
- Masipag in Philippines

For these standards to succeed, policy support is required in terms of:

- Local standards/or norms conceived by stakeholders
- Grass root orientation
- Simplified documentation and management systems
- Local market linkages
- Biodiversity conservation
- Organic seeds
- Gender justice (Daniel, 2005).

In domestic market, new and small players also need to treat organic as an 'add on' business with other businesses and brands to begin with so that it becomes economically-viable without incurring much direct costs. Segmenting the market (certified *v/s* natural, personalised *v/s* distant, processed *v/s* loose/raw) could

also be useful to focus on targeted segments effectively. Franchising is another route for faster spread and better marketing in partnership with local players (franchisees). It is also important to offer complete range to attend to market effectively. For this, agencies could try product exchange and network for marketing instead of each one of them grappling with marketing. Intermediate products market (selling through other products/part organic) could be another way to expand the market for organics. Joint branding with others in food or fibre sector can be used to benefit from market strength of existing market players in conventional markets.

The steps needed for promoting organic farming systems include focus on domestic market like 'green foods' market in China (Ghosh, 2004), certification or conversion support or subsidy as done in California (up to 70%) by USDA in 2001 and in EU for conversion to or continuing with organic production under EU-agri-environment programme since 1993 (Klonsky and Smith, 2002; Padel *et al.*, 2002; Ghosh, 2004), and promotion of market mechanisms like Mumbai Grahak Panchayat which had dedicated consumer groups who place advance orders. In organic produce chains, group certification by public or development agencies can provide a chance for small farmers to take up organic cultivation. The government agencies should not share the cost of certification with private agencies operating in organic sector if the purpose is to empower the growers.

But, it is market oriented programmes which are more sustainable as was the case in Denmark (Padel *et al.*, 2002). Targeting institutional market, *i.e.* hotels, hospitals, airlines and railways, to begin with, is an important strategy for promotion of market for organic produce in the domestic market. The NGOs can also be roped in for market creation as they have credibility for such products. Further, home delivery can prove effective tool in high end segment of market. Tying up of the organic products with other environment-friendly products can also help. Regular supply can also come in handy for promotion and market building. Further, there could be common storage and processing centres to tackle the small volumes problem. The organic movement is promoting market development as a more sustainable way of maintaining an economic incentive for farmer conversion. Though the retail chains may not currently account for a large volume of organic sales, they are the venue where existing non-buyers can be converted to buyers of organic foods. Therefore, retail chains will play an important role in boosting demand for organic goods and in advancing the cause of organic movement (Ritcher, 2005). The tie up with existing food chains/outlets could help mainstreaming the organic produce. Above all, the state needs to correct the anti-organic bias in its public policies. For example, chemical inputs are subsidized more or equally well along with organic and there is no MSP for organic produce.

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Positioning Organic Imported Products in Europe

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Abstract

The current positioning of organic products is based on a segmentation approach that recognise the organic market basically as a (enlarging) niche. Research conducted through various EU projects shows that positioning of organic products cannot simply hinge on attributes/characteristics that differentiate organic products from their competitors, nor a strategy based on benefit segmentation is enough. People in Europe are less and less buying food products for their physical characteristics, since in an opulent society, food has lost is primary function of solely bringing calories and proteins for human survival. Most consumers buy food given their emotional appeal or, even more, their value content. Health, ethical and environmental consideration are becoming more and more important, and affect consumer attitude toward imported (organic) food. A value/need-based positioning of organic food products is proposed, based on a lateral marketing approach.

Product positioning relates to forming a particular product image in the mind of consumer (Ries and Trout, 1972). In traditional marketing terms, positioning consists of highlighting some characteristics of product to differentiate it from its competitors and to acquire competitive advantages in competitive arena. Marketers tend to position with logical, functional, symbolic, and experiential aspects of products, ignoring other possibilities (Kotler and Trias De Bes, 2003).

In organic products, current positioning is mainly based on some attributes of products, either positive (healthy, better tasting) or negative (produced without chemicals, GMO free, with no added artificial flavouring, preservatives, *etc.*). Further, current positioning is usually pursued with a general symbolic reference to need/goal of maintaining health, which appears one of the most relevant values in our long-living, aging western society.

Besides, organic attribute appears as a further element of differentiation in category management (you have the full-fat yogurt, the probiotic-added yogurt, etc. and the organic yogurt), although all organic products have a common positioning in the mind of consumers.

Methodology

Our conceptual framework draws most heavily on means-end chain theory (Gutman, 1982; Olson and Reynolds, 1983). The objective of means-end chain theory is to understand what makes products personally relevant to consumers by modelling the perceived relationships between a product (defined as a bundle of attributes) and the consumer herself (regarded as holder of values) (Pieters *et al.*, 1995).

A means-end chain (MEC) is a knowledge structure that links consumer knowledge about product attributes with his/her personal knowledge about consequences and values (Gutman, 1982).

The means-end approach suggests that consumers think about product characteristics or attributes in terms of personal consequences. These may be perceived as positive (benefits) or negative (risks). In other words, means-end chain model gives the possibility to explicitly link consumers needs and products charac

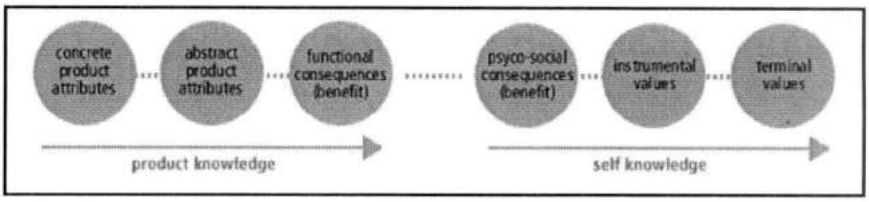

Fig. 1 Means-end chain model

teristics, and reveals their goals/motivations in purchasing a product. In means-end chain theory, consumers exert a behaviour (as an example: acquire a credit card), as a mean, to reach an objective or an end (ex: not to pay cash) (Reynolds and Whitlark, 1995). Besides, consumer also see most product attributes as a mean to some end: at the conscious level this may be represented by some positive consequences, in a more abstract and subconscious level their end is to attain values, that is "preferred end states of being and preferred modes of behaviour" (Peter *et al.*, 1999).

Positioning in a means-end framework will look at product attributes, consequences of product use, and values attained by product use (Peter *et al.*, 1999), and is strictly related to the attitudes and belief evaluations that form these attitudes. According to Fishbein and Ajzen (1975), overall attitude towards an object is a function of two factors: the *strength* of the salient beliefs associated to a product and its attributes and the evaluations of those beliefs. Beliefs can be expressed as the means-end chains stored in memory, which are acquired through the consumers' varied experiences. Because people's cognitive capacity is limited, only a few of these beliefs can be activated and consciously considered at once. These are called salient beliefs (Peter *et al.*, 1999).

In order to investigate the influence of attributes like origin, production, processing and inspection methods, on organic products' positioning, we have used means-end chain theory to developed a tool to discover what personally motivates consumers to **have trust** in organic products.

Data collection was made by means of soft-laddering technique which is an in-depth interviewing technique used to construct means-end chains (Reynold and Gutman, 1988; Grunert and Grunert, 1995) by repeatedly asking the consumers a series of questions in format "Why is that important to you?".

Approximately 800 in-depth interviews have been carried out in Europe as part of a larger EU-funded project (OMIARD). Consumers interviewed vary according to their gender, age, frequency of purchase of organic products, level of knowledge of organic products and residence (rural *vs* urban). About 667 interviews were retained for analysis, the others being discarded either due to refusals or because of incomplete information.

In order to identify their cognitive structures, consumers were asked to imagine a quality sign, that would give them confidence in organic origin of the product and to link these motivations to product attributes and their consequences in order to reveal their underlying beliefs, feelings and desired ends.

Interviews were conducted in native languages and a first coding was performed by native language speakers. Subsequent coding was performed centrally by authors, who actually merged and newly recoded the material which was used for national analyses. The results of a means-end chain analysis is a hierarchical value map (HVM) or consumer decision map (Reynold and Gutman, 1988). Coding of consumer responses and mapping was performed using a specialist software package developed by the authors (Mec AnalystPlus).

Results

Our previous research (Zanoli and Naspetti, 2002; Zanoli, 2004) has shown that most organic products are always associated with the instrumental value Health, and most importantly with the terminal value Well-being/Quality-of-life, which subsumes also all the hedonistic values associated with personal gratification (Fig. 2).

But beside her personal well-being, the European consumer is more and more concerned with the so called "altruistic" values to be attained by consumption of organic food, such as Sustainability, Respect for the

Environment, Benevolence (toward other human being but other animals too). This is particularly true in Northern European countries (Zanoli, 2004).

To this respect, European consumers appear to be more and more concerned about the so-called "food miles" issue that is the amount of miles that food actually "travel" from farm to fork – and this is also reflected in their attitude to organic products (Ellis, 2007). Our previous research has shown that – especially in German speaking countries (DE, AT, CH), in Denmark and in UK, consumers express preferences for buying organic food from their own region. Buying national, regional or local product allows consumers to care for their own and their family health, since products are perceived as fresher and richer in nutrients and vitamins. Low food mileage allows consumers to contribute actively towards environmental protection and sustainability. Buying locally also supports small-scale farming and local economy in general, and provides an opportunity to oppose to the globalisation of food industry, seen as largely in hand of large multinationals corporations (Zanoli, 2004)

The results of our study show that food miles have an impact on the level of trust consumers attach to the products (Fig. 3).

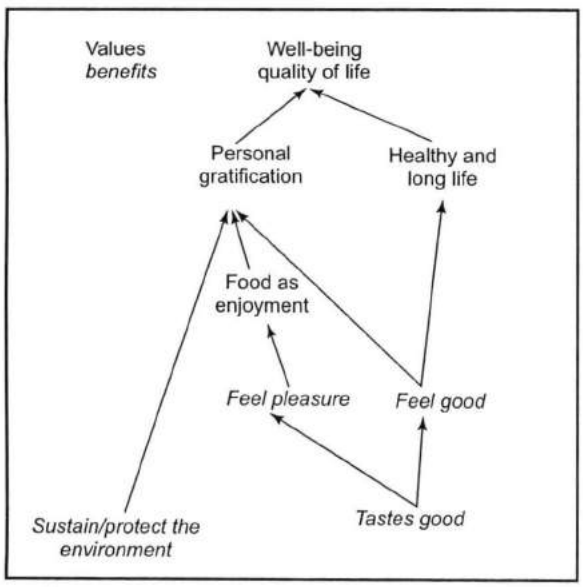

Fig. 2 Partial hierarchical value map (benefits and values) for organic products (*Source*: Zanoli, 2004)

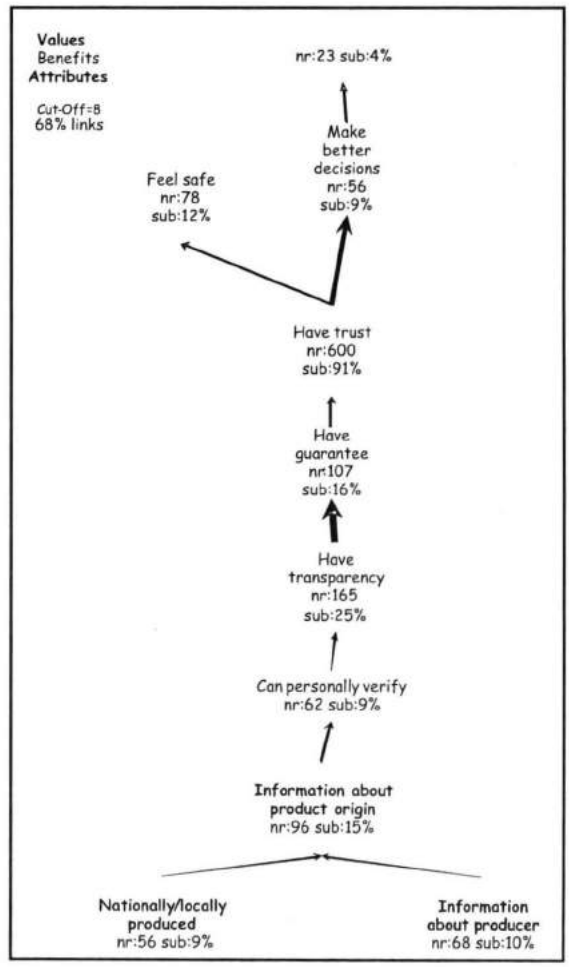

Fig. 3 Partial hierarchical value map of organic trust builders (n = 800)

The European consumer of organic food perceives local/regional/national products as safer and more trustworthy since they are easier to verify in person. In *imported* products, European organic consumers have shown to have preferences for products about which they have a high level of information about producer. The success story of so-called "fair trade products" (organic or not) in Europe show that not all imported products are badly positioned in the mind of consumers. There are, of course, products that are "naturally-born" as imported (e.g. tropical fruits, coffee and tea); but even organic products which are locally undersupplied (like pears) are well accepted. What are seen with suspicion are those products which are available on local supply chains but are often substituted by imported products due to commercial strategies by the distributors (because they have a much lower price if imported).

Strangely enough, albeit all consumers complain about the higher price of organic products, they do not seem to favour cost-minimizing distributors strategies. This is not only peculiar to the organic sector, though in this sector such complaint are more often reported by market research.

Conclusion

In case of highly-symbolic products like organic products, which consumers perceive mainly on the basis of "credence" attributes like the (organic) label, it is of paramount importance that product is positioned in terms of terminal values. This would favour a strong emotional involvement with the product, while in general food products are associated with low consumer involvement (Zaichowsky, 1985).

In the context of increasing competition and growing interest in organic foods, it is of primary importance to take into consideration factors affecting consumer trust towards organic products.

Imported organic products are often seen as less safe and trustable since consumer have lower information on how organic standards are met in foreign countries, and how inspections are performed. The lack of information produces a lack of confidence and cognitive dissonance, because he feels unsafe and lacking control over his own decisions. This affects the achievement of final goal – at value level – which is self realisation (Fig. 3). This attitude towards imported products is not very different to the attitudes of public towards immigrant workers. As the response to segregation and racist attitudes is to increase dialogue, multicultural understanding and mutual respect, the answer to better imported product positioning is also relational.

More information and transparency over the whole imported products' supply chain is of paramount importance to establish a higher level of trust. This cannot overcome the "food miles" issue, but can help in reducing the "cultural distances" between the consumers and the (imported) products.

As is well-known product positioning is highly influenced by communication and advertising. Communication strategies could be used to inform, educate and commit consumers. Considering people usually fully learn 80% of what experienced – against 20% of what is heard and 30% of what is seen (William Glasser) – experiential communication tactics should be used to improve product knowledge and product positioning.

Sampling and special tasting events at fairs and exhibitions are just examples on how to improve the perceived value of imported organic products by consumers. Beside a lateral marketing, value-based strategic approach is suggested. "Lateral marketing restructures a product by adding needs, uses, situations or targets unreachable without the appropriate changes" (Kotler and Trias De Bes, 2003). Claiming and building on a positioning based on self realisation, an organic exporter could develop new products, uses and situations that would re-position the product in the eyes of consumers. Although a minority of organic consumers will object even to importing bananas and coffee, most consumer welcome imported product which are seen not as direct substitutes of local products, but as an increase in the assortment. Although there are local varieties of rice grown in Europe, Basmati rice is not seen as direct substitute and competitor of such varieties by most organic consumers, since they have different usage in cooking.

Exporting "original", highly characterised food products will help to overcome the higher xenophobia expressed by organic consumers in Europe. At the same times, these products can be sold as "made in ..." without activating negative attitudes in the mind and heart of consumers. This will help to achieve better pricing and profit, since they will not be positioned as *low-price commodities* but as *high-quality/differentiated* products.

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Learning from Retail Experiences for Success in Exports of Organic

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India is one of the largest consumer markets in the world with over a billion population. The domestic food and beverages market is estimated to be about US$ 200 billion, growing at 6% per annum. While consumers who may be interested in organic food will be much smaller, it is still very big. Assuming a growth rate of 6% for overall food and beverages and market penetration of 2% for organic products in about 10-15 years, market for organic products in India can be US$ 7 billion (About INR 28000 Crores). The figures by any standards are huge and very few markets in the world can offer such market size.

Challenges in Domestic Market

But tapping this market has its own set of challenges—some generic and some specific to organic market. The generic challenges include poor logistic network, poor infrastructure, lack of national distributors, complex taxation and low penetration of organized retail. This imposes a lot of costs. Added to this the market is very competitive and traditionally food products operate on lower margins.

The organic market in India is at a very nascent stage and lacks critical customer base required to achieve some sort of scale. Though the triggers like health problems, growing disposable income and growing awareness are there, the challenge is to channel this into demand for organic products. In addition to above factors, the Indian consumer is extremely value-conscious.

Anyone interested in tapping the domestic market will have to simultaneously work on creating awareness, ensuring continuity of supply at reasonable prices. This requires a robust and dependable supply chain. Also there are not many choices in terms of product range and depth for organic customers. Hence one needs to offer a wide range of products to retain customers' interest. To achieve this an organization requires deep skills in supply chain management, managing costs, good technical skills, efficient value delivery and forging partnerships across the value chain.

Tapping Export Markets

The organic markets in developed countries are going through an exciting phase with high market growth, growing consumer base and a lot of innovation. This provides an ideal opportunity for exports from developing countries. The worldwide market is estimated to be more than US$ 30 billion, growing at the rate of 10-13% per annum. About 90% of the market is split almost equally between US and Europe. On the flip side, supply has also increased tremendously, the retail consumer prices, suppliers average unit values and profitability have been coming down steadily. The main competition for Indian organic food exports are from Latin America, Mediterranean countries and China. Latin America and Mediterranean region is favorably located for both US, and European markets and has an edge both in terms of supply choices, product variety and lower freight. The market is also mostly dominated by spot trade. With conventional food companies and retailers entering the organic trade the commercial dynamics have changed to aggressive negotiations and demanding terms by importers. The quality standards have also gone up tremendously.

The key success factors for success in export markets are scale of operations, high quality, ability to adhere to schedules, strong finances and highly efficient operations.

Leveraging Strengths Across Markets

By and large capabilities required for succeeding in domestic and export markets are same. In export markets apart from competing with domestic players one has to contend with players from other countries. Both require a strong supply chain to ensure reliable supplies. Efficiencies across the value chain along with scale of operations are important to ensure that the end product is competitively priced. Leveraging across both markets also leads to economies of scale over a period of time. This ensures that the fixed costs are spread over larger volumes and gives room to price products reasonably. Initially operating in domestic market also gives opportunities to improve quality, fine tune the supply chain, put systems, processes and people in place. This would greatly help in responding to export client's requirements. It is critical that one maintains highest quality standards so that it can meet the export requirements. The fluctuations in export prices and demand- supply are much higher. Hence a robust domestic presence would help to stabilize this.

Summary

The capabilities for success in domestic and export markets are similar. Scale of operations, robust supply chain, high quality standards, efficiency across the value chain, good systems, process and people band-width. Initially operating in domestic market helps to acquire the competencies particularly for start up organizations entering organic sector. A robust domestic market presence can contribute to strong export presence.

Global Trends in Organic Agriculture – Imbalances at Global Marketplace

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Keywords: Demand, growth, perspectives

Every year over the past decade the market for organic food has grown at double-digit rates. According to "The World of Organic Agriculture: Statistics and Emerging Trends 2007" from the International Federation of Organic Agriculture Movements (IFOAM) and the Swiss Research Institute for Organic Agriculture (FiBL), today there are over 120 countries involved in organic agriculture, with over 31 million has (76.5 million acres) being farmed organically on a global level. This is about triple the number that was reported in 2000, only seven years ago. Driving this growth is a booming consumer market that Organic Monitor has reported to be worth over $40 billion worldwide. This need for supply has led to a global organic marketplace. While this presents a world of new products and opportunities, it also comes with many challenges.

