जैविक खेती सूचना पत्र

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From Editors Desk

Dear Readers

We all are witnessing rapid strides, organic farming is making in India. The country has already crossed 1.2 million marks in land under organic management. Emergence of India as single largest country in cultivable arable land, wild harvest collection area and organic cotton production were notable feature during the year 2008-09. The year 2009 has also witnessed the much awaited notification of domestic regulatory mechanism for organic certification. Coming of BioFach to India is an indication of its growing strength in world organic trade. Additions of two more certification bodies indicate growing business opportunities in this service sector. But in spite of these significant features the country is still lagging behind in linking growing number of organic farmers to market. Only 2% of the total production is being exported and another 15% is being traded as organic in domestic market. Immediate efforts are needed to link all these farmers with market. I invite all the stakeholders to work together to bring organic market revolution in the years to come.

A.K. Yadav

The World of Organic Agriculture in India

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Emergence

The growth of organic agriculture in India has three dimensions and is being adopted by farmers for different reasons. First category of organic farmers are those which are situated in no-input or low-input use zones, for them organic is a way of life and they are doing it as a tradition (may be under compulsion in the absence of resources needed for conventional high input intensive agriculture). Second category of farmers are those which have recently adopted the organic in the wake of ill effects of conventional agriculture, may be in the form of reduced soil fertility, food toxicity or increasing cost and diminishing returns. The third category comprised of farmers and enterprises which have systematically adopted the commercial organic agriculture to capture emerging market opportunities and premium prices. While majority of farmers in first category are traditional (or by default) organic they are not certified, second category farmers comprised of both certified and un-certified but majority of third category farmers are certified. These are the third category commercial farmers which are attracting most attention. The entire data available on organic agriculture today, relates to these commercial organic farmers

Growing area

Emerging from 42,000 ha under certified organic farming during 2003-04, the organic agriculture has grown almost 29 fold during the last 5 years. By March 2009 India has brought more than 9.2 million ha area under organic certification process. Out of this cultivated area accounts for 1.2 million ha while remaining 8.0 million ha is wild forest harvest collection area. Year wise growth of cultivated area under organic management is shown in Table 1, Fig. 1. Overall status of organic production projects, processors, quantity produced, quantity exported and the value of export is given in Table 2, Fig. 2. State wise details of total area and number of farmers under full organic, in-conversion and total under organic management (2008-09) are given in Table 3. Details in respect of important commodities produced during 2008-09 are given in Table 4.

Regulatory mechanism

For quality assurance the country has internationally acclaimed certification process in place for export, import and domestic markets. National Programme on Organic Production (NPOP) defines the regulatory mechanism and is regulated under two different acts for export and domestic markets. NPOP notified under Foreign Trade Development and Regulation Act (FTDR) looks after the export requirement. The NPOP notified under this act has already been granted equivalence by European Union and Sweden. USDA has also accepted the conformity assessment system of NPOP. Due to this, the product certified by any Indian accredited certification agency under NPOP can be exported to Europe, Sweden and USA without the requirement of re-certification. To look after the

requirement of import and domestic market the same NPOP has been notified under Agriculture Produce Grading, Marking and Certification Act (APGMC). Regulatory body of NPOP under FTDR act is Agricultural and Processed Foods Export Development Authority (APEDA) under Ministry of Commerce and of NPOP under APGMC act is Agricultural Marketing Advisor (AMA) under Ministry of Agriculture. Accreditation of Certification and Inspection Agencies is being granted by a common National Accreditation Body (NAB). 18 accredited certification agencies are looking after the requirement of certification process. Out of these 4 agencies are under public sector while remaining 14 are under private management.

Growing number of farmers and operators - Out of total 1812 operators, while processors account for 276 and individual farmers 650, majority of farmers i.e. 713,467 are small and marginal farmers covered by 886 grower groups. Out of the total organic producers in the world approximately half of them are in India. This is mainly because of small holdings with each producer.

Table – 1 Growth of area under organic management

S.No.	Years	Area under Organic management in Ha
1.	2003-04	42,000
2.	2004-05	76,000
3.	2005-06	1,73,000
4.	2006-07	5,38,000
5.	2007-08	8,65,000
6.	2008-09	12,07,000

Table 2 Overall status of organic production projects, processors, quantity produced, quantity exported and the value of export (Year 2008-09)

S.No.	Component	Quantum
1.	Area under Organic certification Process (ha) Full organic In-conversion Total	 640161 566803 1207755
2.	No. of Farmers under Organic certification Process Full organic In-conversion Total	 256518 457599 714117
3.	Number of operators	1812
4.	Number of processors	276
5.	Number of grower groups	886
6.	Number of exporters	299
7.	Total Production (MT)	1,811,111
8.	Total quantity exported (MT)	53,918
9.	Value of export in US $	116.09 million
10.	Value of export in INR Rs.	580.45 crores INR