Supporting Growth of Organic Agriculture Around the World

Although growth rates have been incredible, organic agriculture still only represents about 0.7% of all agriculture worldwide. As the market grows and supply continues to be a major challenge, the conversion to organic production will be crucial for maintaining momentum. In USA, all 50 states now participate in organic agriculture to some extent, and those in organic cross their fingers, hoping that **2007 Farm Bill** will provide more dollars for research and certification subsidies to help encourage conversion. The European Union has added a rural development programme to offer incentive payments for farmers and has developed the European Action Plan on Organic Food and Farming, which includes a multi-annual EU-wide organic agricultural promotion campaign as well as a plan to improve farming standards and strengthen import and inspection requirements.

Though, many countries having greatest potential for organic production do not often have the knowledge, technology, or economical resources to enter the marketplace. For these key areas, many of which are developing countries, organic agriculture will not only help provide a livable income, but will also help build soil fertility on land threatened by erosion and degradation. In these countries, there is an essential role for governments, as well as manufacturers, to play in assisting conversion so that it is done to the highest standards.

Latin America

The Latin America represents about a quarter of all certified organic agricultural land in the world. It has become one of the largest importers to USA due to their tropical and subtropical climatic conditions. This growth has inspired several countries to step up their efforts to meet the demand. Recently, the Bolivian Government passed legislation to develop organic agriculture emphasizing positive benefits to health, protection of environment and opportunity to gain access to markets. These efforts go so far as to redistribute land to indigenous communities for organic farming, as well as provide farmer field schools to teach organic methods. According to reports, the Bolivian organic export market is worth around $25 million, with over

364,100 certified ha of land including quinoa, coffee, cacao, chestnut, amaranth, soy, onion, peas, broad beans, peanuts, as well as Andean tubers, grains, fruits and other underexploited crops. The Association of Organic Producers of Bolivia predicts growth will top $450 million by 2016. The market for organic quinoa alone has grown to 5,000 tonnes already. It is expected that this grain, which can only be grown in mountains, will reach 30,000 tonnes in next four years.

Brazil has also been very proactive, and issued a Pro-Organic Plan to stimulate organic production, research, association building, marketing and trade. In addition, Brazilian Export Promotion Agency (APEX) launched OrganicsBrasil, a project to promote the export of organic products, focusing on small to medium-scale farmers. Organic agriculture in Brazil represents less than 3% of the total agricultural production. However, there is an enormous potential for growth. Brazil intends to achieve 20% organic in the next 5-6 years, stimulated mainly by small producers.

Through OrganicsBrasil, producers have brought their products to trade shows around the world, connecting them with major retailers. Since the project began, the number of Brazilian companies involved has more than doubled. Most of the remaining parts of Latin America have developed their organic agriculture due to direct supplier/buyer relationships, however other countries are starting to get more involved. Costa Rica has approved funding for research and teaching. Argentina and Chile have official export agencies, helping producers to attend international fairs and print product catalogues. In Mexico, there is a growing interest in national and state agencies as well.

Asia

Asia has also had incredible growth in both their own standards and developing products for export. In India, Uttarakhond was declared an "organic state" in 2003. Recently, over 3,000 women staged a demonstration in hopes of seeing another state, Orissa, declared organic as well. Women are often the biggest victims of industrial farming in developing areas, as they are the ones harvesting pesticide-covered crops. In addition, indigenous traditional knowledge systems (ITKS), which are at the core of organic farming, are officially being validated by the ICAR, New Delhi, as recommended farming methods.

The Thai government spent 1.2 billion baht ($35 million) on National Organic Agenda and developed a National Action Plan for organic development with support from the International Trade Centre. The Action Plan helped stakeholders in Thailand have a clear idea of opportunities offered by organic agriculture for trade development and poverty reduction, and helped the government coordinate their policies. The Thai organic market is valued at $23 million, main export commodities being rice, fruits, vegetables and herbs.

China's Creditably Crisis

From tainted toothpaste to contaminated pet foods, China had the largest number of import violations in the past year. Although none of these scares involved organic products, the Chinese organic industry faces many challenges to gain the trust of the global organic industry and to become a credible source of organic products. One reason for skepticism is China's rapid conversion to organic. In 1997, China ranked 45th in organic production, with a land coverage of 4,000 ha. By 2004, China jumped up to 13th with 301,295 ha. Today, it is ranked number three with 2,300,000 ha. Currently, there are around 10 foreign certifiers in China. These certifiers account for 40% of all organic certificates issued in China and practically all the Chinese organic products exported to EU, North America and Japan are given the green seal through foreign certifiers.

While China's flawed import record and polluted environment do raise red flags, when it comes to organic the government has backed some key projects including the development and strict regulation of certified organic regions. One of these is WanZu in South China, which has over 45,000 acres of crops, with another 10,000 in transition, that are being certified organic to both EU and USDA standards. To ensure that

no pesticides are used, vehicles are searched upon entry. And, in many of these areas, if one farm is caught breaking the rules then the field and the products of the whole group will be rejected or fined.

One of the biggest concerns is that China prohibits surprise inspections. However, there is no such government rule in China. In fact, under China's organic standards, certifiers are required to perform a certain number of unannounced inspections annually. Also, some of the foreign certifiers are starting to take measures to ensure the certification quality by including unannounced secondary inspections, although these are not required by the USDA National Organic Program(NOP).

Another concern is the use of "night soil," or human excrement, as a fertilizer. This is allowed in China, with many restrictions, including that it must be fully composted and it cannot be used on leafy, tuber or root crops. This practice, however, is strictly prohibited under USDA guidelines, and therefore anyone growing crops for export to USA is banned from using this form of fertilizer.

Importing countries themselves have an active role to play in ensuring the integrity of organic products coming from China. Japan, for example, has some of the highest quality imports due to the strict examination of organic products by Japanese authorities. Some Japanese companies send their staff members to supervise the organic production and processing in China, thereby encouraging best practices in organic production and maintaining a high level of integrity. Many US companies that source from China also do their own cerification inspections or lab tests to check for heavy metals. Overall, China holds great potential as a major source of organic products given its vast agrogeographic diversity and its clear desire to be in the global organic market. From a strictly global perspective, credible organic production from China is crucial for addressing the shortages in supply, as it offers the ability to produce a variety of products in large quantities. The integrity and credibility of organic products coming from China, or other developing countries, hinges on the active participation of those companies sourcing there as well as the diligence of the foreign certifiers operating in those countries.

Facilitating Global Sourcing

Today, there are over 60 government regulations worldwide on organic production. These regulations are an essential tool for differentiating products in marketplace and often serve as an instrument of coordination, particularly in developing countries. While these regulations may lead to more organic farming, it does not mean more supply for US processors. Currently, USDA certification is the only one accepted for products labeled organic in USA.

To help provide processors with more sourcing options and give other countries a more effective way to do business with USA, the NOP has developed recognition agreements with several countries, enabling their governments to accredit certifiers to NOP standards. Their government entity can play the role of NOP within their country and the goods certified by these accredited agencies will be recognized as "USDA Organic." Currently, the NOP has recognition agreements with eight countries including British Columbia, Canada, Denmark, India, Israel, New Zealand and the United Kingdom. The recognition agreement between the NOP and New Zealand has been a very positive development and has stimulated organic activity, particularly in animal, dairy and off-season fruit production. In fact, 250 dairy farmers have transitioned to organic, major market being USA.

A downside to recognition is that it does not work the other way around, meaning that products certified under the NOP are not recognized by other governments. In this sense, the flow is only one way into the USA. Farmers then either have to pay for multiple certifications or hope that all of their product will be bought by US companies.

The ideal trade situation would be through equivalency, meaning that if a product is certified to an equivalent regulation then it may be sold in the USA, without having to be recertified to USDA standards. The NOP has been working on this process with Japan and came up with a list of three production inputs that are not

allowed in Japan. Thus, USDA products are accepted as long as they do not use these. The NOP has attempted this process with the EU as well, but negotiations have failed thus far due to differences in regulations, such as the allowance of antibiotics for animals under certain conditions in Europe, which is not permitted in the NOP standards.

There are still high hopes for Canada. This year, the NOP invited the Canadian Organic Office (COO) to send in the protocols for its new organic programme for review, a step that will formally initiate talks on equivalencies between two countries. At this early stage it sounds more like a recognition agreement than a comprehensive equivalency between the two programmes. But, there is such strong trade in organic between the two countries; we hope that this is simply the first step towards full equivalency.

On a global level, the International Task Force (ITF) on Harmonization and Equivalency in Organic Agriculture was developed to facilitate international trade and access of countries to international markets through both private sector and regulatory authorities. The ITF which is convened by the FAO, IFOAM and the United Nations Conference on Trade and Development (UNCTAD) is currently developing tools such as a common set of International Requirements for Organic Certification Bodies (IROCB) that will serve as a benchmark for equivalence.

The IFOAM also maintains the Organic Guarantee System (OGS), an international certification designed to facilitate the development of worldwide organic standards and third-party certification. The OGS includes basic standards for processing and production as well as accreditation criteria. Currently, IFOAM is revising the system and all those in the organic community are urged to offer their feedback regarding the proposed changes.

Up and Coming Challenges

Grower Group Certification

A grower group is typically a group of smaller producers that is regulated by an internal control system (ICS), which ensures the group's compliance. The IFOAM has established guidelines for this recognized as legitimate by the EU. However, the NOP announced this year that it would not continue to allow its accredited certifiers to certify grower groups because of a lack of direct third party (independent) verification on the farmer level. To solve this issue, IFOAM is working with the US National Organic Standards Board to develop a recommendation for certifying grower groups that meets both the NOP needs and follows the IFOAM guidelines.

If group certification was completely ruled out, prices would go up dramatically for US processors and consumers. The smallholders and cooperatives would face an unbearable competitive disadvantage compared to large plantations.

Agrofuel Production

Agrofuel, also known as biofuel, has the potential to be a reliable source of renewable energy, however there are issues. At the forefront are worries that the high prices corn is fetching for agrofuel will woo farmers away from converting to organic. Also, these production practices rely heavily on pesticides and synthetic nitrogen fertilizers and require extremely high land requirements to produce sufficient amounts of biomass.

Food Miles

With the rise in "buy local" campaigns, the issue of food miles, or the distance that food travels before it reaches the consumer, has become an important topic. As the demand for organic products has increased, so has the amount of products sourced from distant places, thereby increasing the amount of food miles at-

tached to organic foods. This practice has been criticized as unsustainable and inefficient on a per calorie basis. Others argue that organic's carbon footprint is balanced out because it requires less energy from farm to plate overall. Research from The Rodale Institute in the US shows that organic methods are far more effective than conventional methods at taking CO_2 from the atmosphere and fixing it as beneficial organic matter in soil.

Recently, the Soil Association in United Kingdom decided only to allow for organic air freighted products, if proven benefits for the producers are attached, like fair trade schemes. BioSuisse goes even farther and does not accept transport by air. It is indeed important to source locally whenever possible and we must think of ways to reduce our carbon footprint, however such moves could dramatically decrease the global conversion to organic while simultaneously reducing sourcing options and the variety of organic products available.

Country of Origin Labeling (COOL)

The USA will soon take steps to identify foreign imports as well. In 2002, legislation was passed requiring products to include the country of origin on labels for meats, fish, produce and peanuts. With the exception of seafood, implementation has been delayed until October 2008 but the Consumers Union is calling for immediate implementation due to recent safety concerns with imported products. A Consumer Reports poll found that 92% of Americans agree that imported foods should be labelled by their country of origin. A USA Today/Gallup poll found that more than half of consumers make an effort to buy US food.

A World of Opportunity

The organic movement must address the current and up and coming challenges, beginning with ensuring organic integrity of products coming from developing countries. These issues have everything to do with the exceptionally high growth rates that have created such a high demand, where in turn buyers and traders put pressure on developing country producers to get supply. This does not encourage best practices in organic agriculture. In fact, it seems like we have forgotten to nourish our roots, the farmers.

It is crucial that buyers sourcing from newly converted systems encourage best practice production using innovations that fit the values of organic and meet the expectations of consumers. Businesses should challenge themselves to look at practices and build relationships and trust with the producers that support and ensure the integrity of organic. If organic industry is able to address the questions arising around the credibility of products coming from developing countries and put mechanisms and practices in place that support best practices, potential for growth of organic marketplace is limitless.

As we grow this world marketplace, we must always be conscientious of our effect on issues such as the environment and social responsibility. Addressing environmental issues comes down to looking at things from more of a worldview. While we must reduce our carbon footprint as much as possible, when we step back and look at the positive impact that organic can have not only on the environment, but also the living conditions of farming communities around the world, it's easy to see that the good outweighs the bad. Overall, when looking at organic from a worldview, there are indeed a world of opportunities if we are willing to continue to go extra mile to ensure that the quality of our products is protected and the actions we take are responsible and for the good of the world.

The information have been taken from an IFOAM article for the Organic Processing Magazine

Public-Private Partnership Model in Organic Pineapple Export — A Case Study from Kolli Hills, Tamil Nadu

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Continuous use of inorganic fertilizers and non-application of organic material (litter) to soil leads to non-availability of food for microorganisms in soil, resulting in loss of biological activity. This creates a condition of plant growing only through inorganic fertilizer and accumulation of inorganic material in plant tissue. Thus, presence of inorganic residue in agricultural products draws international attention and people are switching over to organic farming methods and also prepared to pay higher cost for organically – produced agricultural foods, especially foodgrains, vegetables and fruits.

Kolli Hills is one such traditional tribal belt in India where people continue to practise natural farming. However, agricultural production sector in Kolli Hills suffer due to poor synchrony between production chain, supply chain and lack of value-added chain for marketing of cultivated crops and also calls for high-value chain marketing due to its difficult terrain. This leads to poor economic status in these areas even below their production potential. Hence, MS Swaminathan Research Foundation (MSSRF), Chennai, has identified organic market as an important marketplace for creating a value-added market chain for Kolli Hills tribal community. The MSSRF facilitated this organic market value-added chain with the help of Ion Exchange Enviro Farms Limited (IEEF) and created inter-national market tie-ups for tribal community through organic certification process.

Problem Setting

Kolli Hills is located in Namakkal district. Its inhabitatants are "Malayali tribes". They cultivate millet landraces such as little millet (samai), Italian millet (Thinai), and finger millet (ragi) and upland rice as upland rainfed crops under natural farming Banana, guava, pomegranate and jackfruit are grown in backyard of houses and farms. Rice is cultivated in low-lying valleys. Compared to other land uses wetland Rice cultivation in low-lying valleys has more inputs both in terms of fertilizers and labour. Tapioca, pepper, cardamom and coffee are cultivated as cash crops. People sell their commodities to Solakkadu, Thenpulam and Manapparai markets. These markets function twice in a week on Wednesday and Saturday. Merchants and middleman from neighboring towns procure the produces from these markets.

Red SpanishVaraity of pineapple *(Ananas sativas)* is cultivated under larger scale in rocky slopes as a rainfed crop. Though this crop is cultivated for commercial purposes they cultivate only through natural farming techniques with very low inputs like farmyard manure and labour. The tribal people walk a long distance from villages in early morning to sell them. Although there is heavy demand for pine apple in inland and abroad, due to middleman operation the farmers sell at lesser cost many times. Price fluctuation in local market, longer distance to market facility, lack of adequate transportation facility, middleman exploitation and improper payment by middleman are identified as key issues.

Process

Processing, value-addition and marketing of organic produce was initially attempted to increase the income of tribal farming communities in Kolli hills. Among 14 panchayats in Kolli Hills four panchayats (Vazhavandhi Nadu, Ariyur Nadu, Tripuli Nadu and Gundur Nadu) were identified based on pineapple cultivation. Participatory Rural Appraisals and open group discussion were conducted with local farming communities to identify the issues related to Pineapple cultivation and marketing.

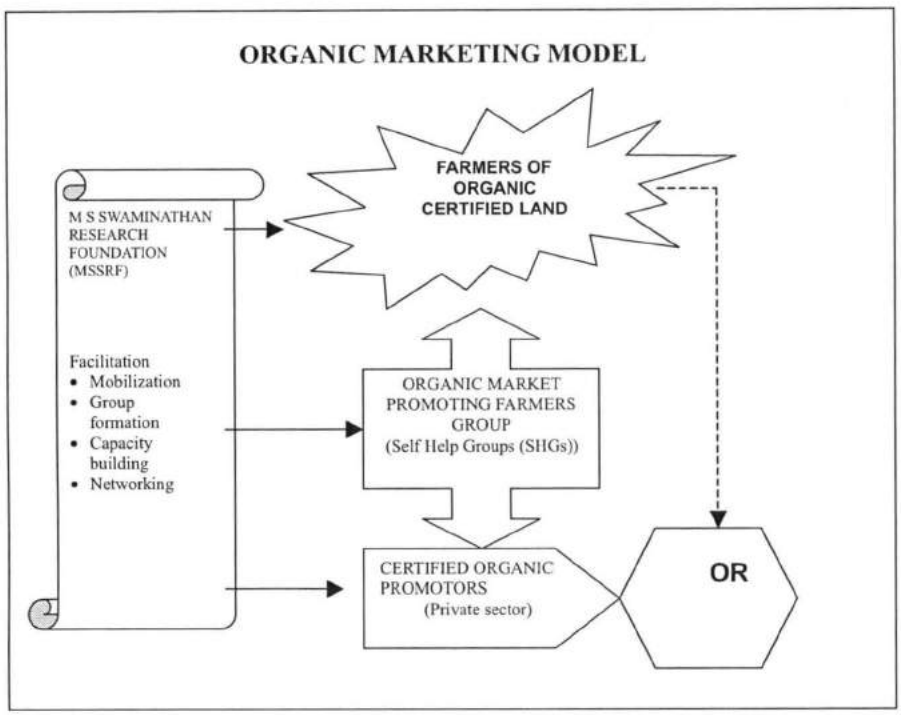
Local level processing and value-addition of fruits especially pineapple was identified as the first step. The survey conducted with local stakeholders like farmers and cooperative society about the possibility of launching a value-addition unit in Kolli hills revealed that the existence of defunct co-operative fruit processing unit in Kolli hills. The same is suffering from frequently interrupted power supply and non-availability of required good quality water. This was again discussed with stakeholder groups revealed that it needs larger level development programmes involving the state funds. Further, stakeholder group decided to identify the market potential in domestic market but the effort was not succeeded because of bulk production in one season. Cold storage facilities and cold storage vagons for transportation was lacking.

As this was getting complicated at every step, MSSRF conducted a series of brain-storming sessions among farmers, group at four different locations and decided that to explore the possibilities for export market for fruit products. It was found that these produces have tremendous market potential in the International Organic Market, since Kolli hills farmers are cultivating fruit crops under natural farming. The farmers also agreed to avail organic certificate from an International Organic Standard Certifying Agency. Following this, MSSRF mobilized the farming tribal people to form Self-help Groups (SHGs) with women, men and mixed members for managing these organic market procedures. The groups were formed in four panchayats having large area under pineapple cultivation. The SHGs groups were periodically trained at the MSSRF, CFTRI and Kurinji Organic Farms on organic farming techniques, export packing and standards for organic certification.

The organic export market involves heavy investment and also skills in managing the market demand and supply chain. Initially, farmers groups are tied up with a private agency with a memorandum of understanding to develop the capacity of the tribal SHGs both in terms of skills and corpus to handle the market. **Ion Exchange Enviro Farms pvt. Ltd. (IEEF),** Pune, based organic product exporting company was identified as a partner, which was legally strengthened by signing the MoU by IEEF Ltd and the SHGs and also with the MSSRF as a facilitator.

With the participation of SHGs, three collection centres in three different regions of pineapple-growing areas were constructed to reduce drudgery involved in local transport by curtailing long distance walk to market. The collection centres along with a weighing scale were built with the support of Rs 60, 000 grant for each centre from MSSRF. The analysis of average price per kilogram in local sandy was found to be three rupees, taking this into account the price per kilogram for organic market was fixed as rupees five throughout the year with the IEEF apart from this 50 paise for each kilogram of pineapple procured was allotted to SHGs as incentives in facilitating the process. Thus, SHGs agreed to pay for organic certificate. The same was also entered in MOU between the SHGs and IEEF and MSSRF as the facilitator.