Fig. 1 Area under certified organic management during different years

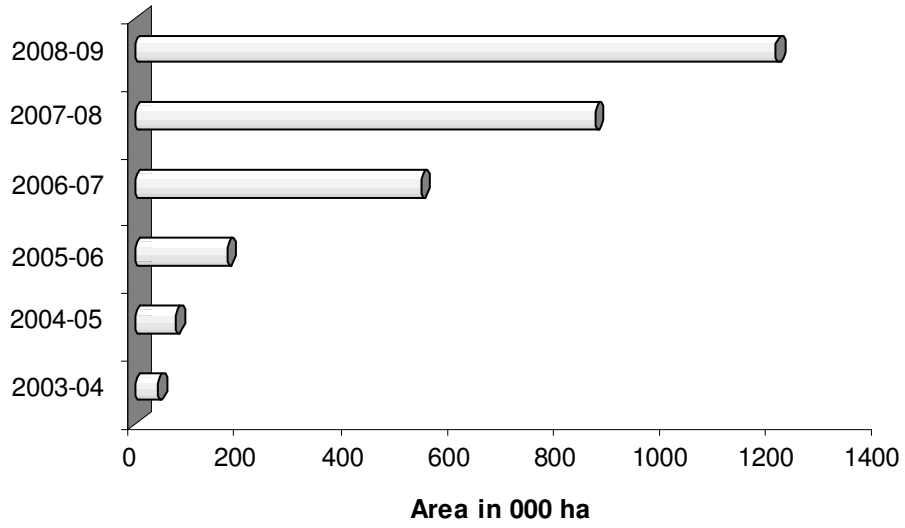


Fig. 2 Organic production at a glance

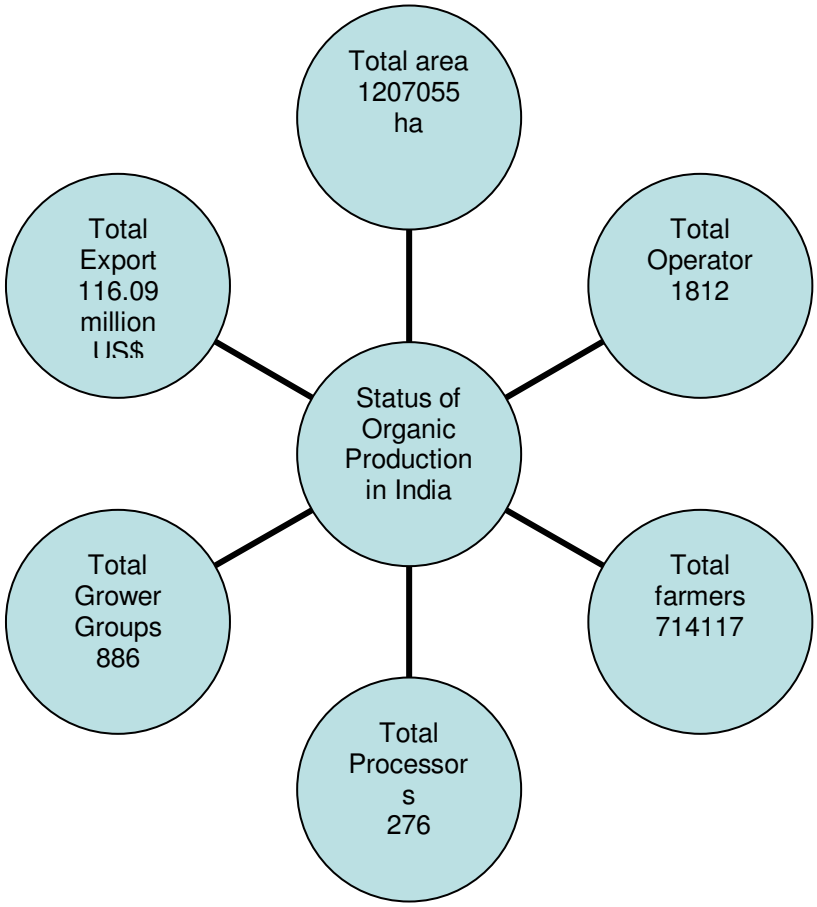


Table – 3 Area Under Organic Certification process and Number of farmers registered (2008-09)							
		Total Area in ha			Total No. of farmers		
S.No.	States	Organic	In-Conversion	Total	Organic	In Conversion	Total
1	Andhra Pradesh	7377.98	25072.544	32450.524	5586	28599	34185
2	Arunchal Pradesh	201.05	110.01	311.06	0	613	613
3	Asam	3976.53	652.84	4629.37	1947	38	1985
4	Bihar	0	0	0	0	1	1
5	Chattisgarh	300.6	203.24	503.84	1	83	84
6	Delhi	4194.1	29095.01	33289.11	956	13917	14873
7	Goa	10959.78	20	10979.78	3280	1	3281
8	Gujrat	23559.57	27367.9748	50927.5448	5537	11520	17057
9	Haryana	5672.92	6547.38	12220.3	2118	3945	6063
10	Himachal Pradesh	144.56	15291.01	15435.57	132	5127	5259
11	J & K	416.47	3	419.47	112	0	112
12	Jharkhand	0	0	0	0	0	0
13	Karnataka	4169.43	18060.712	22230.142	3554	15689	19243
14	Kerala	6130.272	4377.525	10507.797	4734	4158	8892
15	Manipur	865.95	9952.12	10818.07	808	15842	16650
16	Maharashtra	129077.26	148703.35	277780.61	47955	165501	213456
17	Madhya Pradesh	322863.16	140689.86	463553.02	111368	55773	167141
18	Mizoram	12097.57	22808.56	34906.13	9841	32000	41841
19	Meghalaya	1220.88	592.5	1813.38	622	329	951
20	Nagaland	1212.65	22830	24042.65	1523	26842	28365
21	Orissa	60006.14	21554.17	81560.31	33197	10655	43852
22	Punjab	170.97	4021.55	4192.52	47	2569	2616
23	Rajasthan	9959.99	19307.58	29267.57	1075	14139	15214
24	Sikkim	1476.61	0	1476.61	1375	0	1375
25	Tripura	0	0	0	0	0	0
26	Tamilnadu	4811.5	3619.6	8431.1	1158	2292	3450
27	Uttar Pradesh	9613.08	12633.08	22246.16	3242	12175	15417
28	Uttarakhand	11093.38	19408.21	30501.59	14239	31896	46135
29	West Bengal	6569.22	7167.84	13737.06	740	2349	3089
30	Other	2020.13	6803.71	8823.84	1371	1546	2917
	Total	640161.752	566893.3758	1207055.128	256518	457599	714117

Table 4. Area and important commodities under wild harvest collection

S.No	States	Area in Ha	Collectors	Crops
1	Jammu & Kashmir	32165.1	476	Walnut Kernels, Black Morels
2	Himachal Pradesh	395000	0	Amla, Harad, Bhera
3	Kerala	135.8	0	Wild herbs, medicinal and aromatic dye plants
4	Karnataka	617.15	3	Wild herbs, medicinal and aromatic dye plants
5	Rajasthan	147419.88	1	Wild herbs, medicinal and aromatic dye plants
6	Gujarat	537.2	236	Wild herbs, medicinal and aromatic dye plants
7	Uttar Pradesh	2432500	50	Wild herbs, medicinal and aromatic dye plants
8	Uttar Pradesh	631.99	1	Wild herbs, medicinal and aromatic dye plants
9	Madhya Pradesh	5000000	0	Wild herbs, medicinal and aromatic dye plants
	Total	**8009007.1**	**767**	

Table 5. Production of important commodities under organic management (Year 2008-09)