During 2001, 2002 farmers were identified as organic farmers with 272 acres through field survey jointly conducted by SHG members, MSSRF staff and IEEF. The MSSRF has paid Rs 1 lakh for acquiring organic certificate on behalf of SHGs. It was decided among the SHGs that from second year onwards they would bear the entire cost of certificate from their incentives. **ECOCERT, Germany,** has been identified for certification to enable them to export to European countries. The MSSRF will continue to facilitate the farmers to get organic certificate and imparting improved organic methods and also help people to networking with banks and horticultural department for getting subsidized loans for cultivating pineapple through organic



methods and for getting quality planting material. In this regard, District Rural Development Agency (DRDA) and Indian Bank, Semmedu provided one of the SHG with Minidor Vehicle loan. Current year Inspection, 35 acre of land is also registered as organic fruit crop nursery for pineapple, banana, guava and pomegranate and also qualified for National Organic Programme (NOP) standards that enable them to export their produces to USA.

Prospects

Nowadays, pineapple-growing SHGs have sold around 280 tonnes of pineapple from 2001 onwards up to 2003 to IEEF Ltd, receiving around Rs 14 lakh instead of Rs 8.4 lakh by selling their product in local sandy. On an average, each farmer has got Rs 2,500 as extra income.

Organic Pineapples through Export Marketing in Kolli Hills Farmers

Year	*Quantity of (tonnes)*	*Value of farmgate price of produce (Rs)*	*Incentives for SHG (Rs.)*
2001	20	1,00,000	10,000
2002	105	5,25,000	52,500
2003	156	7,80,000	78,000

This ongoing efforts not only promotes the household stable income, but also reduces the drudgery and relieves the people from loss incurred due to fluctuating market demand and helps in safeguarding from over-exploitation of middlemen, promoting organic farming for sustainable livelihood of rural poors. Apart from this direct benefit, organic marketing strategy helps in natural resource management through retaining in management of their soil with organic manures.

Opportunities

The Kolli Hills tribal communities have greater opportunity for entering more and more into organic market since the system as a whole is still under the control of natural organic management. Even tapioca is also grown under limited fertilizer inputs and zero pesticide utilizations, there is greater potential for following:

- Widening the marketing scope for other agri produces from Kolli Hills
- Introducing organic product market in domestic market
- Improving organic quality standards of the agri produces.

Challenges

Kolli Hills tribal community lack in marketing skills, capacity building towards marketing techniques takes longer time. With regard to organic market lack of education has also been a major constraint for educating them towards maintaining records for Internal Control System (ICS), preparing documents and communicating. Though these difficulties could be removed through continuous capacity building by an organization like MSSRF. The organic certification process also delimits their bargaining power. In organic market, certifying agency needs elaborate documentation of organic fields beyond the capacity of tribal community. The tribal community do not have any hold in certificate since the transaction certification could be provided by an organization which have assert more than the value of the product certified. This creates a condition that only the transaction provider could fix the rates and buyer to their convenience. Here comes a question whether the organic market encourages the poor? Therefore, it is suggested that certificate could be provided to group of poor farmers by a certifying agency. The certifying agency could authorize a group of operators/multiple operators for issuing the transaction certification who are authorized by poor farmers' group where it provides space for farmers to bargain with multiple promotors. Besides, comprehensive support for organic farmers, especially from marginalized terrains in terms of building capacities for maintaining internal control systems, access to new technology, buyers contact systems, financial capital for certification, Government support for infrastructural facilities are prerequisites for self-sustained promotion of organic farming and export.

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CHAPTER V

Value-Addition and Processing

Organic Food Processing – Underlying Principles, Concepts and Recommendations for the Future

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Key words: Food processing, regulations for organic food processing, consumer perception, organic food

Abstract

Principles of processing of organic and 'low input' food have been analysed in the EU funded QLIF project. A literature survey showed that some of the principles are generally accepted (e.g. use of certified organic ingredients, a certified production chain and minimal use of additives), others are shared broadly (e.g. more careful processing methods, naturalness) and some principles are in discussion mainly in the private sector (e.g. environmental management concepts, social requirements, regional focus *etc*). Recent studies showed that consumer associate organic food with the following dimensions/attributes: health, high quality, use of natural raw materials, welfare-orientated animal husbandry as well as environment-friendly land-use and processing techniques. The challenge will be to consider such wider consumer perceptions and expectations, particularly when revising the EU regulation No 2092/91 on organic food and farming. In the current adopted Council Regulation (EC) No 8620/1/2007 Rev 1 of June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91, some of these elements are included, but not all. How detailed such aspects should be regulated in implementation rules is seen quite differentiated by processors and non-processors which were asked in a Delphi Survey, depending on different areas. At the EU regulatory level, top priority mentioned was minimal use of additives, followed by minimal and careful processing. Quality/sensory aspects, however, were not seen as primary objectives at the EU level, because companies should have the chance to develop individual sensorial profiles for their products. However regarding minimum use of additives, this is clearly perceived to be an EU level issue. There is also a tendency to prefer additives of certified organic origin, both among 'processors' as well as 'non-processors' points of view. The challenge in future will be to develop regulations with the right balance between authenticity, health orientation and convenience to maintain the confidence of consumers and credibility of products in the use minimum and careful processing strategies permitted under organic farming standards.

This synthesis chapter contains the final results of work done in a subproject on processing within the EU-funded integrated QLIF Project (Quality Low Input Food). A special work package dealt with the 'Development of a Framework for the Design of 'Minimum' and 'Low Input' Processing Strategies, which Guarantee Food Quality and Safety'.

Materials and Methods

The synthesis of this work is based on: a literature survey; a Delphi expert survey; an analysis of consumer studies and relevant regulatory framework; and elaboration of recommendations by the consortium involved in the subproject. A two-step expert survey was conducted using the Delphi method during October 2004-May 2005. In first round, 250 experts in 13 countries in Europe were asked to respond to a standardized questionnaire. The Delphi expert survey was designed in such a way that the most important and currently discussed aspects regarding organic food processing were taken up. One hundred and twenty experts from 13 countries responded in first round and 83 in second round. The experts were chosen in such a way as to have a good representation of food processors from different sectors, with different field of activities. In first round, 55% experts from food processing companies and 45% experts from non-processors (e.g. research, consultation, certification, consumer information, and governmental agencies), and the second round 46% experts from food processing companies compared to 54% experts from non-processors participated.

Results

Literature survey

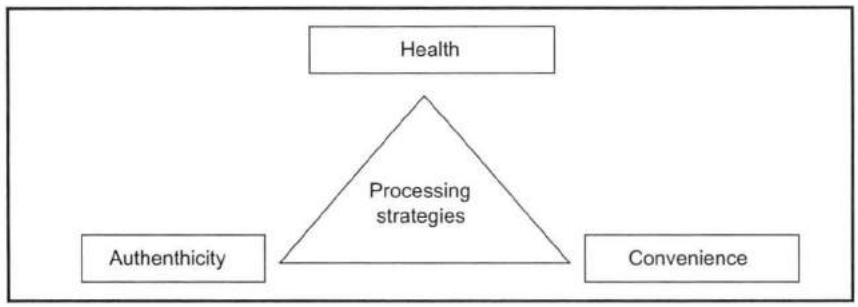
The literature survey (Schmid *et al.*, 2005) focused on underlying principles of organic food processing. These were shown to be quite different depending on type of product, level/standard of processing and marketing concepts. Some of the principles are generally accepted (e.g. use of certified organic ingredients, a certified production chain and minimal use of additives), others are shared broadly (e.g. more careful processing methods and naturalness) and some principles are under discussion mainly in private sector (e.g. environmental management concepts, social requirements and regional focus). Clearly, there was a lack of guiding principles and related criteria needed to make a decision about various processing methods until 2006. The report shows that current EU Regulation 2092/91 covers a number of consumer perceptions such as certification system, traceability, minimal use of additives, labelling concepts and use of organic raw materials. However, careful processing, freshness, healthy nutrition and fair trade are not fulfilled.

Consumers perception

The results from QLIF-subproject 1, which is dealing with "consumer attitudes towards quality and safety of organic-and-low input foods" (Midmore *et al.*, 2005), indicate, that consumer attitudes to organic food quality are often vague, unstable and link food to health, environment, ethics and identity. The surveys on organic consumer characteristics, consumer knowledge and product perception (Midmore *et al.*, 2005; Wier/Calverly, 2002; Woodward/Meier-Ploeger, 1999) emphasises that "merit good" features are associated with organic quality dimensions such as:

Use of natural raw materials; welfare-orientated animal husbandry; environment-friendly-land-use and processing techniques. The above arecontributing not only to individual benefits in terms of healthy eating, but also to social and environmental goals. The most intangible aspects of quality perception are found in emotional sphere.

The development of organic market shows a trend to more and more convenience and highly processed foods, because of changes in lifestyle among consumers buying organic products (Michelsen *et al*, 1999; Hamm *et al*, 2004). Can these different concerns and expectations be addressed at the same time? Is it time to re-assess carefully the meanings of "natural" and "authentic" of organic foods in growing markets (Gallmann, 2000; Holt, 1993; Meier-Ploeger, 2002; Nielsen, 2000)? (*see* box).



The concepts of a natural (whole-food) and sustainable nutrition in global organic food market are therefore currently under discussion. This includes topics of authenticity of foods and health aspects of organic processed food. The question is, if technical developments in food processing as well as revisions of standards or EEC regulation 2092/91 could influence and develop organic food production systems towards: (a) shorter and local supply chains, (b) minimum processing, (c) introduction of environmental management systems in organic processing companies. Such steps would be necessary to improve the match between currently available organic processed foods, current consumers perceptions and expectations towards such foods and the aims of EU regulation 2092/91!

Relevant regulatory framework

The new EU regulation 1924/2006 on nutrition and health claims of the EU Parliament and Council (Brussels, 2006) focuses on authenticity, product quality and health. In adopted Council Regulation (EC) No 8620/1/2007 Rev 1 of June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91, principles and criteria for organic food processing were elaborated. In overall principles agreed, strengthen the focus on a system approach to organic farming, which is based on using system internal resources, instead of external inputs. If such inputs are used they should be preferably from organic production or natural or naturally-derived substances and only in exceptional cases synthetic products. The proposed processing principles for organic food require use of organic inputs, restricting use of food additives, non-organic ingredients, micronutrients and processing aids. Substances and processing methods which may mislead consumers regarding the true nature of product shall be excluded (e.g. reconstituted fruit juice with a claim "natural fruit juice"). Food, but also feed, shall be processed with care, preferably by use of biological, mechanical and physical methods. The proposed general rules for processed food require that "substances and techniques, other than by adding natural flavourings, that reconstitute properties which are lost in processing and storage of organic food, that correct results of negligence in processing of these products or that otherwise may mislead regarding the true nature of these products shall not be used" (Brussels, 2006). The criteria for authorisation of certain products/substances in processing are that these substances (a) technologically needed, (b) found in nature and (c) may only have undergone mechanical, physical, biological, enzymatic or microbial processes, except for cases in which products and substances from such sources are not available in sufficient quantities or qualities on the market. It is, however, currently unclear how exceptions from the production rules regarding additives and other substances will be handled.

The proposed principles, rules and criteria for substances to be used in organic processing reflect to a high degree concerns of consumers as well as those of processors (*see* below). The principle of authenticity is clearly stated, but without using term as well as principle of care in the processing of food. The minimum use of additives, mainly from natural origin, remains one of the key issues, whereas environmental objectives are mentioned, but not defined as rules. Social rules are missing. Much will depend from the planned implementation rules, which the EU Commission will elaborate for 2009, when this new regulation should be put in force.

Approaches Used in Organic and Low Input Food Processing – Impact on Food Quality and Safety.

One focus of survey was to narrow and clarify definitions which are often used to characterise organic food processing. Based on the feedback from experts, we can conclude that instead of a final definition of terms, 'careful processing' and 'authenticity', a more elaborated definition of production methods, as well as good labelling would be more helpful for producers, as well for consumers. The intent of both principles/terms of 'careful processing' and 'authenticity' would then be addressed indirectly.

An important question was 'which aspects should be regulated' on an EU regulation level and which ones should be addressed at other levels (national, private company or label level) or should not be regulated at all. The feedback from experts was quite varied, depending on food processing area they were working in.

At the EU regulatory level, top priority was given on minimal use of additives, followed by minimal and careful processing. Quality/sensory aspects, however, were not seen to be primarily an issue that would need to be regulated at the EU level, because companies should have the chance to develop individual sensorial profiles for their products. Thus, we can conclude, based on the feedback from food processing specialists and processors in Delphi survey, that for the future revision of EU Regulation 2092/91, a more differentiated approach is necessary.

Which criteria are important for an organic product to be successful in food markets? For most experts the most important criterion is the sensory quality. The second most important criterion is the minimal use of additives and processing aids and third most important criterion is freshness, followed by authenticity.

In general, most of the experts expect special processing methods to be used in production of organic food. But when experts were asked more specifically what processing methods would be appropriate for organic food, they found it difficult to select those methods that are usable/suitable or not usable/suitable. However, use of additives was clearly seen as an issue that needs to be regulated at the EU level. There was also a tendency to prefer additives of certified organic origin both from the processors' and 'non-processors' points of view.

Code of Practice

The expert consultation has shown that there is a lack of clear guidance for operators on how to translate given regulations into practices at company level. A 'code of practice' for organic food sector is seen to be a good instrument which would eliminate the need for describing all issues in detail in EU Regulation 2092/91. A number of problems which occurred during last years were caused by insufficient implementation of the rules of EU Regulation 2092/91. Guidance is needed on management level, but also for inspection/certification bodies, if more responsibility is given to operators (Beck, 2005).

Recommendations

The final recommendations for development of organic food processing are addressed to different groups of actors. Following examples are to highlight possible activities:

- Recommendations for the European Commission: Minimising the use of additives (maintain a restricted list); defining and promoting careful processing and authenticity of food; revising regulations for organic food and farming based more on principles, support for research projects.
- Recommendations for competent national authorities: national code of practice for organic food processing through initiating platform structures; support for research projects.
- Recommendations for private sector: new labelling concepts; food safety prevention and monitoring; sensory quality improvement; environment-friendly processing techniques. It is important that there be an ongoing debate regarding how it might be possible to respond better to consumer expectations while maintaining the principles of authenticity of organic food production.

Conclusions

There is a need for further discussion on processing, minimal use of additives, and practical concepts of authenticity of organic tools. The development of a code of practice would be a good practical instrument for the implementation of the existing regulation in practice as well to test and implement planned modifications (Beck, A. 2005). The challenge is to find a good balance between authenticity, health orientation and convenience.

Acknowledgments

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Value-Addition through SMEs for Successful Business in Organic Food Products

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Organic agricultural practices and marketing of organic food products are growing almost everywhere in the world. Through some countries rely on export, organic marketing continues to develop especially in West European countries, USA and Japan, where different forces affect success of market. The world market for organic food is about 28 billion US $, with a growth rate of 10-15%, the largest increase being in North America. Asia is expanding as a supplier in fresh agricultural produce, especially in fruits, spices, rice and tea.

Organic food production can be defined as an approach to agriculture where the aim is to create integrated human, environmentally-and economically-sustainable agricultural production systems. Maximum reliance is placed on locally or farm-derived renewable resources, and management of self-regulating ecological and biological processes, and interactions in order to provide acceptable levels of crop, livestock and human nutrition, protection from pests and diseases, and an appropriate return to human being and other resources employed. Reliance on external inputs, whether chemical or organic, is reduced as far as possible. Organic agriculture is also known as ecological agriculture, reflecting the reliance on ecosystem management rather than external inputs.

The objective of sustainability lies at the heart of organic farming and as one of the major factors, determining acceptability or specific cultural practices. The term 'sustainable' is used in its widest sense, to encompass not just conservation of non-renewable resources (soil, energy and minerals) but also issues of environmental, economical and social sustainability. The term 'organic' is best thought of as referring to the concept of the farm as an organism, in which all the component parts–soil minerals, organic matter, microorganisms, insects, plants, animals and humans – interact to create a coherent and stable whole. The key characteristics of organic farming include protecting long-term fertility of soils, providing crop nutrients indirectly and using soil microorganisms, effective recycling of organic materials including crop residues and livestock manures, controlling weeds, diseases and pests by relying primarily on crop rotations, natural predators, diversity, organic manuring, resistant varieties and use of limited thermal, biological and chemical intervention and extensive management of livestock.

Asian Food Market

The Asian food market is valued over US$ 600 million, the main share has been from Japanese market. The Asian region is expected to remain an important supplier of organic fresh fruits, tea and spices. There are about 500,000 ha of certified organic farmland in the Asia. In Sri Lanka, more than 17,000 ha of farm lands are certified as organic, covering 0.7% of the total in of the country. There is also 2,500 ha of land under transition stage. Although Sri Lanka still does not have a local organic certification system, percentage of land under organic is highest in the region. In most of the countries, certified organic cultivation is limited only to private organizations and large-scale cultivators. However in Sri Lanka, some of the small-scale farmers also reap the benefits of organic agricultural system, as many private enterprises are promoting organic food production in rural areas, so that they can initiate a supply chain through rural villages. According to a recent study, village-level organic farmer community network consists about 35,000 people. At present, there are several private

sector organic supply chains working smoothly for agricultural commodities such as black pepper, cinnamon, pineapple, lime, mango, coconut, cashew and medicinal herbs. In this process, exporter or processors use cluster village system and set up a collection point or a processing centre in a central place close to the cultivating area. The contractor not only certifies the lands of villages, but also runs a private extension arm to handle day-to-day issues of small farmers. Usually, contractor promotes a few agricultural commodities for a cluster of villages, so that farmers' income is stable throughout the year. This activity is a win-win situation for farmers as well as contractors, since farmers get a better price, while contractors get a better volume with less management issues. In addition small-scale organic farmer does not have to invest on high cost of certification and all his input supplies are also provided by contractor through his nucleus farm.

Organic Food Production in Sri Lanka

At present, Sri Lanka is developing a national organic certification system. The draft is now out for the public review. All organic farms and processing facilities depend on importing country certification, which is a major investment. However, when whole village is certified, the cost involvements are within the reach of contractor, as he has no capital investment of land or land preparation. The product during conversion period also is collected by this contractor, as he has a special market for such products under eco-label. Application of organic manure and botanic extracts is guided by the extension arm of the private contractor. However sometimes, there are technical difficulties in audit keeping of inputs and output as some of the small-scale farmers are illiterate. In such cases, fertilizer suppliers and crop collectors are assisting the farmers to keep records, which is a necessary activity of organic farming. The collectors are also keeping records of collection, which is known as product-with-a-face, so that they can track down any complaint from the later part of the value-chain. In this system, contractor will add value to commodities by means of primary or secondary processing, fair trading or using biodynamic cultivation practices. Hence, small-scale organic farmer will get benefits of value-addition without major investments.

Some of the traditional farming practices used by small growers is now adopted for organic farming system in Sri Lanka. In paddy, organic farming is mainly done using traditional varieties. However, this traditional paddy is cultivated using a new system, System of Rice Intensification (SRI), which originated from Madagascar, but now it has been gone through several changes to make it more suitable for local conditions. In SRI method, very young paddy shoots are transplanted at 10 inches distance. This method requires only about 40% of water compared with conventional one. The market potential of theses types of rice is high since they have quality characteristics similar to that of wild rice.

Fruit

Pineapple, papaya and mango are most popularly grown as organic fruits among small farmers. Dehydrated pineapple is major organic fruit product exported from Sri Lanka. A recent value-addition to dehydrated pineapple is to do the osmotic dehydration by using a local sweet product, which is prepared using the sap of a palm tree. In addition, caning of guava pulp, mango pulp and pineapple in pineapple juice is produced in large quantities. The frozen single strength juice is also produced for pineapple and passion fruit.

Spices

Spices are another popular commodity among small-scale farmers. In Sri Lanka, most of the spices are grown in backyards of small scale farmers. The farmers usually do not use any chemical fertilizers or pesticides. Hence, it is somewhat easy to convert to certified organic products with some financial and technical inputs. Since spices are grown in village home-gardens, a new concept has been created to certify these organic

products as *Kandiyan-Home-Garden* products. It is now internationally accepted. Due to small farmland issue, maintenance of quality of the product is a serious issue in spices. However in organic sector, quality problems were handled by initiating central processing units, which are built and managed by contractor.