S.No.	Commodities	Quantity produced in MT		
		Organic	**In-conversion**	**Total**
1.	Rice	44335	32354	76690
2.	Wheat	6892	15364	22560
3.	Other cereals/ millets	67333	63985	131318
4.	Pulses	17560	16785	34345
5.	Oil seeds including Soybean	163185	59647	222832
6.	Cotton (raw seed cotton)	284832	86906	371740
7.	Spices	17419	20084	37504
8.	Tea/ coffee	16506	10838	27344
9.	Fruits and Vegetables	194505	538073	732579
10	Herbal/ medicinal plants	129543	58767	188310
11.	Other miscellaneous crops	8001	25235	33236

Table 6. Estimates of area covered by different crops under organic management (Year 2008-09)

S.No.	Commodities	Area in ha		
		Organic	In-conversion	Total
1.	Paddy	18134.00	9766.00	27900.00
2.	Wheat	4056.00	7192.00	11248.00
3.	Other cereals/ millets	26184.00	37678.00	63862.00
4.	Pulses	12023.00	17617.00	29640.00
5.	Oil seeds including Soybean	91849.00	87307.00	179156.00
6.	Cotton	259699.00	93299.00	352998.00
7.	Spices	6507.00	23291.00	29798.00
8.	Tea/ coffee	12711.00	12465.00	25176.00
9.	Fruits and Vegetables	128879.00	41176.00	170055.00
10	Herbal/ medicinal plants	32313.00	10690.00	43003.00
11.	Other miscellaneous crops	27995.00	28306.00	56301.00
12	Crop details not available	19812.00	198110.00	217922.00
	Total area	640162	566897	1207059

Fig. 5. Production of different crops under organic management

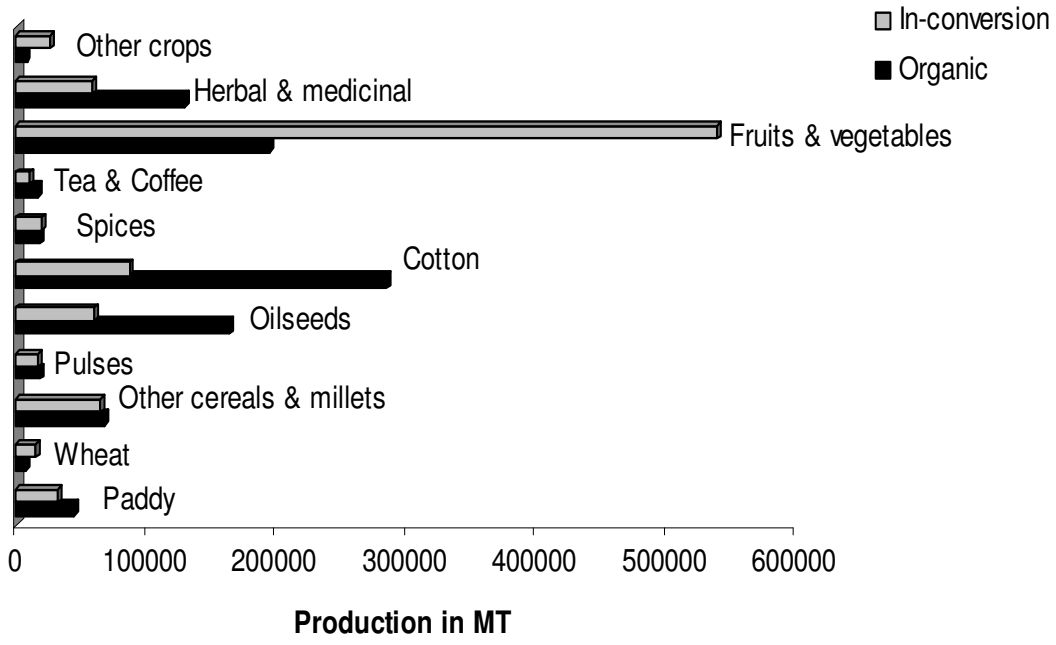
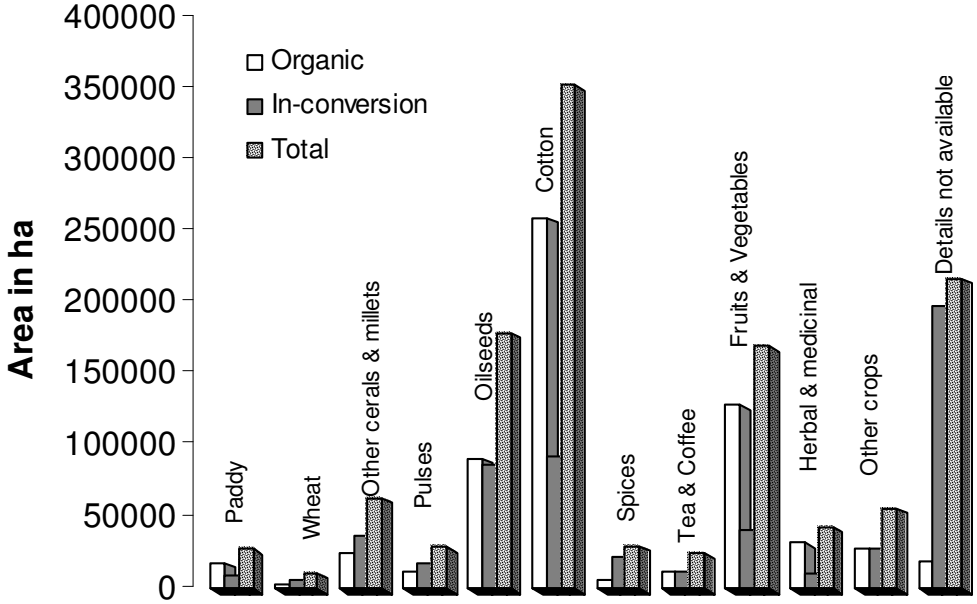


Fig. 6 Land use pattern with different crops under organic management



Important features of Indian organic sector

With the phenomenal growth in area under organic management and growing demand for wild harvest products India has emerged as the single largest country with highest arable cultivated land under organic management. India has also achieved the status of single largest country in terms of total area under certified organic wild harvest collection.

With the production of more than 77,000 MT of organic cotton lint India had achieved the status of largest organic cotton grower in the world a year ago, with more than 50% of total world's organic cotton.

Future prospects

Although, commercial organic agriculture with its rigorous quality assurance system is a new market controlled, consumer-centric agriculture system world over, but it has grown almost 25-30% per year during last 10 years. In spite of recession fears the growth of organic is going unaffected. The movement started with developed world is gradually picking up in developing countries. But demand is still concentrated in developed and most affluent countries. Local demand for organic food is growing. India is poised for faster growth with growing domestic market. Success of organic movement in India depends upon the growth of its own domestic markets.

India has traditionally been a country of organic agriculture, but the growth of modern scientific, input intensive agriculture has pushed it to wall. But with the increasing awareness about the safety and quality of foods, long term sustainability of the system and accumulating evidences of being equally productive, the 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 option.

Table 7. Category wise export details for the year 2008-09

PRODUCTS	Ex. Qty (in M.T.)	Ex. Value (in US $)	Destination
Cotton	10886.6753	25421860.57	China, Germany,Pakistan,Japan,Taiwan,Indonesia, Mexico , Sweden, france, South Africa, UAE, Bangladesh, USA, Portugal,Turkey, Italy
Basmati Rice	5250.0766	11261905.36	France, Germany, U.K.,Kuwait, Italy Thailand, Israel, Netherlands
Honey	2961.798	7487796.85	UK, Germany, USA, Canada, Belgium, Austria
Tea	2727.434	16710260.92	Australia, Canada, Germany, The Netherlands, United Kingdom, USA, Denmark, Italy, Japan, Kazakhstan, Srilanka,
Processed food	2223.617	6145638.69	USA, Germany, The Netherlands, Austria,Israel, Dubai, UK
Dry Fruits	1922.91	15430991.26	USA,Germany,UK, Austria, Netherlands, Italy, Switzerland, Denmark
Misc	1779.4721	2185501.22	Germany,USA, France, Denmark, Sri Lanka, Canada
Medicinal & herbal Plants	1685.97	13292446.48	UK, Thailand, South Korea, Czech Republic, Germany,Belgium, Monacco
Sesame	1272.626	1691589.41	Germany, USA, Austria, Taiwan.Czech Republic,New Zealand
Spices	1013	4866677.78	UK,Germany, Australia, USA, Switzerland, Netherland, Belgium, Polland
Cereals	364.803	458949.37	USA, Germany,Netherlands
Coffee	349.241	1243243.33	Denmark, Germany, Japan, The Netherlands, USA, U.K., sweden,France
Fruits	75.263	258110	USA,UK,Italy
Vegetables	36	63,000.00	Germany
Aromatic oils	19.9134	928824.97	South Africa, France, USA
Pulses	9.97	21186.25	USA, Germany, The Netherlands, Austria, Israel
oils and oleoresins	0.729	12301.11	Germany, France, Italy, USA
Oil crop	11891.28	8611896.69	
TOTAL	**44476.23**	**116092180.3**	**135 PRODUCTS EXPORTED IN 18 CATEGARIES**

Product Quality in Organic and Low Input Farming Systems

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Introduction

The intensification of agricultural production in the last century has resulted in loss of biodiversity, environmental problems and associated societal costs (Niggli & Leifert 2007; Cooper et al. 2007). Agronomic changes introduced during the intensification of agricultural production were also suspected to have caused with negative effects on food quality. However, until recently there was very little quantitative information to underpin this hypothesis (Cooper et al. 2007). Over the last 10 years a wide range of studies have compared the composition of foods from intensive and organic/ low input systems and several recent literature reviews concluded that there are higher levels of nutritionally desirable compounds (e.g. vitamins, antioxidants, polyunsaturated fatty acids) and lower levels of undesirable compound (e.g. pesticides, growth regulators) in foods from organic and 'low input' production systems compared to food from conventional systems (Cooper et al. 2007; Brandt 2007; Benbrook et al. 2008). Also the increasing demand and current price premiums achieved by foods from 'low input' and especially organic production systems were shown to be closely linked to consumer perceptions about nutritional and health benefits of such foods.

However, the exact reasons for these differences in food composition are poorly understood. The QLIF project (www.qlif.org) therefore carried out factorial field experiments and surveys to identify the effect of individual production system components (e.g. animal and crop genetics, nutrition, health management and husbandry) on food composition. It also carried out pilot dietary intervention studies to test the effect of organic food consumption on immune system, behaviour and hormonal regulation using experimental rat models.

Quality of Foods from organic livestock systems

A major focus of livestock production under QLIF was to study the effect of (a) dairy genotype/breed, (b) husbandry methods and especially feeding regimes on milk composition. They demonstrated that milk from organic and 'low input' production systems contained higher levels of nutritionally desirable unsaturated fatty acids (e.g. omega 3, CLA) and antioxidants (α-tocopherol, β-carotene, lutein and zeaxanthine) than milk from intensive conventional dairy production systems. In other studies the levels of nutritionally desirable fatty acids and fat soluble vitamins and/or the sensory quality of organic meat and egg quality parameters were also reported to be higher than their conventional counterparts (Hirt et al. 2007; Sundrum 2007). The improved nutritional composition of meat, milk and eggs was often linked to outdoor

grazing based husbandry and high forage feeding regimes in the case of dairy cows and/or the use of more robust and/or slower growing livestock genotypes in the case of poultry (Hirt et al. 2007; Butler et al. 2008). Surveys also showed that levels of antibiotic use in organic and 'low input' dairy cow herds were significantly lower than those of conventional high input herds (Hoyle et al. 2004; Cooper et al 2007).

Standard processing practices (e.g. pasteurisation of milk; cheese and yogurt making processes, standard slaughter and meat conservation practices) appear to have limited effects on relevant parameters (e.g. fat composition, fat soluble vitamin content) between organic and conventionally systems (e.g. Bergamo et al. 2003). The introduction of strategies to improve product quality (e.g. the introducing of grazing based feeding regimes) is also likely to reduce farm costs in many regions of the EU, especially given the rapidly rising costs of concentrate feeds, but economic analyses under QLIF are still ongoing.