Vanila

Vanilla is another crop, requiring manual labour, for cultivation as well as for processing. Hence, cultivation of vanilla is more suitable in small-scale farming since each and every flower has to be pollinated manually during 8:00 – 10:00 AM because flowers bloom only for a few hours. The curing of pods should also begin the same day of harvesting. The curing process, which involves blanching, shade drying during day time and bundling and curing during night time takes about three months to obtain optimum flavour. Therefore, traditional technologies available with farmers are promoted to obtain high quality organic vanilla.

Cinnamon

Cinnamon is an important crop in Sri Lanka, producing more than 90% of the total world requirement. About 80% of its crop is produced by small farmers, having land holding of less than 2 acre. Cinnamon is an expensive commodity compared to cassia, and cinnamon drying and curling are labor intensive activities. Organic cinnamon is very expensive commodity and further value-addition is done by processing to a special grade–Alba, which is preferred by buyers. Most of the local spices are used to extract essential oils. Even though oleoresin extraction is possible, it is not usually carried out for organic products in Sri Lanka, as the extraction methods are very expensive. However, essential oil extraction process is essentially a steam distillation activity. The traditional distillation units are as good as their modern counterparts. The current market price of organic cinnamon bark oil is about US $ 400 – 500/ liter depending on constituents. Some of the organic essential oils are fractionated as per customer requirements as further value-addition.

Coconut

Coconut is a nationally important commodity in local diet and also providing foreign exchange. Its crop is very sensitive to moisture stress and converting to organic shows the benefits in less than couple of years. The main issue of coconut lands is low carbon content in soil, which results in poor fertilizer and moisture retention. In addition, application of NPK has now aggravated the situation by depleting micronutrients. Hence small-scale farmers and estate owners are also in the process of applying more organic matter to their coconut lands. Most of the small scale farmers own at least 5 coconut trees. The organic farming has improved their yield in addition to increase the plant vigor. Some of the cultural practices such as growing nitrogen fixing plants, having a cover crop, collecting water bodies and animal husbandry are well-adapted in organic farming of coconut.

Tea

Since Sri Lanka introduced organic tea to the world market in early 1990s, it is gaining popularity especially as a health beverage. However, local scenario has changed since then and now small tea holders are producing more volume of tea than that estates owners. Since tea has been growing in the same field for a long time, there is a yield drop initially, when converted to organic but the decline levels off after about two years. The small-scale farmers also have other crops in the same field as their plant density is low. As a shade having avocado trees and as a ground cover *gotu-kola* is a common practice by most of small-holding organic tea growers. Producing flavored tea is a common value-addition practice in tea trade. Hence, flavouring with natural ingredients has been

initiated in organic tea and is doing well in local as well as international market. In addition, traditional herbal tea and functional tea have been introduced to market and the initial response is very positive.

Cashewnut

Cashew is socially important crop as it grows in very dry areas, where no other cash crop grows. The Sri Lankan cashew fetches a very good price in international market due to its special flavour. Hence, growing of cashew through dry zone villagers has been initiated by several NGOs and private enterprises. To add value to commodity, some of the lands are certified as organic. Since cashew crop is seasonal, a few other dry zone crops such as *gotu-kola* and mango are also cultivated in the same land to get a regular income to small-scale farmers. In addition, cashew processing is a very labour-intensive, providing employment opportunities to rural villagers.

Hence, organic agriculture has created an excellent opportunity to promote rural agricultural produce of small scale farmers through small and medium business.

Value-Addition and Direct Marketing – Keys of Our Success

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Keywords: Innovative sustainable prosperity

All of us strive to add value to what we do. We look around / search, for noteworthy developments relevant to our work, and interest. We inspect, evaluate and modify such innovative developments as per our situation. Incorporate them in our work and get benefits and then pass on those benefits to others too. At NuTech farm, we have, in our 11 years' organic farming, learned some good things. We learnt, that proper marketing is crucial to realize best returns from perishable agro-produce and when the paying market is at a long distance from place of production, as in our case, this becomes even more important. So we set our sights on crop selection and value-addition to either lessen or overcome the perishability of the produce.

Here are some details of our Innovative approaches for such sustainable prosperity.

Innovative Approaches

Our farm size is 42 acre (17ha) near Rayan village in Kutch district of Gujarat. Since July 1996, we have gone total organic.

Crop Selection

As per our soil, water and agro-climatic situation, we decided to go for such crops which perform well. *Aloe vera* and fresh dates are the crops we chose for the farm & the criteria we kept in mind while choosing these crops were that: a) minimum pest and disease problems, b) we should be able to market directly, c) hold future potential and d) can withstand stress.

Generally, value-addition in agriculture being after harvesting. We believe it starts right from crop selection and goes on through cultivation practices as well.

Cultivation of *Aloe Vera*

Kutch has ideal agroclimatic conditions for growing *Aloe Vera.*

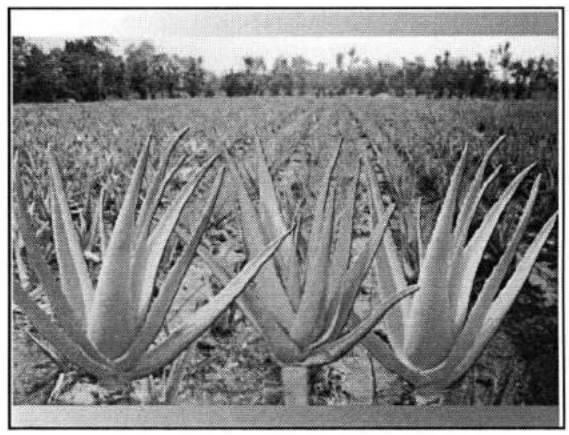
Sandy loam soil, minimal rain, energizing sunshine are ideal for its cultivation.

Variety : Aloe barbadensis has become quite popular now, but 9 years back we were lucky to have International Aloe Science Council (U.S.)'s guidance. However, those who have jumped into *Aloe vera* cultivation, without proper varietal selection, lament on their poor decision after 1 year !

Planting distance : Generally, farmers try to accommodate maximum number of plants in an acre, but considering ease of harvesting, weeding, irrigation management and active nutrient contents in final product, we have extra distance between rows. We plant on specially prepared raised beds, plant population is lowered by 24%, but attractive returns and ease of operations compensate for the same.

Sustained nutrition : Use of seaweed, algae, caltropis, euphorbia, and neem with FYM provides adequate P, K and micro nutrients, but for N, there had been concerns. Thanks to *Sesbania rostrata,* that sizable amount of organic N is available, About 45 kg/ acre in 50 days ! The *Sesbania rostrata* is a wonderful green manure crop, providing partial shade to Aloe in hot summer. Two times a year we do soil- drenching with panchgavya concoction.

Irrigation management : To have right balanced active nutrients, in final product, proper watering is as important as nutrient management. We have plants of *Adhatoda vasica* at strategic points in Aloe plots, with their large leaves, they are our irrigation indicators, even fertility indicators too.



Weeding : With adequate distance between two rows, we remove weeds in monsoon and in summer. Our friendly shepherd's sheep are allowed for controlled grazing in Aloe plots. A good win-win situation for the shepherd, sheep and us!

With all these innovative practices, we started getting very good quality of Aloe leaves with maximum active nutrient contents but that alone could not assure good returns ! Who would buy Aloe leaves ? We had to prepare stabilized product. So we experimented various methods to stabilize Aloe juice. Our efforts bore fruits and we were ready with stabilized *Aloe vera* gel which had best possible active ingredients.

As it so often happens, solution to one set of problem, is touchstone for whole new set!

We thought, here we are, with a good product which has so much of potential in cosmetics industry! We started approaching various cosmetics manufacturers, but *aloe vera* gel being a novel item those days, we were asked to educate how well and effectively aloe vera gel can be used as an input to make an active product. This resulted in more experiments and making different products.

Awareness about Aloe's wonderful medicinal properties, gradually started spreading in urban areas, like Mumbai. We availed services of an ayurveda expert & started combining aqueous extracts of selected herbs with stabilized aloe gel for specific health conditions. There were lots of things to be done again ! A core group was formed which tested our formulations. Had to apply to government agencies for relevant licenses, prepare right packaging, labels, brochures, marketing team, promotions . . .so many new things ! Obstacles arose, we overcame them. Problems surfaced, we solved them, people discouraged us, we ignored them. We understand that right direction matters most, speed will come up at destined time.

Our organic *aloe vera* cultivation is certified as per NPOP & EEC no. 2092/91 + EC 1788/2001 by Indocert)

Fresh Dates

Fresh dates is a delicious and a nutritious fruit. This may be something new for many !

Most of us know brownish (or blackish) processed wet dates (khajur). They are dried dates (sold along with high value dry fruits) while kharek is delicious fresh fruit, which is becoming popular now and holds tremendous potential.

The Kutch region has the best climate that suits kharek.

Selecting Kharek as our preferred crop is obvious for following reasons: (a) returns of Rs 1 lakh and above per acre even in poor soils, (b) trees prosper even in saline water where TDS (total dissolved solids) are 4000 - 5000ppm, (c) long productive life of average 70 years, (d) very low pest and disease problems, (e) fruits are available in June-July when most fruits are absent in the market, (f) presently, good quality kharek is marketed mainly in Mumbai and some cities of Gujarat, and has a huge all India market eagerly awaiting ! (g) can withstand draught.

Cultivation of Kharek

Right variety : There are no proven varieties of kharek. Recently, imported tissue cultured plants of Barahi variety have arived from Israel. But 20 years back, we used to visit different kharek farmers who used to have one or two very good trees, and such selected fruits were used as seed material.

Kharek is a diocious tree, i.e. male female plants are different. We maintain a ratio of 12 males : 100 females. Now of course, further propagation is done by selected suckers.

Our success in kharek has been partly due to rigorous exercise for best quality planting material i.e. thorough selection. Other factors of success are innovative cultivation practices, care in harvesting, grading, packing and ultimately direct marketing.

Cultivation: We are doing *in-situ* composting in trenches dug between every second row of kharek. Initial digging and filling up trenches is a costly affair. We use various kinds of biomass : dried leaves of kharek, branches of neem, weeds, aloe process waste, seaweed, green algae, caltropis, euphorbia, leaves, waste fodder etc. To trigger their decomposition, we pour special slurry or concoction of fresh cowdung, urine, bacterial cultures, topped up with honey, ghee, and buttermilk, and then do mulching. We also maintain adequate moisture in trenches.

Proper pollination, pruning and fruit bunch covers are also important steps for getting good yield.

With the onset of spring, each female tree produce 8-15 flower spathes or up to 30 as well in span of about 30 days, so whole of February, one person goes on doing hand pollination everyday morning. When the fruits develop to chickpea size, we select best 4-6 bunches and prune off others, in May-end or early-June. We cover fruit bunches with plastic covers to protect soft-skinned fruits from damage of early rains and even occasional dust storms

All this need a lot of efforts. Certain trees demand extra care. To prevent fruit-fall, we do drenching of castor oil in active root zone.

Sweetness and smoothness of fresh dates are key factors for better price realization and repeated demand. We belive our liberal

use of seaweed, green algae, cowdung slurry and drip irrigation impart unique sweet and smooth taste, our keeping quality is 20-25% better than conventional khareks.

Generally farmers go to fruit wholesalers or APMC markets. We were sure from the beginning that these were not our priorities. When we strive to produce such good fruits, we have to see that it reaches deserving people.

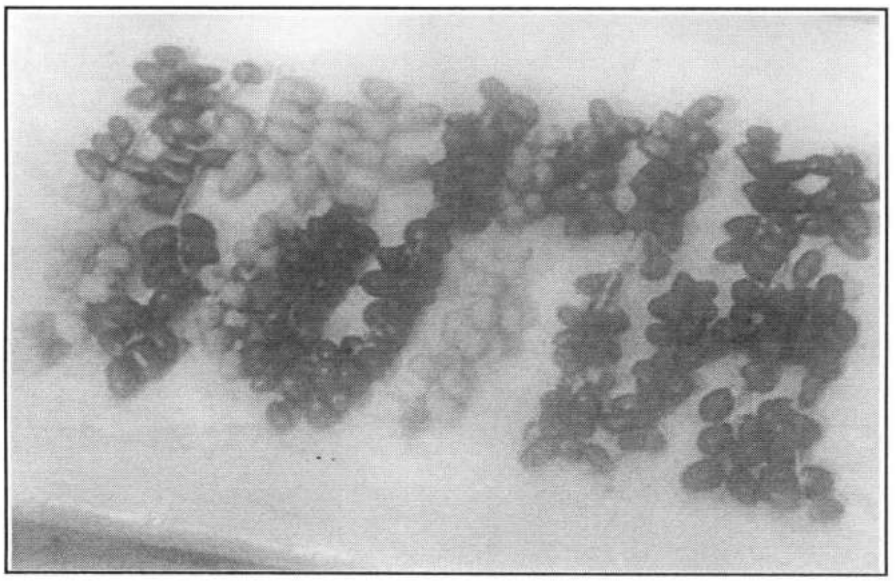
Our Kutchi Jain community has prospered well in Mumbai. In every-kharek season, they patronize by consuming good quantity of kharek and distribute among their friends and relations / business associates. Initially, we used to place small ad in our community's daily bulletin.

Just telling them that select kharek from NuTech farm has arrived. There were some friendly shop keepers (high-value food stores) who were ready to sell them. As the demand increased more sellers are approaching us. At Mumbai, we repack khareks in netted bags of 1 kg each, and do door delivery to shopkeepers and consumers for a minimum order of 10 kgs.

Our select khareks are light yellow to orange to red to purple in different sizes (20-70 mm), different shapes (round, elongated, conical and cylindrical) but all these have unique sweet, smooth & crispy taste. Now, we do not have to look for new buyers, every year we have standing orders, demand is more than what we can produce.

Our farm has been hosting woofers (willing workers on organic farms) since last 8 years.

We have had about 125 here so far, from various countries of world, some of these wwoofers have become very good friends as well.



CHAPTER VI

Organic Agri-Horti-Aquaculture

Wheat Productivity Under Organic Input Production System

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Abstract

A field study was carried out during rabi seasons of 2003-04 to 2006-07 at Students' Farm of CCS Haryana Agricultural University, Hisar (India) on different organic and fertilizer levels on productivity of wheat crop in moongbean-wheat cropping sequence. The maximum grain yield of 4,197 *kg/ha, was obtained where recommended dose of nitrogen through inorganic source was applied.*

Key words: Organic, fertilizers, wheat, yield

To sustain agricultural productivity, it is imperative to take care of soil, health and environment. In India, during past three decades, intensive agriculture involving exhaustive-high yielding varieties of cereals, particularly of wheat has led to heavy withdrawal of nutrients from soil. This results in an increase in consumption of chemical fertilizers but the trends of fertilizer-use efficiency is not encouraging. These erratic fertilizer-use patterns, if continued for years, would cause much greater drain on native soil fertility and soil may not be able to support high production levels in future. Therefore, in the event of nutrient turnover in soil-plant-system being considerably high under intensive farming, neither chemical fertilizers nor organic/biological sources alone can achieve production sustainability. Even with the recommended dose of fertilizer application, yield potential has reached a plateau as a result of deterioration of soil health in terms of depletion of organic matter and nutrients. It is therefore, the need of the hour to maintain and/or improve soil fertility for sustainable crop production through conjunctive use of organic manures and biofertilizers with chemical fertilizers.

Organic manures are important source of nutrient addition to soil. They not only provide nutrition to plants but also improve physical properties of soil in terms of improved infiltration, water-holding capacity, aeration and permeability, soil aggregation and rooting depth and decreased soil crusting, bulk density, water and wind erosions. These also increase biological activity in soil, reducing population of pathogens. Among various nutrients, nitrogen is required by wheat in large amount. It plays key role in enhancing the photosynthetic activity of wheat which results into high dry-matter production and consequently higher productivity. The nutrient-use efficiency is very low when supplied through chemical fertilizers as they are not properly utilized. So, as to maintain soil health with improving fertilizer-use efficiency, integration of chemical fertilizer with FYM may be one of the options, which can provide stability and sustainability in productivity of wheat crop with improved quality on long-term basis.

Material and Methods

The field experiment was conducted during *rabi* seasons of 2003-04 to 2006-07 at Student's Farm of CCS Haryana Agricultural University, Hisar (India), on different organic and fertilizer levels on yield attributes and yield of wheat in moongbean-wheat cropping sequence. The experiment comprised four treatment, viz.T_1, recommended dose of nitrogen through inorganic source; T_2, recommended dose of nitrogen through organic

source; T_3, 75% of recommended dose of nitrogen through inorganic source + 25% of recommended dose of nitrogen through organic source + biofertilizer and T_4, inorganic source based on soil test value with four replications in randomized block design. Organic manures were applied 28 days before sowing as per treatments. Entire amount of phosphorus and half of nitrogen was applied at sowing and the remaining half amount of nitrogen was applied at the time of earhead formation. The soil of experimental field was sandy loam, low in organic carbon (0.41%), low in available nitrogen (160 kg/ha), medium in available phosphorus (10.2kg/ha), and high in potash (341kg/ha). Analysis of variance was performed as per the standard procedures (Gomez and Gomez, 1984).

Results and Discussion

The data clearly indicate that how progressively yield increased over the previous year in the treatment where organic source of nutrition was applied. During 2003-04, the yield was 1,867 kg/ha, whereas it was 3,015 kg/ha during 2006-07. There was an increase of 61.48% where organic source of nutrition was applied during fourth year. Although maximum yield was recorded where recommended dose of nitrogen was applied during all the years. The gap in yield level was much higher in T_1 and T_4 initially which goes on decreasing in each successive year as shown (Fig. 1). These results are in conformity with those of Gosling and Shepherd (2005).

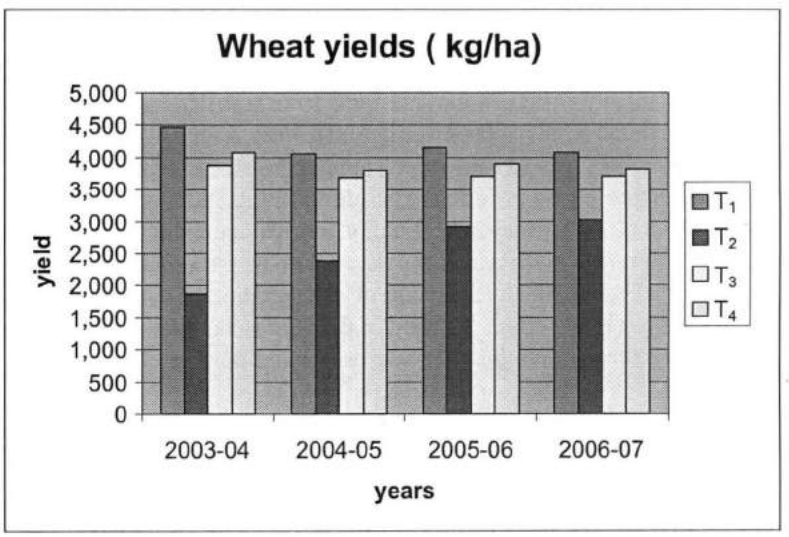

Fig. 1. Comparision of wheat yield during 2003-04 to 2006-07

The data reveal that number of effective tillers/m row in wheat was affected significantly. Maximum number of effective tillers were produced where recommended dose of nitrogen was applied through inorganic source. Inorganic source based on soil test value, 75% of recommended dose of nitrogen through inorganic source + 25% of recommended dose of nitrogen through organic source + biofertilizer produced more number of tillers than application of recommended dose of nitrogen through organic source during all the years. The maximum spike length was observed in recommended dose of nitrogen through inorganic source though it was statistically at par with inorganic source based on soil test value and was significantly higher than rest of the treatments. Minimum spike length was observed when recommended dose of nitrogen through organic source was applied during both years. Maximum number of grains spike was observed by recommended dose

of nitrogen through inorganic source which was statistically at par with inorganic source based on soil test value, followed by 75% of recommended dose of nitrogen through inorganic source + 25% of recommended dose of nitrogen trough organic source + biofertilizers (Table 1). The same trend was observed during all the years. The results are in line with those of Reddi and Patil (2003) and Sardana *et al.* (2002).

Table 1. Mean pooled data of wheat in moongbean-wheat crop sequence

Treatment	*Effective tillers/m row length*	*Length of spike (cm)*	*No. of grains /spike*	*1,000-grain weight (g)*
T_1 (recommended dose of nitrogen through inorganic source)	108.6	9.5	45.6	41.8
T_2 (recommended dose of nitrogen through organic source)	92.5	7.7	39.1	38.3
T_3 (75% of recommended dose nitrogen through inorganic source + 25% through organic source + biofertilizer)	104.1	8.4	42.1	40.0
T_4 (inorganic source based on soil test value)	107.7	9.1	43.3	41.1
CD (5%)	4.25	0.71	3.31	1.85

Table 2. Mean pooled data of wheat in moongbean-wheat crop sequence

Treatment	*Grain yield (kg/ha)*	*Straw yield (kg/ha)*	*Biological yield (kg/ha)*	*Harvest index*
T_1 (recommended dose of nitrogen through inorganic source)	4197	5806	10003	41.9
T_2 (recommended dose of nitrogen through organic source)	2547	3806	6353	40.1
T_3 (75% of recommended dose nitrogen through inorganic source + 25% through organic source + biofertilizer)	3744	5301	9038	41.4
T_4 (inorganic source based on soil test value)	3910	5382	9292	42.1
CD (5%)	298	544	976	NS

The maximum grain yield (4,197 kg/ha) was obtained under the treatment of recommended dose of nitrogen through inorganic source, followed by inorganic source based on soil test value during all the years (Table 2). The treatment with inorganic source based on soil test value was statistically at par with 75% of recommended dose of nitrogen through inorganic source + 25% of recommended dose of nitrogen through organic source + biofertilizer. Minimum yield was obtained during all the years under the treatment where recommended dose of nitrogen was applied through organic source. The similar trend was observed in straw and biological yield . Harvest index was not influenced significantly by the application of nitrogen through organic and inorganic sources. Similar results were obtained by Sharma and Manohar (2002) Sardana *et al.* (2002), Reddi and Patil (2003) and Stoeva and Loneva (2003).

The recommended dose of nitrogen through inorganic source produced significantly highest grain, straws and biological yields than other treatments except inorganic source based on soil test value. The yield levels increased every year in treatment where organic source of nutrition was applied. Wheat yield level was 60% where organic source of nutrition was applied. This shows that comparable and significant yield levels can be attained in due course of time under organic input production system without jeopardizing fertility levels.

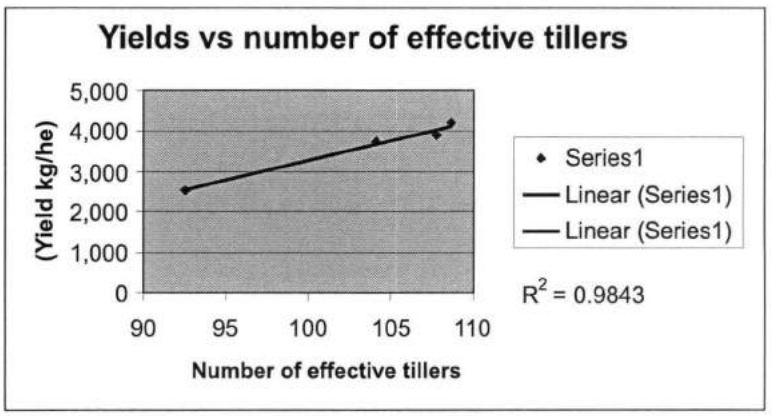

Fig. 2. Effect of tillers on yield of wheat during 2003-04 to 2006-07

There is a close relationship between pooled data of yield and effective tillers of wheat, showing the best fit curve (Fig. 2).

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Large-scale Promotion of Organic Farming in India

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Keywords: Organic, farming, traceability records.

Organic farming is a holistic management system, which promotes and improves the health of agro-ecosystem related to biodiversity, nutrient biocycles, soil microbial and biochemical activities. Organic farming emphasizes management practices involving substantial use of organic manures, green manuring, organic pest management practices *etc.* It based on minimal use of off-farm inputs and management practices that restore, maintain and enhance ecological harmony. Organic is a labelling term which denotes products produced under the requirements of Organic Foods Production Act. Organic farming methods help in healing our earth by returning vitality and nutrients to soil, keeping air and water safe from pollution caused by toxic pesticides and herbicides. The principal guidelines for organic production are to use materials and practices that enhance ecological balance of natural systems.

Sustainable Organic farming

Indian farmers were basically organic farmers before the advent of inorganic fertilizers and chemical pesticides. Use of synthetic inputs caused a concern to environment and human health. In recent past, this has become a major concern where consumers demand organically grown foods by not using chemicals. To make organic farming successful, it is essential that eco-friendly technologies, which can maintain or increase agricultural productivity, need to be developed and made available to farmers. Eating organic food is a great way to protect the environment.

Organic Status

Global: 24 mha (1.6% agriculture area); Nearly 130 countries produce organic product, Australia (10 mha) – lead country

Indian: 37,000-41,000 ha, (0.3% of the total area)

: 2.50 million ha (APEDA) (including 2.43 mha of forest area with wild herbs and medicinal plants.

Approaches to Organic Farming

Organic farming involves following five principles:

- Conversion of land from conventional management to organic management.
- Management of the entire surrounding system to ensure biodiversity and sustainability of the system.
- Crop production with the use of alternative sources of nutrients such as crop rotation, residue management, organic manures and biological inputs.
- Management of weeds and pests by better management practices, physical and cultural means and by biological control system.
- Maintenance of livestock in tandem with organic concept and make them an integral part of the entire system.

Main Issues under Organic Farming

- Standard
- Inspection, Certification, Accreditation
- Input
- Market (export/domestic).

Standards

Globally 61 standards available:

- Important standard includes – IFOAM, CODEX, EU, Demeter, JAS, Naturland etc.
- National standard in India under NPOP (2002) (General Principle, Recommendation, Standard, list (permitted/non-permitted)
- Mainly "process" standard, cover – cultivation, fertilization, pest/disease management recently under review.
- Efforts for harmony with EU regulation.

Certified Organic

Certified organic is a term given to products produced according to organic standards as certified by one of the certifying bodies. A farmer wishing to be certified applies to a certification body requesting an independent inspection of the farm to validate that organic farm meets their standards. Farmers, processors and traders are required to maintain organic integrity of the product and to maintain a document trail for auditing purposes. Products from certified organic farms are labelled and promoted as certified organic.

When certifying the business, it is important to know whether the markets for the products will serve some certification bodies have accreditation or equivalency agreements with countries in the EU (European Union), United States National Organic Program (USDA-NOP), Japanese Agricultural Standard (JAS), Standards Council of Canada (SCC), Conseil des appellations agroalimentaires du Québec (CAAQ) or other organic certification systems.

Main Markets for Organic Produce

In the EU, Germany is a leading country in terms of organic food production; followed by Italy and France. The EU and USA are approximately at the same level of organic food production, somewhere between 4 and 6 billion Euros per year, with Japan at third place. In respect of worldwide organic food consumption Denmark and Austria lead the way with 37.3 and 34 Euro per capita consumption per year. The average consumption of organics in EU and USA is approximately 16 Euro ($15)/ capita/year. The worldwide market share for organic products is 0.5-3%, but it is hard to determine, as some countries do not certify their products.

Global Market (Export)

- Current market = 26 BN US $
- Annual Growth = 15-20%
- USA = 11–13 BN US $
- Japan = 350–450 MN US $
- Europe = 10–11 BN US $

In the UK, demand for organic food increased by 55% in 2000. The organic fruits and vegetables sector represents 15-25% of total organic world market.

Exported to

- **Europe**: Netherlands, UK, Germany, Belgium, Sweden, Switzerland, France, Italy, Spain
- **America:** USA, Canada
- **Middle East**: Saudi Arabia, UAE
- **Asia**: Japan, Singapore

Source: Org. Marg = 2002)

India (domestic market)

- 31 organic products currently exported
- Number. of exporters = 69
- Organic value (2003) estimated = US $ 15.5 million (Rs 710 million, Indian)

Major Organic Food Products produced in India

Type	*Products*
Commodity	Tea, coffee, rice, wheat
Spices	Cardamom, black pepper, white pepper, ginger, turmeric, vanilla, mustard, tamarind, clove, cinnamon, nutmeg, mace chilli
Pulses	Red gram, black gram
Fruits	Mango, banana, pineapple, grape, passion fruit, orange, cashew nut, walnut
Vegetables	Okra, brinjal, garlic, onion, tomato, potato
Oilseeds	Sesame, castor, sunflower
Others	Cotton, herbal extract

Government Initiative (as facilitator)

- NPOP programme (2000), National Standard, Accreditation, Certification, Organic export through Ministry of Commerce, APEDA.
- Development of Organic Farming Technology package by the ICAR, New Delhi
- Launching of National Project on Promotion of Organic Farming (from. October 2004) (Rs 57.0 crore) (Tenth Five Year Plan).
  - Capacity building through service providers
  - Setting up of vermiculture hatchery, biofertiliser plant, fruit/vegetable compost plant (25% back-ended bankable project)
  - Human resource development through training, field demonstration
  - Setting up of model organic farm.
  - Quality testing and input production technology.
  - Market development, publicity etc.

Organic Farming under NHM Programme

- Adoption of Organic Farming with Traceability Records (e-Organic Agriculture) for Facilitation of export of Horticultural Crops from Uttar Pradesh.

- Implementation, Training and Certification of Organic Farming with Traceability Records (e-Organic Agriculture) for Facilitation of Export of Horticultural Crops from Uttar Pradesh.
- Adoption of Organic Farming with Traceability Records (e-Organic Agriculture) for Facilitation of export of Horticultural Crops from Punjab
- Implementation, Training and Certification of Organic Farming with Traceability Records (e-Organic Agriculture) for Facilitation of Export of Horticultural Crops from Punjab.

Implementing Agency

The National Agricultural Cooperative Marketing Federation of India (NAFED) Ltd. and International Traceability Systems Ltd, New Delhi.

Under Uttar Pradesh Project

The NAFED has successfully undertaken the project on "Implementation, Training and Certification of Organic Farming with Traceability Records (e-Organic Agriculture) for Facilitation of Export of Horticultural Crops from Uttar Pradesh". The work progress is in full swing in 25 districts, namely Mathura, Farukkabad, Kannauj, Pratapgarh, Ghazipur, Ballia, Sidharthnagar, Maharajganj, Lucknow, Mainpuri, Etawah, Rai Bareilly, Allahabad,Meerut,Unnao,Jaunpur Varanasi, Kushi Nagar, Sant Kabir Nagar Basti, Gorakhpur, Saharanpur, Agra and Ghaziabad with an allocated area of 15,000 ha. The project on Organic Adoption, Farmers training and IPM Promotion in Uttar Pradesh is in progress in Mathura, Farukkabad, Kannauj Pratapgarh, Gazipur, Ballia, Sidharthnagar, Lucknow, Saharanpur and Maharajganj with an allocated area of 3,300 ha,. Area, farmer and crop identification is completed in total 3,300 ha, 66 clusters with internal control system are formed. Organic management of crops including on-farm input management according to National Standards on Organic Production started under the supervision of devoted project staffs. The field staffs were trained on different aspects of project implementation including organic farming and certification and then send to their respective districts along with senior experts. About 3,300 ha of area was identified for organic adoption with 2,023 registered farmers along with identified crops including banana, mango, aonla and vegetables (cauliflower, chilli, cabbage, brinjal, lady finger, and potato).

Various activities of project

- **Farmers Training on Organic Adoption and Certification** had been completed in 9 district. Major national institutions which have excelled as premier institutes for farmers' training in latest concepts of agriculture as Indian Agricultural Research Institute(IARI), New Delhi; Indian Organic Certification Agency (INDOCERT), Kerela; International Competence Centre for Organic Agriculture (ICCOA), Bangalore, and Uttarakhand State Seed and Organic Production Certification Agency (USS and OPCA), Dehradun, were invited for this project and were actively involved in farmers' training.
- ***Soil samples:*** These have been collected and in process of analysis in various soil testing laboratories. Isolation and characterization of microorganisms through microbial profiling has been completed in collaboration with IIT, New Delhi.
- ***On-Farm Nutrient Management:*** Based on the data available from the detailed physical, chemical and microbial profile of soil, input were designed to improve beneficial microbes and to control the insect and diseases were designed.
- ***Enriched compost making:*** Preparations of enriched compost using soil reclamator as well as vermicompost, NADEP were demonstrated in each cluster.

- ***Traceability System:*** Data collected from field is being continuously uploaded in website especially designed for this project. Two websites have been developed and currently operative. They are: www.eagritraceup.in and www.eagritrace.in
- ***Market Promotion and Marketing:*** Initiatives have been taken for market tie ups with different retail chains. They are:
  - Reliance
  - Mother Dairy
  - Big Apple
  - Food Bazaar
  - Spencer's.

Indian Organic Certification Agency

The INDOCERT is the respective certifying body which is a nationally and internationally operating, certification body, accredited in India as per the National Programme for Organic Production (NPOP) by APEDA. It has been contacted for external inspection and certification.

Under Punjab Project

Under organic adoption and certification project, work progress is in full swing in 10 districts, namely Amritsar, Kapurthala, Jalandhar, Fatehgarh Sahib, Hoshiarpur, Ludhiana, Ferozpur, Bhatinda, Muktsar and Patiala with an identified area of 3,000 and 3,500 ha respectively. Farmer and crop identification and formation of internal control system for certification according to National Standards for Organic Production is in progress. Rest of all the activities have to be followed as per undergoing projects of Uttar Pradesh.

Conclusion

The popularity of organic farming is gradually increasing and now organic agriculture is practicsed in almost all countries of the world. According to a recent report of International Federation of Organic Agriculture Movements (IFOAM), total organically-managed area is more than 24 million ha worldwide. Organic farming is practised in 130 countries. Only 35% of India's total cultivable area is covered with fertilizers where irrigation facilities are available while in the remaining 65% of arable land, which is mainly rainfed, negligible amount of fertilizers is being used. The north-eastern region of India provides considerable scope and opportunity for organic farming due to least utilization of chemical inputs. It is estimated that 18 million ha of such land is available in the north-east, which can be exploited for organic food production. With sizable area under naturally-organic/default organic cultivation, India has tremendous potential to grow crops organically. The interest in organic agriculture in developing countries is growing because it relies on natural and human resources available, requires less financial input and provides safe food, conserving environment. Organic farming systems can deliver agronomic and environmental benefits both through structural changes and tactical management of farming systems. The benefits of organic farming are relevant both to developed nations (environmental protection, biodiversity enhancement, reduced energy use and CO_2 emission) and to developing countries like India (sustainable resource use, increased crop yields without over-reliance on costly external inputs, environment and biodiversity protection, *etc*).

Em Technology – Perhaps the Most Powerful Organic Tool

Sanjay Aggarwal, CEO, Maple Orgtech (India) Ltd,

India has off late become a food deficit country from earlier being a food-sufficient one. Though there are many factors that have contributed to this sad metamorphosis, one of the main factors identified by experts has been slow but gradual soil degradation due to overuse of chemicals and not feeding the soil on a consistent basis. The slow death of soil has mushroomed into increased cost for farmers to maintain current yield though yield have been dropping none-the-less. Increased use of pesticides has adversely effected ecological balance, leading to more deadly pest attacks.

The Problem

The Indian farmers have realized that chemical fertilizers are used for crop and not for soil, and all biocides kill pests but increase the problem. They in fact increase the problem by eliminating the farmer-friendly insects. Use of biocides to kill one pest is now being viewed as dropping an atom bomb on a town, which has one bad person! The ground-water is declining with an alarming rate across the country. It is estimated that more than 45% of fresh water available is used for agriculture.

Meanwhile, Indian farmers find themselves in a vicious cycle of using more and more inputs and getting lesser yield. This coupled with vagrancies of nature, are leading to a debt trap and thereafter most of the farmers suicide. On a macro-scale, it has been seen that cost of production is rising by over 4%, whereas returns are stagnant around 1.50%. This deficit is leading to more and more farmers coming under the debt trap and not able to repay their loans. It is estimated that more than 80% of farmers in such states are under this debt trap. This debt situation has been further aggravated with private money lenders offering loans at extremely high rate of interest. More than 14,000 farmers have committed suicide as a result in the past decade.

A change in agriculture is urgently needed as livelihood of more than 70% population is at stake, which still depends upon this noble occupation. Alternative technologies are viewed with a lot of skepticism by farmers. They suffer from lack of quality, lack of proper usage, cumbersome process or even effectiveness. This has been the main reason why many biological technologies have not found a permanent market. The Government has emerged as the single biggest customer.

The solution

Billions of different microbes make up soil food web. They synergistically work in soil to produce all nutrients that a plants needs. The type and number of microbes decide the nature of a soil. In the west, many laboratories measure the quality of soil by studying their presence. These are three basic rule which apply for a soil to be fertile they are:

- All microorganisms needed by plants are present and functioning.
- The desired level of nutrients for these microbes are present.
- The correct ratio of fungi: bacteria and predator: prey are present.

Many different microbes are present in soil. All of them have not yet been completely identified. Some of these are fungi, bacteria, nematodes, ectomycorrhizae, VAM, soil protozoa *etc*. In a stable ecosystem, these

microbes can be classified into three categories: natural microbes range from 60 to 70% of the total population, beneficial microbes from 15 to 20% and balance made up by harmful microbes 15-20% of the total population. Fertility of soil depends upon strategic ratio and can also be called ecological balance. With overuse of synthetic chemicals, intensive cultivation *etc*, population of harmful microbes increase, which retrograde soil quality and vice-versa. Thus, it can be safely stated that we need to focus on restoring ecological balance in order to gain maximum productivity at least possible cost for farmers.

EM Technology

The EM Technology helps in reversing this trend and bringing back this ratio in due course of time. In this background, EM (Effective Microorganisms) technology has emerged as a clear winner. It is a powerful tool for farmers to tide over a majority of their problems. The salient benefits of the technology for a farmer are:

- Composting can be carried out in record time with any type of biomass. Farmers are using it to make excellent compost out of coir pith in Kerela. Spices Board has even documented the same in a report to us.
- Composting can be done without the use of any cowdung. It is a blessing in disguise for farmers who do not have any livestock and yet wish to make compost.
- The farmers can make compost in the field itself. There is no need to make separate heaps to make compost.
- EM allows farmers to make various biopesticides using in farm waste. The cost is a fraction of conventional biocides.
- Farmers can make 'Bokashi', a fermented form of compost, with much higher nutrients and can be made in less than 8 days.
- It is extremely cost-economic.

The EM (Effective Microorganisms) was formulated by Dr Teruo Higa in early 1980s. Since then, EM has spread to 155 countries worldwide. He has offered EM as a gift to mankind. It is his vision that every living being on this planet benefits from this wonderful technology. The powerful benefits of EM over all existing organic technologies, makes people worship and call it 'Magic' sometimes.

It is a consortium of many microbes. The most common amongst them are Lactobacillus, Photosynthetic and Yeast. The microbes in EM are not Genetically Engineered (Non-GM), exotic or imported. It is manufactured by officials of EMRO (EM Research Organization, Japan) through a natural process in our state-of-the-art factory at Kolkata.

The microbes are both aerobic and anaerobic in nature. The liquid solution carries a pH below 3.50. It works under a wide variety of moisture, temperature and salinity conditions. The Lactobacillus bacteria forms a barrier against harmful microbes enhancing early breakdown of organic matter. Photosynthetic microbe forms the heart of EM and is a very powerful anti-oxidation agent. It creates useful substances like amino acids, nucleic acid and host of other enzymes beneficial for other microbes and arrests the formation of harmful gases. It arrests foul odour. Yeast acts as a bridge between these two microbes. It acts on waste produced by photosynthetic bacteria and converts it synergistically into inputs for Lactobacillus bacteria. It also produces useful substances for soil.

Maple is manufacturing and marketing EM in India. Maple also helps state governments, NGOs and corporate sector in designing and implementing projects aimed at sustainable rural development. The EM can be an extremely powerful tool for farmers to earn a better and sustained income. We measure this in the form of **CRY**. The income can be increased through reduction of cost of production (chemical input substitution and labour), better rates due to quality aspects (higher shelf-life, taste, appearance *etc*,) and better yield. The

farmers gain in rupee terms 18-40% depending upon crop type, soil type, climatic conditions and package of practices followed. As soil goes on becoming fertile, the gain is sustained over a long period.