Crop production systems

QLIF crop production focused studies focused mainly on the effect of (a) fertilisation regimes (type and level of mineral NPK fertilisers and/or animal and green manures used), (b) crop rotation design and (c) crop protection protocols (type and level of chemosynthetic pesticides and other crop protection methods) on a range of nutritionally desirable secondary plant metabolites (e.g. vitamins, antioxidants, proteins, phenolics, glycosinolates, vitamins). To a lesser extent the effect of (d) crop genotype/variety, (e) rootstock type and (f) ripening stage at harvest was also investigated in selected commodities (e.g. tomato).

In selected commodities (e.g. wheat and potato) metabolic profiling was supplemented with protein and gene profiling. These profiling studies showed that plant metabolism is affected most by variety choice and fertility management, while rotations position and crop protection have less of an effect in most crops. Where the effect of agronomic methods on total antioxidant activity (e.g. tomato) was compared in soil (as opposed to synthetic growth media), variety and/or rootstock choice and specific organic matter based fertilisation regimes significantly increased antioxidant activity. In addition, the ripening stage at harvest and the age of the tomato plant at harvest had a significant effect on tomato quality, indicating that harvesting immature fruit and the use of long season tomato production systems reduce the antioxidant content of tomato. These studies clearly indicated that organic soil based and short season tomato production protocols, and the use of short supply chains, which allow the delivery of fully ripe fruit to local markets, will increase antioxidant levels in tomato.

For most other crops a range of specific secondary metabolite groups associated with potential beneficial health effects were monitored under QLIF and field trials and analyses are still ongoing. However, studies from the first 3 seasons indicate that while there is often a trend for more of the nutritionally desirable secondary metabolites to be found at higher levels when organic fertilisation regimes and/or crop protection regimes were applied, some compounds were unaffected and some were increased when conventional fertilisation and/or crop protection regimes were applied (Niggli & Leifert 2007). Recent literature reviews (e.g. Brandt 2007; Benbrook et al. 2008) reported higher levels of nutritionally desirable compounds in organic crops when compared to conventional crops, but were mainly based on research papers, which focused on individual or small numbers of commodities and secondary metabolites.

The more differentiated set of results from the QLIF project are therefore likely to make it more challenging to interpret the existing comparative crop composition data with respect to both (a) agronomic recommendations with respect to further improving crop quality and (b) potential beneficial impacts of secondary metabolite profiles in organic foods on human health.

Conclusions

The generally beneficial impact of extensive organic production protocols on livestock foods (meat, milk and eggs) composition is becoming increasingly clear and the first studies showing positive health impacts of organic milk consumption have recently been published (Rist et al. 2008; Kummeling et al 2008).

A more differentiated picture has emerged for crop foods, with (a) an overall trend for higher levels of nutritionally desirable compounds being detected in organic compared to conventional foods being confirmed by most studies, but (b) certain agronomic practices (e.g. netting to protect crops against pests) being linked to negative effects on specific groups of secondary metabolites. Recently published dietary intervention study indicated increased immunological responsiveness and robustness in chicken raised on organic diets based on a mixture of grains and legumes (Huber 2007) and effects on body weight and the immune system in rats and mice raised on organic feed stuff (Lauridsen 2007, Finamore 2004). These studies indicate positive trends of organic food consumption and should be explored further in the future.

Quality expectations of consumers always radiate around four central concepts (a) taste (and other sensory characteristics), (b) health, (c) convenience, and for some consumers (d) process characteristics (e.g. organic production, natural production, animal welfare, GMO-free) (Grunert 2005). To what extent improvements in food composition satisfy consumer preferences and hence their willingness to pay for that improved quality is currently being studied under QLIF. Alignments may be needed between consumer expectations and quality improvements to achieve the maximum socio-economic benefits. Alignment could be influenced by governmental policy, marketing strategies and consumer education.

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India Organic
Research Notes and News

Rice-Fish Culture and its Potential in Rural Development: A Lesson from Apatani Farmers, Arunachal Pradesh, India - Rice-based fish farming, though, inevitable as a mean of double crop production from the unit land, often proves as cost-effective practice for marginal and poor farmers. The lack of adequate knowledge and support to farmers keep them away from the benefits of rice-based fish farming. The novel technique adopted by Apatani farmers in Lower Subansiri district of Arunachal Pradesh, India reduces the knowledge gap to achieve optimum benefit from such farming practice. The farmers enjoy a fish production of 500 kg per hector per year without providing any supplementary feed to the fish stocked in their rice-fields. The economic return of the farmers was estimated up to 65.8% per annum from their rice-fish integrated fields. The system of rice-based fish farming by Apatani farmers, therefore, bears immense potentiality to be recognized as low cost and sustainable farming practice and could be a significant breakthrough for poor and marginal farmers of the rest of the World. (Source – Saikia and Das J Agric Rural Dev **6** (1&2), 125-131, June 2008)

Effect of Organic Farming on Soil Fertility , Yield and Quality of Crops in the Tropics - To elucidate the advantages of organic farming over inorganic farming in sustainable agriculture, experiments were conducted at Kerala Agricultural University, College of Agriculture, Vellayani using Cowpea (Vigna unguiculata subsp. sesquipedalis (L.) Verdcort) as a test crop. The experiments were carried out in a loamy skeletal kaolinitic rhodic haplustult soil. Different treatments tested were T1:Full recommended dose as per Package of practices recommendation (20 kg N ha^{-1}, 30 kg $P_2O_5ha^{-1}$ & 10 kg K_2O ha^{-1} with 20 t FYM ha^{-1}), T2: Full recommended dose as Farm Yard Manure, T3:Full recommended dose as FYM + P Solubilizing Microorganisms, T4: Full recommended dose as Vermi compost, T5: Full recommended dose as Vermicompost + P Solubilizing Micro organisms, T6: Full recommended dose as Poultry manure, T7: Full recommended dose as Poultry manure + P Solubilizing Micro organisms, T8: Inorganic alone (20kg N ha^{-1}, 30 kg $P_2O_5ha^{-1}$ & 10 kg K_2O ha^{-1}). Farmyard manure, vermicompost and poultry manure were applied on the N content basis and additional requirements of P and K were met through application of rock phosphate and ash according to treatments.