There are more than 2,000 websites on the internet and over 3,000 technical reports available, where one can learn about EM. Though many universities and institutes have come out with excellent reports on EM Technology, the Government needs to take notice of this awesome tool and make it available across the country for the benefit of farmers like in many countries worldwide.

Already, more then 2 lakh farmers are using EM in India and more than 40,000 tonnes of compost has been made. Technical documentation is available to suggest that farmers have gained consistently with the use of this technology. The increased demand for technology and presence of more than 9 organizations selling spurious EM are evidence of its rising popularity in India!!

Organic Aquaculture

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Key words: Organic aquaculture, naturland, shrimp

Aquaculture is production of fish and other marine organisms under controlled conditions. Global rise in aquaculture reflects declining wild fish population in the world coupled with rising consumer demand for seafood. The brackish water area available in India for shrimp farming includes existing traditional prawn filtration fields also, which are located in Kerala and West Bengal. The vast filtration areas are actually paddy fields, where they glow salt resistant paddy varieties. The traditional prawn, filtration system is highly environment-friendly as they do not use antibiotics, chemicals etc. and hence paddy fields can easily adopt for organic aquaculture. The coal lands in Trichur district and the farms in Kuttanadu, Alleppey district of Kerala are also doing aquaculture close to organic standards after their paddy crops.

The problems with aquaculture today is use of wild fish for farmed fish feed, chemical and antibiotic usage, disease transfer, genetically modified species, massive destruction of mangrove forests for shrimp farm construction etc. Taking into consideration of all above said problems, MPEDA, the Marine Products Export Development Authority, Ministry of Commerce and Industry, and Government of India proposes to implement organic aquaculture in India by availing the consultancy and technical collaboration from the Swiss Import Promotion Programme (SIPPO), Zurich, Switzerland. Organic aquaculture ensures that farming activity is in harmony with nature, with due care for good health and welfare of cultured organisms. Organic products have become very popular nowadays due to rise in health and environmental and awareness, concerns on food safety. There is a growing demand in developed countries, especially USA EU, *etc*. The premium. for organic products is also high in international markets.

Organic Aquaculture

Organic aquaculture includes careful selection of sites for aquaculture farms, protection of adjacent ecosystems, prohibition of chemicals, natural remedies and treatments in case of disease, feed stuff from organic agriculture, fish meal and oil in feed derived from by products of fish processed for human consumption (no dedicated "feed fishery"), prohibition of GMO neither in feed stuff, nor in stock itself, processing according to organic standards.

Existing public/national regulations on organic aquaculture are France (special part on shrimp), UK (only for finfish/salmonids), Denmark (only for finfish/salmonids), Quebec *etc*. Upcoming Public/National Regulations on Organic Aquaculture are European Union Organic Regulation (binding for all member states from 2009, making single state regulations obsolete), USA National Organic Program (NOP) (expected about 2009/2010)- various countries, e.g. Brazil, Honduras with national organic programmes in various stages of implementation. Existing Private Standards/Certification Schemes on Organic Aquaculture are BioSuisse (Switzerland), Debio (Norway), Ernte (Austria), Krav (Sweden), Agrior (Israel), Soil and Off (UK), BioGro (New Zealand), Naturland (Germany).

Naturland

Founded in 1982, head office in Gräfelfing (near Munich/Germany).Accreditation by **IFOAM** *(Int. Fed. of Organic Agriculture Movements), USDA/NOP (Organic Regulation of the USA), Quebec Organic Regulation, and EN 45011/ISO 65 (Int. Requirements for Certifiers).* The uniqueness of Naturland standards is the standards addressing social aspects of production. Naturland standards for organic aquaculture includes site selection, species and origin of stock, breeding and hatchery management, water quality, stocking density, health and hygiene, oxygen supply, fertilization, feeding, transport, slaughtering and processing.

The India, organic aquaculture project (IOAP) is the first organic aquaculture initiative in India, taken up by the Marine Products Export Development Authority, Kochi. It envisages the implementation of organic aquaculture project for brackish water shrimp, *Penaeus monodon* (black tiger shrimp) and fresh water giant prawn, *Macrobrachium rosenbergii* (scampi), in Kerala and Andhra Pradesh. Naturland organic aquaculture standards are selected for certification due to international acceptance. Today, aqua farms in more that 20 countries are producing according to these standards, e.g. organic trout in Germany, organic shrimp projects in Ecuador, Peru, Brazil, Vietnam, Thailand and Indonesia. The INDOCERT is selected as the inspection agency considering our knowledge and experience with many organic projects nationally and internationally.

Conclusion

Under organic aquaculture project, stakeholders includes hatcheries for fresh water prawn and tiger shrimp, farms, feed mill and processing plants. The first expected certified products is on 2009. There is no certified scampi is available in the world, as a leading shrimp and scampi producer, India has good potential for organic scampi and shrimp production.

From Research Station, Farmer to Market: Expereinces of Horticultural Research Station, Ooty, in Organic Horticultural Research and Extension — A Case Study

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Keywords: Organic farming, technologies and constrains

The Nilgiris, the queen of hill stations, is the lungs of south India, due to rich biodiversity and dense shola forests in the ecosystem. During last three decades, agricultural scenario in the Nilgiris has drastically changed due to extensive and intensive cropping system with excess use of chemicals, which has led to cessation of microbial activity in soil system, paving way to high incidence of pests and diseases. Due to continuous application of chemical fertilizers, soil has become highly acidic (pH 3-4.5), with high deposition of salts and depletion of organic matter. The poor soil health has reflected in decline in yield of priority crops like potato, cabbage, carrot and beans.

The Experiment

To increase yield and to improve quality of organic farming system, trials were laid out at the farms of Horticultural Research Station, Ooty. The experiments consisted of four treatments. They are:

- Integrated biodynamic organic farming system*
- Conventional chemical farming (as practiced by farmers)
- Biodynamic + conventional farming system
- Absolute control (no set of treatments was given).

*Includes compost, biofertilizers, biocontrol agents, cow pat pit, horn silica and Agnihotra ash.

Results

In potato adoption of integrated biodynamic organic farming systems resulted in a total yield of 30.6 tonnes/ha, while it was 26.8 tonnes/ha in conventional system, (Table 1). There was 6.7% in crease in yield compared with conventional system.

Table 1. Yield vegetables under biodynamic organic farming system.

Treatment	*Potato (tonnes/ha)*	*Carrot (tonnes /ha)*	*Cabbage (tonnes /ha)*	*French beans (tonnes /ha)*
T_1, biodynamic	30.6 (6.7)*	30.5 (15.5)*	56.8 (15.7)*	21.9 (23.7)*
T_2, conventional	26.8	26.4	49.1	17.7
T_3, biodynamic + conventional	24.4	25.3	42.3	12.8
T_4, absolute control	17.9	17.4	28.0	10.0

* Values in parentheses indicate per cent increase over conventional method

The biodynamic organic farming system in potato cultivation recorded highest net profit of Rs 85,000, while the conventional treatment has fetched only Rs. 30,750 as net profit (Table 2).

Table 2. Net profit from cultivation of biodynamic potato, cabbage, carrot and French bean

Crop	*Net profit (Rs.)*	
	Biodynamic	*Conventional*
Potato	85,000 (176.4)*	30,750
Cabbage	1,59,775 (172.9)*	58,550
Carrot	2,07,500 (287.4)*	53,560
French bean	1,41,000 (321.5)*	33,450

* Values in parentheses indicate per cent increase over conventional method

Moreover, nutrient analyses revealed an increase in contents of major nutrients in carrot produced by integrated system. There is an increase in carbohydrate content by 59.4%, protein by 66.7%, vitamin C by 74.1% and b-carotene by 81.8% over conventional system (Table 3).

Table 3. Effect of biodynamic organic farming system on nutritive value of carrot variety Koroda

Treatment	*Carbohydrate (g/100 g)*	*Protein (g/100 g)*	*Vitamin C (mg/100g)*	*β carotene (mg/100g)*
T_1, biodynamic	20.4 (59.4)*	1.5 (66.7)*	19.5 (74.1)*	8.2 (81.8)*
T_2, conventional	12.8	0.9	11.2	4.51
T_3, biodynamic + conventional	12.0	0.9	11.0	4.48
T_4, absolute control	10.8	0.8	10.0	4.40

* Values in parentheses indicate per cent increase over conventional method

The effect of various farming systems was studied on carnation variety. Cobra. There was significantly more number of flowers/plant (13.5) and 20.5% over the conventional system (Table 4). The vase-life of organically-produced flowers was 14 days and 40% more over conventional system. Moreover, benefit: cost ratio of integrated biodynamic organic farming system was 4:3.

Table 4. Effect of organic farming on yield and shelf-life of carnation variety. Cobra

Treatment	*No. of flowers/plant/year*	*Shelf-life of flowers (days)*	*Benefit: cost ratio*
T_1, organic	13.5 (20.54)*	14 (40.0)*	3.4
T_2, conventional	11.2	10	2.3
T_3, organic + conventional	10.2	9	1.7
T_4, control	6.0	6	0.6
CD (5%)	1.6	–	–

* Values in parentheses indicate per cent increase over conventional method

Note: The flowers produced organically were sold @ Rs 4/flower, while those produced by conventional method @ Rs 3/flower.

The biodynamic organic farming system in rosemary recorded a herbage yield of 6.67 tonnes/ha, while it was 6.01 tonner/ha in conventional system. The increase in oil recovery was 22.2% composed with conventional system (Table 5).

Table 5. Effect of organic treatments on growth and yield of rosemary variety. RO-5

Treatment	*Yield (tonnes/ha)*	*Oil content (%)*	*Benefit: cost ratio*
T_1, organic	6.67 (10.9)*	1.1 (22.2)*	1.96
T_2, conventional	6.01	0.9	1.87
T_3, organic + conventional	5.56	0.9	1.68
T_4, control	3.33	0.8	1.11
CD (5 %)	--	NS	--

* Values in parentheses indicate per cent increase over conventional method

Market Potential of Organic Products

Demand for organic products is stemming in domestic as well as export markets. In South India, the demand increased to 115 tonnes per day in the Nilgiris district. The Nilgiris organic products are capturing high value and are being sold at 40% premium prices than other produce. Number of organic certified crops from the Nilgiris is given in Table 6.

Table 6. Certified organic produces from the Nilgiris

Crop	*Quantity available /year*	*Rate (Rs./kg)*	*Certifying agency*
		Plantation crops	IFOAM
Coffee	3 tonnes	72	Contact person:
Pepper	2 tonnes	66	Key Stone Foundation,
		Fruit crops	Key Stone Centre,
Wild amla	3 tonnes	6.50	Grooves Hill Road,
Mandarin orange	500 kg	30	Kotagiri-643217.
Lime	10,000 Nos.	0.75/fruit	Ph: 04266-272277, 272977
Strawberry	20 tonnes	150 – 180	email:greenshop@keystone-foundation.org
		Vegetable crops	
Potato	150 tonnes	15	Vanya Orr,
Cabbage	100 tonnes	10	The EARTH Trust,
Carrot	100 tonnes	10	13/19A6 Hema Cottage,
Cauliflower	50 tonnes	15	Bharatinagar,
Beans	100 tonnes	14	Ketty Post,
Peas	75 tonnes	32	The Nilgiris-643215.
Garlic	25 tonnes	50	Ph: 0423-2517036
Others	50 tonnes	—	email:vanya_orr@yahoo.com
		Aromatic oils	
Rosemary (fresh)	420 mt	20	SKAL NOP (USAD)
Rosemary (dry)	80 mt	80	Contact person:

(Contd.)

Crop	*Quantity available /year*	*Rate (Rs./kg)*	*Certifying agency*
Rosemary oil	120 kg	1800	HOPE,
Thyme (green)	40 tonnes	25	The Nilgiris.
Thyme (dry)	40 tonnes	120	
Thyme oil	10 kg	3100	
Eucalyptus oil	5000 litre	350	Ph: 9443047784

Training and Extension Activities on Organic Farming

The Horticultural Research Station, Ooty, has trained more than 13,000 persons which paved path to increase the area under organic farming in the Nilgiris up to 5,675ha. The impact of trainings on trend of synthetic fertilizer use has drastically reduced to 54.5% (Tables 7).

Table 7. Impact of training on organic farming on synthetic fertilizer use during 1994-2006 in Nilgiris district

Year	*Fertilizer consumption (tonnes)*	*Decrease in consumption (%)*
1994-1995	96,320	–
1998-1999	63,290	34.3
1999-2000	60,528	37.2
2000-2001	54,885	43.0
2001-2002	52,869	45.1
2002-2003	52,348	45.7
2003-2004	48,654	49.4
2004-2005	46,465	51.8
2005-2006	44,408	53.8

Table 8. Trend in pesticide consumption during 1994-2006 in Nilgiris district

Year	*Value (Rs, crores)*	*Decrease over base year (%)*
1994-1995	25.0	–
2001-2002	15.0	40.0
2002-2003	13.5	46.0
2003-2004	11.5	54.0
2004-2005	10.5	58.0
2005-2006	10.4	58.4

Similar to synthetic fertilizer, a decrease of 58.4% in chemical pesticide consumption has thus been achieved (Table 8).

Recommendations

The integrated biodynamic practices recommended for vegetable crops, viz. potato, cabbage, carrot and French bean, are listed below:

- Application of *Metarrhizium anisopliae* @ 20 kg/ha at the time of land preparation for management of white grubs in potato, carrot and cabbage.

- Application of *T. viride* and *P. fluorescens* @ 2.5 kg/ha each at the time of land preparation for management of root rot in carrot, blight and tuber rot in potato, damping off of cabbage, wilt of carnation and gerbera and root rot of rosemary and thyme.
- Spraying of 10% stinging nettle leaf extract 45, 60 and 75 days after planting for management of aphids in cabbage.
- Spraying of 10% extract of garlic, green chilli and asafoetida mixture 3 times 45, 60 and 75 days after planting for management of sucking pests like thrips
- Use of pyrethrum bait prepared out of pyrethrum flower, wheat bran and jaggery (2:1:1) for management of cutworms.
- Spraying of Dasagavya (3%) 5 times at 15 days interval from one month after planting to manage powdery mildew and leaf spots.
- Foliar spraying of 3% Panchagavya 3 times at one month interval to promote plant growth.
- Spraying of vermiwash (10%) 5 times at 15 days interval from one month after sowing.
- Spraying of cow pat pit (5 kg/ha) in 100 liters of water 45, 60 and 75 days after planting.
- Spraying of AgniHotra ash 3 times at one month interval from one month after planting to control die-back diseases of vegetable crops.
- Foliar spraying of horn silica at the rate of 2.5 g/ha 65 days after planting by dissolving it in 50 litres of water to increase yield and quality of vegetables.

Constrains

- Initial conversion requires minimum of 6 months to shift to organic farming.
- Lack of information on organic production.
- Imaginary fears on crop loss.
- Irregular supply of organic inputs in markets.
- Lack of coordination and inability to identify markets.
- Drastic reduction in cattle population and fodder.
- Lack of infrastructure facilities like cold storage, vacuum packing units, processing units *etc.*
- High cost and lack of information on certification of organic produces.
- Lack of support from Governmental agencies and other relevant departments in the form of subsidy and financial assistance.

Suggestions

- Intensive research on organic farming and networking of research information
- Increasing awareness and technical know-how through intensive training programmes
- Formation of farmers federation at state level to encourage organic produce demand
- Supply of organic inputs at subsidized rates
- Goverment funds may be given directly to practicing farmers through producer company concept (for farmers, of farmers and by farmers)
- Coordination with animal husbandry department to increase the population of local cattle breed
- Reintroduction of mixed farming system with sheep, goat and poultry
- Establishment of organic hubs which could serve as information technology centres and collection centres to facilitate and provide information on marketing
- Creation of better infrastructural facilities like processing units, vacuum packing units and community cold storage warehouses

- Improved credit facilitates for organic farming through banks
- Simplification of certification procedures, reduced certification cost and encouraging group certification
- Implementing Government policies that support organic farming
- Facilitating contract farming with super markets and multinational companies
- Introduction of organic farming curriculum at school and college levels
- Increasing consumer awareness on the values of organic products
- Sustainable livelihood of small farmers (74% of total in India) through low-cost biological approaches of crop production should be the focus of NHM.
- Resource centre on organic farming should be established under NHM and GOI at the Nilgiris to carter to the needs of expanding organic farming community.

CHAPTER VII

Organic MADP's

International Standard for Sustainable Collection of Wild Medicinal and Aromatic Plants (ISSC-MAP): Scope, Opportunities and Challenges

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Medicinal and aromatic plants (MAPs) have always been an important resource for human health-care from prehistoric times to the present day (Honnef *et al.*, 2006). According to WHO, majority of world's human population, especially in developing countries, depends on traditional medicine based on MAPs (WHO, 2002). About 40,000-50,000 plant species are used in traditional and modern medicinal systems throughout the world. Although trade volume of MAPs sourced from cultivation is increasing, number of cultivated MAPs is still relatively low. Most medicinal plant species are and will be sourced from the wild over the long term due to numerous factors: most medicinal plants are traded locally and regionally rather than internationally; costs of domestication and cultivation are high; and land for cultivation of non-food crops is limited. Moreover, cultivation is not necessarily most beneficial production system (Honnef *et al.*, 2006). Wild collection secures valuable income for many rural households, especially in developing countries, and may provide incentives for conservation and sustainable use of forests and other important plant areas. Hence, wild collected MAPs can be an important factor in source countries' local economies (Schippmann, Leaman amd Cunningham 2002).

Approaches to sustainable wild MAP collection that engage local, regional, and international collection enterprises and markets are urgently needed to provide specific guidance for industry, resource managers, collectors and other stakeholders on sustainable sourcing practices. To provide such guidance, the German Federal Agency for Nature Conservation (BfN), WWF and TRAFFIC Germany, IUCN Canada and the IUCN Medicinal Plant Specialist Group (MPSG) have put forth an International Standard, through a series of consultations with several experts and stakeholders, called the ISSC MAP, version 1 of which is available for implementation in different scenarios and test its utility in attaining sustainability to a set of prioritised species.

The ISSC-MAP has 6 principles and 18 criteria, which properly and objectively applied, envisage helping to render sustainability to the wild harvesting methods and level for prioritised medicinal plants (Annex are 1).

Four primary pathways for implementation of standard were identified during the development phase: certification (by an independent body or industry association), resource management, legal adoption and policy, and voluntary codes of practice. Existing standards for sustainable use provide relevant information with specific guidance on sustainable sourcing practices. Many existing guidelines on good harvesting practices focus on product quality. The novel aspect of ISSC-MAP is its focus on the ecological aspect of a sustainable collecting practise, as mainly reflected in its principles 1 and 5. For the first time, the crucial aspects of sustainable yield, regeneration rates, assessments and monitoring, adaptive management and taxonomic accuracy are being addressed.

The ISSC-MAP provides guidance for resource management and management planning that ensure long term availability of resources, and covers social aspects at the same time. Adhering to ISSC-MAP can offer better marketing options for products. The application of ISSC MAP http://www.floraweb.de/proxy/floraweb/map-pro/) has been tested in a community participation mode at two places in India, at Savandurga and Agumbe in Karnataka state.

Scope of Application

A study for development of methodology for sustainable harvesting of medicinal plants was initiated by FRLHT in collaboration with the Environmental Change Institute of University of Oxford and the local forest department during 2003.

Savandurga and Agumbe were sites selected for the study. The study was aimed to experiment merger of traditional knowledge with scientific methods of assessment for establishing a participatory adaptive management methodology for sustainable harvesting of medicinal plants from the wild. An innovative concept of constitution of local **TASK TEAM** was used to ensure participatory processes.

A Task team is a formal local group consisting of representatives from various stakeholders like local community members, members of VFC (Village Forest Committee), Self-Help Groups, local panchayat members, medicinal plants collectors, traders, healers, local NGOs and local staff of forest department.

Further the Task Team has been charged with following tasks:

- Select and confirm medicinal plants selected for study
- Develop data collection methodology and formats (see pictures)
- Document collection and utilization practices
- Evaluate collection practices in terms of its effect on growing stock, yield and regeneration
- Identify and demarcate sample plots in field corresponding to 3 harvesting regimes, viz. control (no harvesting), business as usual (unregulated harvesting) and best practice (regulated harvesting)
- Disseminate and train others through innovative process of CTCT (Community to Community Training).

Following have been identified as roles and expected outcome from different stakeholders. The local people seem to appreciate the need for harvesting the natural resource in a sustainable manner as well as about organic nature of the produce. They have realised the importance of wild collection as such a process does not involve use of any inorganic fertilizers or pesticides etc. and that will fetch more value to resource as raw material going into production of medicines.

Stakeholder	*Role*	*Outcome*
Task Team	Select, enumerate, keep records, analyse and carry out local level dissemination of learnings	Increased capacity to collect wisely and to train others
Village Forest Committee (VFC)	Reach out to other VFCs in the region and other people to join hands	Better dissemination and team building
Forest Department	Facilitate the study and incorporate learnings from the study into tender conditions and supervision of contractors	Study findings get mainstreamed into departmental functioning with respect to medicinal plant harvests
Self-Help Groups	Promote traditional use of medicinal plants	Savings in health care expenses by the community
FRLHT	Provide technical and financial support and disseminate the findings at the state and national level	Smooth working of the Study and increase in training capability

Source: Communication Strategy Leaflet, 1(1): January 2004, FRLHT

Opportunities

The current demand for herbal medicines and more than 80% dependence of the herbal industry on raw material collected from wild sources, provides a host of opportunities for introducing the standard at different

levels of medicinal plants operations, *viz* collection, transportation, storage and conversion of material. The application may range from voluntary adoption to regulatory compulsion. Existing principles and guidelines for conservation and sustainable use of medicinal plants address primarily the national and international political level, but only indirectly provide governments, the medicinal plant industry and other stakeholders, including collectors, with specific guidance on sustainable sourcing practices. For example, revised *Guidelines on Conservation of Medicinal Plants* (WHO/ IUCN/WWF/TRAFFIC forthcoming) and *WHO Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants* (WHO 2003) provide general recommendations addressed primarily to governments and other political stakeholders, NGOs, IGOs and businesses worldwide. These guidelines call for, but do not provide, concrete principles and criteria for conservation and sustainable use of medicinal plants. The ISSC-MAP provides a practical interface between general recommendations set out in these *guidelines*, and management plans that must be developed for particular species and specific situations

Challenges

There are many challenges to meet in developing and applying a standard set of principles and good practices leading to support of sustainable wild collection of MAP resources. These challenges include:

- Circumstances of ecology, habitat, and pressures on resources are unique for each species, requiring management plans that are specific to each MAP collection operation and area.
- The dependence of local communities on MAP resources for health and livelihood security is largely unassessed and unrecorded.
- Little research on harvesting techniques has been directed toward understanding how to collect wild MAP species sustainably.
- Maximum quotas for wild collection of MAP species are often based on overly simple and untested assumptions about the relationship between available supply and regeneration of MAP resources.
- Products, uses, and markets based on MAP species are numerous and diverse, with similarly numerous and diverse entry points for practices supporting sustainable use.
- There is a wide proliferation of labels and claims, such as organic and fair trade, which imply but do not provide a means of verifying sustainable wild collection.
- Long and complex source-to-market supply chains make tracing a product back to its source extremely difficult.

Annexure 1

ISSC-MAP Principles and Criteria

SECTION I: WILD COLLECTION AND CONSERVATION REQUIREMENTS

Principle 1. Maintaining Wild MAP Resources
Wild collection of MAP resources shall be conducted at a scale and rate and in a manner that maintains populations and species over the long term.

1.1 Conservation status of target MAP species

The conservation status of target MAP species and populations is assessed and regularly reviewed.

1.2 Knowledge-based collection practices

MAP collection and management practices are based on adequate identification, inventory, assessment, and monitoring of the target species and collection impacts.

1.3 Collection intensity and species regeneration

The rate (intensity and frequency) of MAP collection does not exceed the target species' ability to regenerate over the long term.

Principle 2. Preventing Negative Environmental Impacts
Negative impacts caused by MAP collection activities on other wild species, collection area, and neighbouring areas shall be prevented.

2.1 Sensitive taxa and habitats

Rare, threatened, and endangered species and habitats that are likely to be affected by MAP collection and management are identified and protected.

2.2 Habitat (landscape level) management

Management activities supporting wild MAP collection do not adversely affect ecosystem diversity, processes, and functions.

SECTION II: LEGAL AND ETHICAL REQUIREMENTS

Principle 3. Complying with Laws, Regulations and Agreements
MAP collection and management activities shall be carried out under legitimate tenure arrangements, and comply with relevant laws, regulations, and agreements.

3.1 Tenure, management authority, and use rights

Collectors and managers have a clear and recognized right and authority to use and manage the target MAP resources.

3.2 Laws, regulations, and administrative requirements

Collection and management of MAP resources complies with all international agreements and with national, and local laws, regulations, and administrative requirements, including those related to protected species and areas.

Principle 4. Respecting Customary Rights
Local communities' and indigenous peoples' customary rights to use and manage collection areas and wild collected MAP resources shall be recognized and respected.

4.1 Traditional use, access rights, and cultural heritage

Local communities and indigenous people with legal or customary tenure or use rights maintain control, to the extent necessary to protect their rights or resources, over MAP collection operations.

4.2 Benefit sharing

Agreements with local communities and indigenous people are based on appropriate and adequate knowledge of MAP resource tenure, management requirements, and resource value.

SECTION III: MANAGEMENT AND BUSINESS REQUIREMENTS

Principle 5. Applying Responsible Management Practices
Wild collection of MAP species shall be based on adaptive, practical, participatory, and transparent management practices.

5.1 Species / area management plan

A species/area management plan defines adaptive, practical management processes and good collection practices.

5.2 Inventory, assessment, and monitoring

Management of MAP wild collection is supported by adequate and practical resource inventory, assessment, and monitoring of collection impacts.

5.3 Transparency and participation

MAP collection activities are carried out in a transparent manner with respect to management planning and implementation, recording and sharing information, and involving stakeholders.

5.4 Documentation

Procedures for collecting, managing, and sharing information required for effective collection management are established and carried out.
Principle 6. Applying Responsible Business Practices
Wild collection of wild MAP resources shall be undertaken to support quality, financial, and labour requirements of the market without sacrificing sustainability of the resource.

6.1 Market / buyer specifications

The sustainable collection and handling of MAP resources is managed and planned according to market requirements in order to prevent or minimise the collection of products unlikely to be sold.

6.2 Traceability

Storage and handling of MAP resources is managed to support traceability to collection area.

6.3 Financial viability

Mechanisms are encouraged to ensure the financial viability of systems of sustainable wild collection of MAP resources.

6.4 Training and capacity building

Resource managers and collectors have adequate skills (training, supervision, experience) to implement the provisions of the management plan, and to comply with the requirements of this standard.

6.5 Worker safety and compensation

MAP collection management provides adequate work-related health, safety, and financial compensation to collectors and other workers.

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Organic Production Technologies for Medicinal and Aromatic Plants

K. Puttanna, E.V.S Prakasa Rao, C.T.Gopinath, T.N.Parameswaran, Alok Kalra, S. Ramesh and R.P. Singh. Central Institute of Medicinal and Aromatic Plants, Resource Centre, Allalasandra, Bangalore-560 065*
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Organic cultivation of medicinal and aromatic plants is gaining importance in recent years. When herbal products are used in pharmaceuticals, foods, flavours, perfumes and aroma therapy directly, without chemical extraction, residues and heavy metals can cause problems if conventional cultivation methods with chemical inputs are used. Pesticide residues have been shown to be present even in steam distilled essential oils[1]. Therefore, organic methods of cultivation of these crops are being developed in certified organic farm of Central Institute of Medicinal and Aromatic Plants, Resource Centre, Allalasandra, Bangalore.

Materials and Methods

Plants and trees with potential as green manure, pest control and other uses have been grown in farm borders. These are: neem, *Melia azadirachta,* pongamia, subabul (*Luecaena leucocephala), Albizzia amara, Albizzia lebbec, Glyricidia mauculata, Sesbania aegyptica, Erythrina indica, Acacia nylotica, Acacia mangium, Thevetia neerifolia, Sapindus indicus, Acacia concinna, Calotrpis purpurea* and *Annona squamosa.* Aromatic crops like citronella (*Cymbopogon winterianus*), palmarosa (*Cymbopogon martinii*), lemongrass (*Cymbopogon flexuosus*), *Eucalyptus citriodora, Bursera delpechiana,* patchouli (*Pogostemon cablin*), geranium (*Pelargonium graveolens*), rosemary (*Rosmarinus officinalis*), khus (*Vetiveria zizianoides*) and basil (*Ocimum basilicum*) and medicinal plants like *Aloe vera,* ashwagandha (*Withania somnifera*), brahmi (*Bacopa monnieri*), gotukola (*Centella asiatica*), *Coleus forskohlii,* tulsi (*Ocimum sancdtum*), periwinkle (*Catharanthus roseus*) and drumsticks (*Moringa oleifera*) have been cultivated using only vermicompost produced on-farm and biofertilizers as sources of nutrients. Vermicompost is produced from distillation wastes of aromatic crops and from weeds[2]. Pests and diseases have been found to be minimal. However, *Coleus forskohlii* can sometimes be affected by root rot. At present, there appears to be no satisfactory remedy for this. Control of this problem using microorganisms is being attempted use of biocontrol agents and PGPRs such as *Trichoderma harzianum, Trichoderma viride, Pseudomonas fluorescens Azotobacter*

Azospirrilum, P-solubilizing bacteria and *Mycorrhizae* for disease control, promotion of plant growth and enhanced supply of nutrients is being studied. When required, either neem oil (0.2%) or neem seed kernel extract (3%) was used for foliar spraying or soil drenching. Green manures like horse gram, *dhaincha* (*Sesbania aculeata*), luceme (*Medicago sativa*) and sunhemp (*Crotolaria juncea*) were grown in rotation with these crops. The organic farm was free from chemicals for more than 20 years but organic-matter content in soil was low (about 0.3%) at the time of certification. A comparison of yields of medicinal and aromatic plants obtained under conventional and organic methods of cultivation has been made[3].

Results and Discussion

The results showed that during initial years some crops showed a slight reduction in yield (about 20% less) under organic conditions compared to chemically fertilized plots (Tables 1 and 2). However, holy basil

*Presenting author

(*Ocimum sanctum*) and especially root crops like *Withania somnifera* and *Coleus forskohlii* performed equally well in both methods of cultivation. The crinkling disease of citronella did not occur in organic farming.

Table 1. Yield and quality of aromatic plants under organic and conventional farming systems

Crop	*Yield/(tonnes/ha)*		*Essential oil (%)*	
	Organic	*Conventional*	*Organic*	*Conventional*
Citronella	10	10-15	1.1	0.9-1.2
Lemongrass	12.5	10-15	1.36	1.0-1.4
Palmarosa	7.4	10-15	0.43	0.4-0.5
Geranium	11.8	10-15	0.38	0.2-0.35
Patchouli	6.4	10-15	3.9	3.0-5.0
E. citriodora	6.4	10-15	1.6	1.2-1.6
Rosmarinus officinalis	10	8-10	1.03	1.0-1.1
Ocimum sanctum	12	12	0.33	0.33

Table 2. Yield of medicinal plants under organic and conventional farming systems

Crop	*Yield (tonnes /ha)*	
	Organic	*Conventional*
Withania somnifera (dry roots)	0.4	0.3-0.4
Coleus forskohlii (dry roots)	9.2	10-15
Stevia rebaudiana (dry herb)	0.5	1.5-1.8

Under chromatography and high performance liquid chromatography, neither oil content in herbs nor composition of oil was affected. Soil quality is being monitored in organic farm. A substantial increase in organic carbon content (0.3-0.6%) is achieved in four years. Bulk density of soil is reducing. There are indications of increase in biological activity also in organic farm. This has resulted in increases in microbial biomass, phosphatase activity and dehydrogenase activity.

In medicinal plants, it may not be possible to recycle the crop residue if harvested crop is sold and taken away from the farm to far off processing units. Large to very large amounts of nutrients may be removed in this way. The cropes of *Centella asiatica* and *Aloe vera* remove a substantial quantity of potassium from soil and in course of time may cause potassium deficiency in soil. Application of seaweed products rich in potassium could be a solution for this problem. These crops also have antimicrobial properties. Due to that they may render biofertilizers and PGPRs ineffective. Research is needed for isolation and study of rhizospheric and endophytic organisms in each species with a view to multiply and use them for specific species and soils.

Conclusions

Aromatic plants, cultivated in organic farm, give yields similar to or slightly less than those under conventional farming. There is no change in essential oil content and there is no change in concentrations of major constituents due to method of cultivation. Medicinal plants can also be cultivated in organic farm with yields similar to or slightly less than those under conventional farming can be obtained. Concentration of active constituents in them is being assessed. Improved technologies using biocontrol agents, biofertilizers, and crop rotation are expected to bring yield on a par with conventional methods.

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Cosmetic's Value Chain in Europe with Natural and Organic Certified Ingredients

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Natural cosmetics have an increasing market acceptance worldwide. Today, the worldwide sales on natural and organic certified cosmetics are approaching 7 billion US Dollar, with an expected rise to over 10 billion US Dollar global natural cosmetic market revenues by the end of the decade. At present, Europe and North America, the two main drivers of growth in this sector, are responsible for the maturity of the one billion US Dollar growth the sector experienced in 2006, followed by Australia and Japan with strong growth in their organic and natural personal care markets. Characteristic for the present status of the markets is the mainstreaming in the patterns of product distribution with natural and organic products appearing in an ever-widening range of outlets, including departmental stores, pharmacies, hotels and supermarkets.

All the big competitors in cosmetic industry are looking at possibilities in green arena, like L'Oreal buying Sanoflore and the Body Shop. Estée Lauder introduced the line of "Origins Natural Resources" in 1990, and recently launched certified organic cosmetics line called "Origins Organics".

Regulations

Unlike for organic foods there are no national and EU regulations for the value chain of natural and organic cosmetics. An important step towards European harmonisation has been made in discussions between the Soil Association in the UK, the BDIH of Germany, AIAB of Italy and the EcoGarantie of Belgium, providing a joint discussion forum for European standards straight to the source. The current French system differs from other European countries like the UK, Germany; Belgium and Italy. The situation in England and Germany is reverse: Soil Association demands organic certification as pre-condition, in contrary BDIH is providing a natural standard for cosmetics, but not an organic one.

Consumer Interest

The trend for ethical beauty products — like luxury organic and ethical cosmetics lines aiming at "ethical chic" — appears to be driven by consumer interests. Mintel in a recent study found that 30% of the consumers feel it is important that manufacturers give a proportion of their revenue to charity. It appears that ethical claims remain a largely untapped resource for traders and manufacturers along the value chain, with only 9 % of make-up products stating that they donated money to charity. Companies in USA and Europe producing and marketing natural products from ethically sourced ingredients are dedicated to supporting the economy and environment in Africa with portions of their proceeds helping to sponsor specific projects and charities.

Current Trend: Ethical Products

This current trend for ethical products is likely to spread quickly into mainstream, like natural and organic movements have done before it, as more and more consumer's rate ethical concerns as important and manu-

facturers realize the impressive marketing opportunities. The latest developments in the market are the result of continued growth that is far above average growth within the personal care sector as a whole. In turn, it is leading to a market that shows signs of maturing by developing specific niches and characteristics. In recent years, growth within the natural and the organic market has continued to steam ahead at double digit figures, and is currently running at around 20 % per annum.

This growth, driven by increasingly knowledgeable consumers, means that the share of personal care market held by organic and natural category is rising significantly–currently standing at 8 % and projected to grow to 15% within the next few years. Alongside the obvious expansion in product development there has also been a significant expansion in the availability of natural and organic personal care ingredients and products in an increasingly wide variety of retail channels.

"Two-tier" Market

Most notable is the fact that such products are getting more and more aisle space in leading mass market outlets, not only serving to increase sales of such products significantly, but also helping to raise the profile, leading to the mainstreaming of such products. Together with the fact that the market for organic products is being fed by two distinct retail channels, it is also evolving in "two-tier" market.

The first tier comprises companies that have grown significantly in recent years, partly on the back of increased sales and partly benefiting from increased capital injections. At the other end of the spectrum, second-tier companies are continuing to grow, but at a smaller rate, as they continue to specialise on more traditional retail channels that are more closely associated with natural and organic products. This is leading to a widening gap between these two groups of companies, and it is one that is expected to widen still further as the two markets continue to evolve.

FairWild

A continuing rise in fair-trade personal care products is visible at cosmetics ingredients trade fairs in Europe. Recent increase in the labels for fair-trade for wild collected and cultivated cosmetics ingredients is based on the basis of private standards. As an important example the FairWild standard was launched by SIPPO and Forum Essenzia in 2006 (www.fairwild.org) implemented through a number of projects in Europe and Asia along the respective value chains.

Natural personal care companies support increasingly the sustainable and environment-friendly production of plant raw materials. Fair trade and fair co-operation with international suppliers are also part of the company philosophy of many natural personal care manufacturers. The financial partnership and the resulting purchase from farmers or cooperatives mean the money goes straight to the producers. The manufacturers create new and stable jobs through long term co-operation world wide.

Scenario in India

The cosmetics and toiletries industry in India is estimated to grow 27 % over 2006 to 2011 due to the countries strong economy performance and useful demographic structure. Like all emerging markets, the trends of India's cosmetics industry are expected to follow those of the more advanced countries, for example an expected growth in natural and organic certified cosmetics. However, significant differences in the market drivers suggest that the sector may not follow the expected patterns.

Market Drivers

Local firms active in natural sector focus on basic hygiene products and offer attractive discounts to reach India's rural low income population along their extensive distribution networks. In addition, Ayurveda experiencing a renaissance in India and many companies are cashing in on the trend by releasing Ayurvedic inspired beauty products. Furthermore, natural ingredients present an economic advantage for local players as natural and Ayurvedic ingredients are often cheaper than their chemical alternatives. Consequently, main drivers of India's natural products trend are the country's low income majority, rather than the consumer elite who are willing to pay the premium as it is the case in Western markets and other emerging markets. In a study Euromonitor highlights that the traditional driver of the natural market has been consumer concern over the safety of chemicals used in standard cosmetic products. India's consumer elite continue to buy the more expensive international brands, offering top of the range high-tech beauty products, and it is the sector of society that is tipped to drive market growth.

Organic, What is Next?

Over 1,400 new organic cosmetic products have launched in France, UK and USA since January 2007. At this rate this will triple what was launched last year. The face care category leads, followed by body care. Hair care products with organic ingredients or claims grew approximately 15 % driven mostly by innovation in the mass market. In fact, due to a variety of factors, organic claims are already being eclipsed by ethical considerations. Greater segmentation and new consumers buying into the organic ethos will account for some growth. Finally development of a global standard will do much to clarify what is or isn't organic and increase the credibility in the eyes of the consumers.

Ethical Production and Processing of Natural Ingredients and Fairtrade

Consumers in Europe are becoming increasingly concerned about what to put on as well as in their bodies. More and more natural products are evolving into organic and certified organic territory. The new organic ingredients and consumer products are now highlighting not just what is in them, but how they are produced. And so the next step in this organic evolution is ethical. This is a broad claim and encompasses:

- A focus on sustainable production methods
- Concern for the welfare of environment
- Use of alternative fuels
- Donation of part or all profits to a relevant charity, and
- Guaranty of fair price/decent living standard for growers in developing countries where ingredients are sourced.

The year 2007 was a tipping point for the eco movement. Being organic alone is no longer enough. Other consumer priorities (quality, safety, reliability and price) matter too. Issues with sustainability and confusion over what constitutes organic mean consumers will eventually default to natural ethical products.