Phosphorus Solubilizing Microorganisms consisted of a mixture of Pseudomonas, Aspergillus and Azospirillum. Phosphorus Solubilizing Micro organisms @1 g plant $^{-1}$ was applied in T3, T5 and T7 treatments. Entire P and K were applied basally and half the recommended N as basal and rest after two weeks of planting for all the treatments. The experiments were laid out in randomized block design with eight treatments and three replications. Lime was uniformly applied to all plots @ 250kg ha^{-1} to reduce the soil acidity. The results showed that organic farming practices improved physical, chemical and biological properties of the soil and helped in carbon sequestration. Organic manures also enhanced the soil enzyme activities such as dehydrogenase and phosphatase. All growth characters like height of plant, number and weight of nodules and leaf area index were found to be significantly boosted by organic treatments.

The highest pod yield was observed in Package of Practices recommendation treatment (T1) followed by vermi compost + P Solubilizing Micro organism's application (T5). But these two treatments were at par statistically. Vermi compost + P Solubilizing Micro-organisms application showed pronounced effect on staw (total shoot weight) yield and total dry matter production. Pod nutrient composition as obtained from chemical analysis projected the role of organic manures in enhancing the pod nutrient content- N, P, K, Ca, Mg, Mn, Zn and Cu. Sulphur content was highest in poultry manure treatment. The influence of organic manure addition over inorganic nutrition was clearly highlighted in pod quality. Vermicompost application registered lowest value for crude fibre in cowpea. Regarding protein content, shelf life and organoleptic evaluation, organic treatments showed superior values over inorganic alone. The study revealed the favourable effect of organic nutrition in enhancing soil fertility and the quality aspects of cowpea pod in comparison with inorganic and integrated nutrition. (Source - Bhaskaran, Usha Pankajam et al 2009, The Proceedings of the International Plant Nutrition Colloquium XVI, International Plant Nutrition Colloquium)

Organic farming practices for rice under diversified cropping systems in humid tropics - In Asia rice farming is confined to small farmers who are compelled to obtain higher productivity for their livelihood. In general there is an increase in area and production of rice in India. In the humid tropical region of Kerala State the area has been drastically reduced in spite of the efforts of the local Government. Crop diversification is a practical means to enhance the crop output. In conventional rice farming the usage of plant protection chemicals is very high and can cause an irreversible change in the wetland ecosystem. Diversified cropping of rice in rainy season and two subsequent vegetable crops viz cucumber and okra in the post rainy and summer seasons under organic farming practices was tested at the Cropping Systems Research Centre of Kerala Agricultural University for a consecutive period of five years from 2003-04. The experiment comprised of seven treatments in which five organic farming practices were compared with integrated nutrient management and full chemical nutrient practices. The study revealed that from the third year onwards organic farming and integrated nutrient management practice gave comparable yield as that of full nutrient as chemical inputs. The N and P contents in the soil were enhanced while the K content was slightly reduced during the end of experimentation. There was an appreciable improvement in organic carbon in all the treatments through crop residue management. (Source - Varughese, Kuruvilla et al 2009 The Proceedings of the International Plant Nutrition Colloquium XVI, International Plant Nutrition Colloquium)

Influence of Organic Manures on Growth, Yield and Quality of Okra - Field experiments were conducted to study the influence of different organic manures on the growth, yield and quality of *okra var* Arka Anamika. The experiments were conducted in a Randomized Block Design replicated thrice with eleven treatments involving different organic manures along with no manure control. The results revealed that among the different organic manure treatments, Okra responded well to the application of FYM 20 t ha^{-1}. The growth characters, yield attributes as well as the yield of Okra were significantly enhanced by the application of 20 t ha^{-1} of FYM. The same treatment also had better quality fruits in terms of less fibre content and highest BC ratio of 3.56 (Source - Premsekhar and. Rajashree American-Eurasian Journal of Sustainable Agriculture, 3(1): 6-8, 2009)

Collapse of beneficial microbial communities and deterioration of soil

health: a cause for reduced crop productivity - Microbial diversity has profound effects on ecosystem functions. Decomposition of organic matter, nutrient cycling, bioremediation of toxics and pollutants, and both the spread and control of infectious diseases are some key roles of soil microbes in the ecosystems. They determine plant growth. However, the relationships between microbial functioning and sustenance of plant growth are still poorly understood. In the last two decades, there has been a decline in the yields of major crops in Asia despite the use of recommended cultural practices. The reduced crop productivity in conventional agriculture has been explained to have been caused by the indiscriminate use of chemical inputs (fertilizers and agrochemicals) and intensive cropping, have made the soil sick. This correspondence illustrates that the collapse of beneficial soil microbial communities under conventional agriculture hampers the delicate positive interactions within and between aboveground and belowground biotic communities, resulting in reduced crop productivity. Conventional tillage significantly reduces the diversity of bacteria by reducing both substrate richness and evenness. Therefore, bacterial community assemblages under the tillage have more similar structures than those under zero tillage. However, conservation tillage and legume-based crop rotations in wheat have been observed to support the diversity of soil microbial communities and may affect the sustainability of agro-ecosystems. Plant species identity is a factor influencing microbial community composition. This is because there are strong interactions between aboveground and belowground biotic communities, as revealed by correlations between bacterial metabolic and plant taxonomic diversities. Plant species and soil type are two important characteristics affecting the structure of the total bacterial community. Soil C/N ratio is most often associated with changes in microbial community composition. Human alteration of soil microbial communities via the alteration of plant community composition and diversity has been observed, which is mediated in part by changes in soil C quality. Moreover, 16S rRNA gene and phospholipid fatty acid analyses have revealed shifts in the total microbial community in response to the different management regimes, indicating that deliberate management of soils can have a considerable impact on microbial community structure and function in tropical soils. Applications of chemical fertilizers and agrochemicals lower the soil microbial diversity. Soil bacteria are more sensitive to chemical N fertilizer application during the plant growth cycle. It is well known that phytotoxins such as phenolics, flavonoids and alkaloids are released from plants to the soil. They are known as allelopathic compounds. To make an agro-ecosystem sustainable these compounds should be removed, a role which is played by the evolving microbial communities with changing functionality for biodegradation. However, temporal changes in bacterial functionality have been observed to disappear in the conventional cultivation with chemical inputs. This leads to the accumulation of allelopathic compounds, resulting in reduced crop productivity. In contrast, organic farming is generally characterized by elevated microbiological parameters, due to incorporation of a wide range of microbial communities via organic manures. Chemical fertilizers and herbicide application in conventional agriculture also affect negatively the potential for top-down control of aboveground pests, possibly due to reduced microbial diversity. They also change interactions within and between below- and aboveground components, ultimately promoting negative environmental impacts of agriculture by reducing internal biological cycles and pest control. On the contrary, organic farming fosters microbial and faunal