REFERENCES

Organic overload http://www.in-cosmetics.com/page.cfm/link=224

Ethical chic http://www.cosmeticsdesign-europe.com/news/ng.asp?id=78839-organic-apoteke-lancome-ethical-natural-organic

Synergising Global Market Potential & Local Production Potential of Organic Madps

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Abstract

World Health Organization (WHO) has estimated that about 80% of the population of developing countries rely on complimentary and alternative Medicine (traditional medicine), for primary health care. Moreover, modern medicines contain about 25% of drugs derived from plants. On account of the fact that derivatives of medicinal and aromatic plants are non-narcotic with no side effects, the demand for these plants is on the increase, in both developing and developed countries. With increasing popular demand for medicinal plants, both in South Asia and internationally, this trade is expected to grow to 5 trillion by the year 2050 (FRLHT, 1996). This papers tries to identify the missing links for the perfect synergy of global demand and local production potential.

Global Markets

A Task Force set up in 2000 by the Indian Planning Commission, for Conservation and Sustainable Use of Medicinal Plants produced the following estimates for the global market:

- Phyto pharmaceuticals: $ 10 billion growing at 6% p.a. through 2002
- Medicinal botanicals/extracts/herbal or dietary supplements: $ 16.5 billion growing at 15% +
- Nutraceuticals: $ 4 billion growing at 10%
- Cosmeceuticals: $ 7.5 billion

In the 1990s, the reported annual global importation of MADPs plant materials, based on the commodity group pharmaceutical plants, amounted to an average of 400,000 tonnes valued at USD 1.2 billon (Lange, 2001).While it may be difficult for a variety of reasons to accurately estimate the size of the market *perse*, it would be reasonable, based on the above figures, to assume that the market for MADPs and related products is in the region of USD 40-60 billion, growing at the rate of 7-10% per annum (IDRC). It is important to note here, that this estimate includes the market for end products (supplements, cosmeceuticals, botanicals, etc.) derived from MADPs. It can be seen that a few countries dominated international trade — twelve countries accounted for 85% of worldwide imports; likewise, just twelve countries were responsible for 82% of the world's exports (Table 1). The leading European market is Germany, accounting for over 50% of the European market, followed by France, the United Kingdom, and Italy. At the level of product groups, however, there are important markets in other countries. Spain, for example, is an important market for raw plant material and natural colours. While the large European markets (Germany and France) are consolidating, smaller markets show stronger growth. New markets at a global level include Brazil, Argentina, and Mexico.

The US market grew relatively fast during the initial years of its development due to the relative ease of new product introduction resulting from legislation which considered products safe unless proven otherwise. This situation has, however, changed with the development of regulatory standards in the USA; OTC drugs must now meet defined criteria for active ingredients or botanical drug substances. Growth in the coming

years may not, therefore, be as high as in the past. Nonetheless, the US still remains a significant and growing market for natural and herbal products, and the major consumer (40% of the world market) for essential oils.

Table 1.

Country of Import	*Volume (tones)*	*Value ('000$)*	*Country of export*	*Volume (tones)*	*Value ('000$)*
Hong Kong	73,650	314,000	China	139,750	296,650
Japan	56,750	146,650	India	36,750	57,400
USA	56,000	133,350	Germany	15,050	72,400
Germany	45,850	113,900	USA	11,950	114,450
Rep, Korea	31,400	52.550	Chile	11,850	29.100
Fiance	20,B00	50,400	Egypt	11,350	13,700
China	12,400	41,750	Singapore	11,250	59,350
Italy	11,450	42,250	Mexico	10,600	10,050
Pakistan	11,350	11,850	Bulgaria	10,1.50	14,850
Spain	8,060	27,450	Pakistan	8,100	5,300
UK	7,600	25,550	Albania	7,350	14,050
Singapore	6,550	55,500	Morocco	7,250	13,200
TOTAL	**342,550**	**1,015,200**	**TOTAL**	**281,550**	**643,200**

Figure based on commodity group Pharmaceutical Plants (SITC 3: 292.4 = HS 1211)
Source: UNCTAD COMTRADE database

Indian Markets

According to a study conducted by Operations Research Group (ORG), the total Ayurveda market in India is valued at Rs. 25,000 million (USD 555 million), of which Rs. 18,000 million (USD 400 million) represents the OTC market (for products such as Liv 52, Chyawanprash, Hajmola, etc.). Data from the Centre for Research, Planning and Action (CERPA) study of 162 main species of medicinal plants conducted in 200U2002 puts the total domestic demand for these plants at a level of 198,054 tonnes valued at Rs. 8,860 million (USD 197 million) during the year, growing at 16.7% and expected to touch a level of 272,618 tonnes valued at Rs. 14,530 million (USD 323 million) by the year 2004-05 (at constant 1999-2000 prices). Increasing awareness and acceptance levels of traditional medicines across all strata of the population, aggressive marketing of Ayurvedic/traditional medicines and OTC products by local companies, and stated plans by top business houses in the country to enter this business segment, can only lead to an expansion in future demands.

Table 2. List of 32 MADPs in demand according to the National Medicinal Plants Board

S.No.	*Species*	*Demand (in tonnes)*		*Annual Growth Rate (%)*
		2001-2002	*2004-2005*	
1.	Amla	22729.5	41782.9	22.5
2.	Ashok	7051.3	10724.2	15.0
3.	Ashwagandha	7028.7	9127.5	9.1
4.	Atis	270.1	448.4	18.4

(*Contd.*)

S.No.	Species	Demand (in tonnes)		Annual Growth Rate (%)
		2001–2002	2004–2005	
5.	Bael	5381.2	7084.5	9.6
6.	Bhumi amalaki	2212.6	2985.3	10.5
7.	Brahmi	3822.5	6621.8	20.1
8.	Chandan	635.2	1073.1	19.1
9.	Chirata	965.2	1284.7	10.0
10.	Daru haridra	1187.3	1829.4	15.5
11.	Giloe	2258.3	2932.6	9.1
12.	Gudmar	N.A.	N.A.	N.A.
13.	Guggal	1505.0	2548.9	19.2
14.	Isabgol	N.A.	N.A.	N.A.
15.	Jatamansi	674.9	866.8	8.7
16	Kalihari	65.4	100.5	15.4
17.	Kalmegh	2005.0	2,197.3	3.1
18.	Kesar	N.A.	N.A.	N.A.
19.	Kokum	N.A	N.A.	N.A.
20.	Kuth	1414.1	1826.3	8.9
21.	Kutki	220.3	317.0	12.9
22.	Makoy	2077.9	2192.2	1.8
23.	Mulethi	873.4	1359.8	15.9
24.	Patharchur	37.8	60.8	17.2
25.	Pippali	3,992.5	6,280.4	16.3
26.	Safed Musali	N.A.	N.A.	N.A.
27.	Sarpgandha	423.6	588.7	11.6
28.	Senna	6,462.5	11,677.3	21.8
29.	Shatavari	1,0924.7	16,658.5	15.1
30.	Tulsi	3.296.8	5,402.9	17.9
31.	Vatsnabh	322.3	3,426.8	30.0
32.	Viavidang	N.A.	N.A.	N.A.

Production/Supply

According to the study carried out by Kuipers for FAO, there are two sources of supply of medicinal plants: (i) material collected from the wild; and (ii) cultivated material..

Wild harvesting

Wild harvesting is the collection of plant material from wild sources. This material can take many forms, such as the bark, leaves, fruits, herbs, flowers, wood or roots. It may be collected from many locations, including open pasture, waste agricultural land, gardens, the roadside or forest land. In some cases the plants may be "weeds" found in agricultural or waste land; in others they may be plants or parts of plants found in horticultural areas or in forest land.

The bulk of the material traded (both domestically and internationally) is still wild harvested and only a very small number of species are cultivated. It is difficult to provide accurate global data on the volume of wild harvested medicinal plants as it is very difficult to distinguish between wild and cultivated material. Although data can be indicated for some specific cases, there is very little actual global data on the volume of wild

harvested medicinal plants. Herbal raw material is often either collected by wage labourers (often from outside the state) or farmers with small landholdings. Cultivation of herbal raw material is rare: in Bangladesh, for example, more than 90 percent of the collection of medicinal plants is from the wild. Illegal and unscientific collection is common. Although the major part of wild harvested material is sourced from developing countries, a surprisingly high amount is also gathered in developed countries. Of major concern is the fact that a significant part of wild harvested material is now traded commercially. As the prices paid to the gatherers tend to be very low, commercial plant gatherers of "mine" the natural resources rather than manage them, as their main objective is to generate an income. Although there are many common species that can be harvested sustainably and with little impact on their survival, an increasing number is not in this category. Of particular concern for the sustainability of the wild resource is the fact that many of the materials are the roots of plants, which are the most difficult plant parts to harvest sustainably. According to the *Report of the Task Force on Conservation and Sustainable Use of Medicinal Plants*, a critical factor in wild harvesting is the availability of cheap labour to undertake the very labour intensive work of gathering. Because in many cases income from such sources represents the only form of paid employment for inhabitants of remote rural areas, there is a ready availability of workers. Further, contractors who employ the collectors often act as middlemen and traders as well. Collectors are often dependent on contractors as they are poor and often owe money to the contractors. Most countries have few or no regulations which control the collection of material from the wild. India, Bulgaria and Nepal are notable exceptions. India has banned the export of several wild species in their raw material form, although the export of finished products containing the material is allowed. A major part of the high range Himalayan plants are wild harvested and many of these are close to extinction from over-harvesting or unskilful harvesting; e.g.: *Nardostachys jatamansi, Aconitum* spp.,

Cultivated material

Cultivated material is more suitable for large scale uses, such as the production of drugs by pharmaceutical companies, which require standardized products of guaranteed or known content and quality. These quality requirements are becoming increasingly important as drug regulations become more stringent in many countries.

Argentina, China, Hungary, India, Poland and Spain are examples of countries that cultivate some materials on a large scale. Requirements of successful commercial cultivation operations are to produce high quality drugs using low input cultivation methods while recognizing that the material has to compete on a highly competitive international market. Given the higher cost of cultivated material, cultivation is often done under contract. In the majority of cases, companies tend to cultivate only those plant species which they use in large quantities or in the production of derivatives and isolates, for which standardization is essential and quality is critical. Some grower cooperatives or collaborative ventures have been set up to enable growers in some countries to achieve greater negotiating power and achieve higher prices. These have tended to be in developed countries, such as the Netherlands, and in Eastern European countries which export significant quantities to the rest of Europe and to North America. Globally, the areas cultivated are limited because cultivated material bears higher production costs, must have secure land ownership or access and requires more sophisticated (and costly) management expertise. Costs must be carried for long periods – in many cases over ten years. The low prices of wild harvested material make the return to cultivation low in many cases.

Distribution

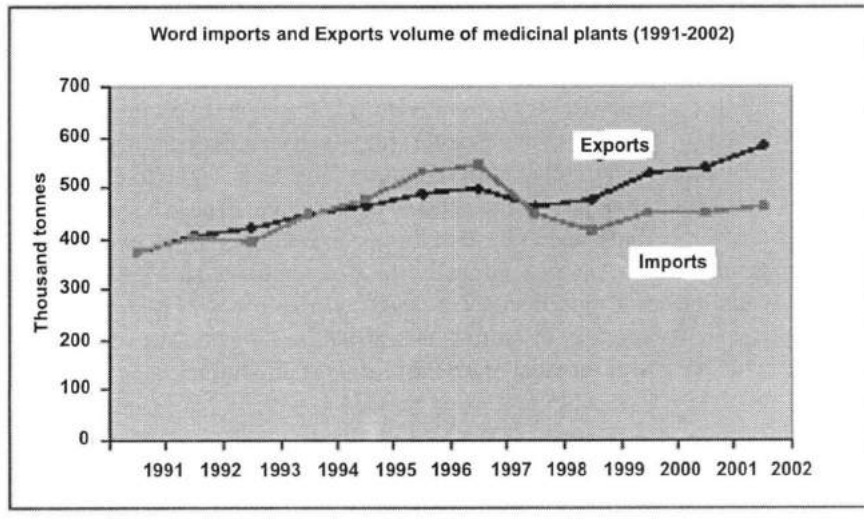
The supply chain is often very long with as many as six or seven marketing stages involving primary collectors and producers, local contractors, regional wholesale markets, large wholesale markets and specialized suppliers. The long supply chain contributes to the low prices primary collectors and farmers receive for their

products. As collection is still more common than cultivation, huge differences in the quality of raw materials occur. The differences concern the amount of active ingredients based on where the plants were grown, what parts of the plants are being used, how the plants were harvested and how they were stored. Raw material is often also adulterated as collection from the wild cannot guarantee the uniformity of raw material. Industry buys from suppliers and wholesalers rather than direct from small holders because of the substantial quantities and broad range of raw material that is needed. This makes product traceability nearly impossible. Currently, contract farming and buy-back arrangements provide the only practical alternatives for exporters whose customers require traceability.

Developing Markets

India has a long-standing knowledge and understanding of using medicinal plants in its codified medical systems, as well as through its highly diverse folk traditions. The knowledge of plant identification, methods of collection and processing, biological activities and uses were transmitted both orally and in written form by traditional medical cultures in India. Medicinal plant trade in India is substantial with total turnover of Rs. 2,300 cores of ayurvedic and herbal products, while major over-the-counter products contribute around Rs. 1,200 cores. Despite its substantial domestic trade and its long experience with herbal medicines, India has not been able to capitalize on this by promoting use in developed country markets. To achieve improvement in this area, India must identify products which may be relevant to diseases found in the developed world and for which no medicine or only palliative therapy is currently available. This would enable rapid access of these herbal medicines into developed country markets.

There are major challenges in tapping the substantial potential for utilizing medicinal, aromatic and natural dyes plants (MADPs) nationally in India, as well as in export markets. At the forefront of these problems is ensuring consistent and acceptable quality. Traditionally, because the usage of plants was a part of a local community's culture and health practices, quality was more manageable. However, this tradition is being rapidly eroded as control of medicinal development and usage moves to the industry. In volume terms, both global exports and imports have been increasing, although the total value has been declining, suggesting falling average unit prices.



Potential Links

Price information

International Trade Centre (ITC) MNS Medicinal Plants & Extracts
E-mail: tirc@intracen.orgInternet:
www.intracen.org

UNITED KINGDOM

Agra Europe Ltd. Publisher of 'The Public Ledger'
E-mail: marketing@public-ledger.com
Internet: www.public-ledger.com

INTERNET

Herb crop shop (at Herb Growing and Marketing Network)
www.herbworld.com/cropshop

Sites for retail prices for herbal materials include:
www.herbmarket.comx
http://libertynatural.com
FAO (Food and Agriculture Organization)Publisher of 'Commodity and Market Review', and 'Food Outlook'E-mail: publication-sales@FAO.org Internet: www.fao.org

GERMANY

Ista Mielke GmbH
Publisher of 'Oil World'E-mail: info@oilworld.de
Internet: www.oilworld.de

INDONESIA

International Pepper Community
Publisher of 'Weekly Prices Bulletin'E-mail: ipc@indo.net.id
Internet: www.ipcnet.org

THE NETHERLANDS

Productschap voor Margarine, Vetten en Oliën (MVO)Commodity Board for Margarine, Fats and Oils
E-mail: info@mvo.nl
Internet: www.mvo.nl
Board for Arable Products
E-mail: gzp@hpa.agro.nl
Internet: www.gzp.nl

USA

IMR International Publisher of 'Quartely Review of Food Hydrocolloids'
E-mail: dseisun@hydocolloid.com
Internet: www.hydrocolloid.com

Other useful addresses

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
E-mail: cites@unep.ch
Internet: www.cites.org

FI Data Services
Internet: www.ingridnet.com

CBI/Accesguide (CBI's database on European non-tariff trade barriers)
Email: cbi@accessguide.nl
Internet: www.cbi.nl/accessguide

GTZ Deutsche Gesellschaft für Technische Zusammen-arbeit GmbH
Internet: www.gtz.de

International Chamber of Commerce
E-mail: webmster@iccwbo.org
Internet: www.iccwbo.org

Netherlands Association for Phytotherapy
E-mail: nvf@fyto.nl
Internet: www.fyto.nl

Traffic Europe (Joint wildlife trade monitoring programme of WWF and IUCN)
E-mail: traffic@trafficint.org
Internet: www.traffic.org

International Council for Medicinal and Aromatic Plants
E-mail: info@icmap.org
Internet: www.icmap.org

European Advisory Services (EAS)Avisory company specialising in European and international food and nutrition policy (incl. herbal supplements).
E-mail: info@eas.be
Internet: www.eas.be

Earthscan Publication Ltd.
E-mail: earthinfo@earthscan.co.uk
Internet: www.earthscan.co.uk

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Wild harvested material is often sold as cultivated. An estimate for Germany suggests that some 70-90 percent of the medicinal plant material imported into that country has been wild harvested (Lange, 1996).

Report of the Task Force on Conservation and Sustainable Use of Medicinal Plants, Government of India, Planning Commission, March 2000.

Indian Organic Agribusiness is indeed at threshold of growth. The initial impetus to the growth of organic sector came with the launch of National Program for Organic Production (NPOP) by the Govt. of India. The momentum to the organic movement was provided by the "India Organic Trade Fairs" started by International Competence for Organic Agriculture (ICCOA) since 2005.

With the contribution of various agencies within and outside the government, the organic agribusiness is therefore slowly but surely, arriving and making its presence felt. This growth will have significant impact across the stakeholders of the organic food chain. Many stakeholders believe that further efforts are needed to refine areas/issues on policy, standards, consumer awareness, marketing, value additions, exploring MADPs etc. and appropriately these are the themes presented in the seminar titled INDIAN ORGANIC AGRIBUSINESS : at THRESHOLD OF GROWTH. This is the knowledge enhancement component of India Organic-2007. The seminar is organized by ICCOA in partnership with *Research Institute of Organic Agriculture (FiBL), Switzerland*. Several international and national experts provided full papers of their presentations, which are compiled and edited, which is being brought out as a publications for the benefit of the shareholders of this threshold of growth.

In its endeavour to further the organic movement in India, ICCOA has been focusing on issues like Organic Marketing Initiatives, development of specific sectors like organic horticulture, aquaculture, MADPs etc. In its effort to disseminate information to the stakeholders, publications get a lot of focus within ICCOA. We hope the readers will enjoy reading one more of ICCOA's publications.

Manoj Kumar Menon is the Executive Director of ICCOA. Previously he was head of its Market Development programs since August 2004. He was also the Coordinator of both editions of the "India Organic Trade Fairs (2005 & 2006), the flagship products of ICCOA. Manoj was State University topper in his degree in Agriculture from Gujarat Agri. University. He did his MBA from "Faculty of Management Studies (FMS)", University of Delhi. He has over 12 years of experience in management of agricultural projects, estates, input marketing and market developments etc. He has also represented ICCOA internationally at the BioFach, IFOAM, FiBL and at various forums nationally.

Tobias Eisenring works at the Research Institute of Organic Agriculture (FiBL) since November 2006. He is responsible for the Indian Organic Market Development Project, a project that is financed by the Swiss State Secretariat of Economic Affairs SECO. In the frame of this project, he advises the International Competence Center of Organic Agriculture ICCOA and supports several Organic Market Initiatives in India.

Before joining FiBL, Tobias Eisenring worked for 10 years in the field of label development and geographical indications (GI) in Switzerland. He is a member of several trademark commissions in Switzerland and freelance at the "Swiss Inventory of the Culinary Heritage". He has an MSc in Sustainable Agriculture and Rural Development from the University of London (UK) and an MBA obtained at the University of Geneva (Switzerland). His major interests are labelling, supply chain management and linking organic products to traditional knowledge and origin (geographical indications).

Dr. Santhanama Annadanou is a Consultant at ICCOA since June 2006. He has a basic degree in Agriculture with a Masters and a PhD in Plant Biotechnology. He provides freelance consultancy in the areas of plant biotechnology, biofuels, biofertilizers and certified organic input and crop production. He has provided consultancy to leading industries and organizations such as UNEP and UNIDO. His major interests are technology intervention in agriculture to enhance income sustainably at the small and marginal farmers farm gate. Has a flair for value addition through innovative processing technologies for fresh and dried agri-horti produce. He is on the nutraceuticals sub-committee for the state of Karnataka, and helps develop the policy and its implementation. He is an active promoter of Stevia rebaudiana cultivation & processing since 1997, and has recently started promoting organic cosmetics through a producers company. He is a member of FIHE, AHBA, ABLE, ICCOA and IFOAM.