decomposers and this propagates into the aboveground system via generalist predators, thereby increasing biological control. Land degradation reflected by yield decline, and diseases and pests under conventional agriculture is a common global problem. As described above, it is mainly caused by the depletion of beneficial microbial communities due to continuous use of chemical inputs and intensive cropping. The degraded lands are rehabilitated using crop rotation or converting into organic farming systems. These are medium to long-term options with relatively high cost. Handling of organic fertilizers in organic farming is also a difficult job. Therefore, less bulky, short-term and low-cost biofertilizing methods are now being tested to replenish the beneficial microbial communities in degraded as well as conventional croplands. One such group of biofertlizers is the biofilmed biofertilizers (BBs), which contain beneficial microbial communities with biofertilizing and bio-controlling capabilities. The BBs are now being experimented with rice, tea, maize, etc. in Sri Lanka with initial successes, and will be shortly tested with wheat and rice in Australia. (Source – Current Science, Vol. 96, No. 5, 10 March 2009)

Developments and strategies perspective for organic farming in India - Organic agriculture is a production system that avoids or largely excludes the use of synthetic compound fertilizers, pesticides, growth-regulators and livestock-feed additives, and thus offers some solutions to the problems currently besetting the agricultural sector of industrialized or green revolution countries. The broader aims of organic farming are: sustainability of natural resources, minimize the cost of cultivation, provide healthy food, augment farm profits and improve soil health. Although in the market place to provide clarity on the organic claim, the organic agriculture requires certification, but broadly any system using the methods of organic agriculture and being based on four basic principles (the principle of health, ecology, fairness and care) may be classified as organic agriculture. Presently organic farming is practised on 30.42 million ha land and global market of US $ 38.6 billion is expected to reach US $ 70 billion by 2012. Area under certified organic farming in India during 2006–07 exceeded 2.55 million ha, with a total production of 586,000 tonnes and it is estimated that at least an equivalent share in the country may be under non-certified organic systems. The total export of certified organic products was 195,000 tonnes, worth Rs 3,012 million. At present there are 16 accredited inspection and certification agencies. Despite several benefits of organic agriculture reported elsewhere, there are some apprehensions that need to be answered, and the Indian scientific community has to strive hard to provide answers to some of these questions through hard-core research in organic farming under tropical and subtropical environments that exit in the country. There is greater need to undertake basic and applied research on these aspects, for which more resources in the form of dedicated team of scientists, better lab facilities and working capital would be required. On the contrary, farmers are also reluctant to convert to organic production because of constraints in availability of adequate quantities of organic manures and other organic inputs in the local market, lack of complete knowledge about organic farming principles, practices and advantages, complex and costly procedures of certification and the risks of marketing of organic produce at premium rates in domestic markets. Strategies needed to promote organic faming in India include adequate research and extension support by the government, quantification of role of organic agriculture in improving the resource sustainability and in mitigating the climate change by the researchers, acknowledgement of organic agriculture as an effective mechanism to reduce

greenhouse gases and sequester carbon, recognition of organic agriculture in Kyoto Protocol carbon credit mechanisms, organic market development, mission-mode programmes for on-farm demonstrations and capacity building of all stakeholders, with full research back-up and Government support for cheaper access to organic certification of farms. (Source – Kamta Prasad and MS Gill, Indian J Agronomy, 2009, Vol 55 (2)

Effect of organic farming on productivity, soil health and economics of rice (*Oryza sativa*)–wheat (*Triticum aestivum*) system - A study was done from 2003–2008 at Kumarganj, Faizabad to assess the impact of organic manures on performance of (*Oryza sativa* L.) – wheat (*Triticum aestivum* (L.) Fiori & Paol.) system. Among different organic farming treatments, incorporation of crop residues in both the crops + green manuring + phosphorus solubilising microbes (PSM) + poultry manure (PM) 5 t/ha + neem cake 0.2 t/ha, resulted in highest values of growth and yield components, yield and net return. This treatment gave 16.1, 16.6, 13.1, 13.1 and 44.5% higher yield of rice and 19.7, 17.0, 14.5, 7.5 and 26.8% higher yield of wheat over T_1, T_2, T_3, T_4 (organics) and T_6 (inorganics) respectively. Maximum amount of balance or un-utilized NPK was computed with inorganic treatment (T_6). All the organic farming treatments improved soil health as evident by increased organic carbon and reduction in soil pH. Highest values of organic carbon (0.64%) after 5 years of experimentation was recorded with wheat residues + FYM 10 t/ha + 0.2 t/ha neem cake in rice and rice residue + pressmud 10 t/ha in wheat (T_3). Treatment with crop residue + green manuring + poultry manure 5 t/ha + PSM + neem–cake 0.2 t/ha also proved most remunerative and gave 15.46, 16.08, 14.17, 8.87 and 36.48 x 10^3 Rs/ha higher net return over T_1, T_2, T_3, T_4 and T_6, respectively. Highest benefit: cost ratio (1.60) was also recorded with this treatment. (Source – Yadav et al Indian Journal of Agronomy, 2009, Volume : 54, Issue : 3)

Organic farming is big opportunity area: CII – In order to highlight the huge potential in organic farming in India and to provide inputs for starting an organic venture, CII's Conference on Organic Farming–Ushering in Organic Revolution presented organic agriculture as a preferred option and priority not only for food safety and biodiversity, but also for improving net income for small and medium-scale farmers. Speakers reiterated that with the growing environmental concerns about the use of agricultural inputs, organic farming comes out as a big opportunity area and emphasized the need to strategize agriculture to focus on better technologies for organic production, organic processing, linkage to markets, and promising regions and crops for organic farming to help India surge ahead and mark its presence in the organic sector worldwide, which is poised to reach $100 billion by 2012. VS Chimni, conference chairman & chief executive officer of Council of Organic Farming in Punjab, stated that immense commercialization of agriculture and reduced nutritional quality of food have led marked increase in ill effects on the health of the consumer. Therefore 'organic farming 'is a trustable alternative. (Source – The Financial Express, 23.07.2009)

Global Organic

Crop yield and soil fertility response to reduced tillage under organic management - Conservation tillage (no-till and reduced tillage) brings many benefits with respect to soil fertility and energy use, but it also has drawbacks regarding the need for synthetic fertilizers and herbicides. The objective of study was to adapt reduced tillage to organic farming by quantifying effects of tillage (plough versus chisel), fertilization (slurry versus manure compost) and biodynamic preparations (with versus without) on soil fertility indicators and crop yield. The experiment was initiated in 2002 on a Stagnic Eutric Cambisol (45% clay content) near Frick (Switzerland) where the average annual precipitation is 1000 mm. This report focuses on the conversion period and examines changes as tillage intensity was reduced. Soil samples were taken from the 0–10 and 10–20 cm depths and analyzed for soil organic carbon (C_{org}), microbial biomass (C_{mic}), dehydrogenase activity (DHA) and earthworm density and biomass. Among the components tested, only tillage had any influence on these soil fertility indicators. C_{org} in the 0–10 cm soil layer increased by 7.4% (1.5 g C_{org} kg^{-1} soil, $p < 0.001$) with reduced tillage between 2002 and 2005, but remained constant with conventional tillage. Similarly, C_{mic} was 28% higher and DHA 27% ($p < 0.001$) higher with reduced than with conventional tillage in the soil layer 0–10 cm. In the 10–20 cm layer, there were no significant differences for these soil parameters between the tillage treatments. Tillage had no significant effect on total earthworm density and biomass. The abundance of endogeic, horizontally burrowing adult earthworms was 70% higher under reduced than conventional tillage but their biomass was 53% lower with reduced tillage. Wheat (*Triticum aestivum* L.) and spelt (*Triticum spelta* L.) yield decreased by 14% ($p < 0.001$) and 8% ($p < 0.05$), respectively, with reduced tillage, but sunflower (*Helianthus annuus* L.) yield was slightly higher with reduced tillage. Slurry fertilization enhanced wheat yield by 5% ($p < 0.001$) compared to compost fertilization. Overall, C_{org}, C_{mic}, and DHA improved and yields showed only a small reduction with reduced tillage under organic management, but long-term effects such as weed competition remain unknown. (Source - Soil and Tillage Research Volume 101, Issues 1-2, September-October 2008, Pages 89-96).

Soil Fertility Management and Pest Responses: A Comparison of Organic and Synthetic Fertilization - The objective of this study was to assess the effect of fertilization (organic or synthetic) and cabbage, *Brassica oleracea* L., cultivars ('K-Y cross' and 'Summer Summit') on the chemistry of cabbage and on the responses of a cabbage specialist *Pieris rapae crucivora* Boisduval. Cabbages were grown from seeds in the greenhouse with either organic, synthetic, or no fertilizer treatments. Trials of ovipositional preference and larval feeding were conducted to evaluate the effect of foliage quality on insect responses. In addition, the foliar chemistry (water, nitrogen, total nonstructural carbohydrates, sinigrin, and anthocyanin) was measured during the insect bioassays. The results indicated that butterflies preferred to lay eggs on foliage of fertilized plants. The larvae grew faster on plants fertilized with synthetic fertilizer, but there was no evidence that contents of sinigrin delayed the developmental time of the larvae. However, plants that received organic fertilizer had higher biomass. In summary, the results of this study suggested that proper organic treatment can increase a plant's biomass production and may have a lower pest occurrence. (Source - Yu-Tzu Hsu et al Journal of

Economic Entomology 102(1):160-169. 2009)

Cover Crops and Organic Mulch to Improve Tomato Yields and Soil Fertility - Cover crops and organic mulches (OMs) have been reported as a means to reduce inputs and increase soil quality. A field experiment was conducted to elucidate the effects of summer cover crops and organic compost on winter fresh market tomato (*Lycopersicon esculentum* Mill.) yields and quality. Cover crops were sunhemp (*Crotalaria juncea* L.), velvet bean (*Mucuna pruriens* var. *utilis*), cowpea (*Vigna unguiculata* L.), and sorghum sudan grass [*Sorghum bicolor* x *S. bicolor* var. *sudanense* (Piper) Stapf.], and compost was applied at 25, 50, and 75 t ha^{-1}. Sunhemp accumulated up to 190–319 kg ha^{-1} of N, which was greater than that by sorghum sudan grass (38–110 kg ha^{-1}). The tomato total marketable yields increased 49–82 and 71–85 t ha^{-1}, respectively, in 2 yr. The application of OM at 75 or 50 t ha^{-1} increased tomato yields compared with that at 25 t ha^{-1}. Yields of extra-large tomato fruits, especially at the first harvest during the early winter, were improved by growing sunhemp or applying the composts. However, no interaction between cover crops and OM was observed for tomato marketable yields or quality. Soil organic C increased when OMs were applied compared with the plastic mulch (PM), whereas total soil N and organic C:N ratio were unaffected by any treatment. These results suggest that either the production of cover crops, especially sunhemp, or the application of compost at high rates can improve winter fresh market tomato yields and quality and advance organic farming. (Source – Wang et al Agron J 101:345-351 (2009)

Consequences of Conventional versus Organic farming on Soil Carbon: Results from a 27-Year Field Experiment - Organic farming practices are regarded as being beneficial for the environment by promoting soil quality and sequestering soil organic carbon (SOC). We studied SOC dynamics in the long-term field experiment DOK in Switzerland. The experiment compares three organically fertilized treatments under conventional (CONFYM), bioorganic (BIOORG), and biodynamic (BIODYN) management, and two systems with (CONMIN) or without (NOFERT) mineral fertilizer. We analyzed measured SOC time series from 1977 to 2004 and applied soil fractionation, radiocarbon dating, and modeling with the carbon model RothC. The SOC declined significantly in most parcels, but was not systematically different between systems. Initial SOC contents correlated with soil texture and were identified as being important with respect to the change rate. The SOC loss was at the expense of mineral-associated carbon whereas the more labile fractions increased. The overall decline was explained by reduced carbon inputs since commencement of the experiment was most pronounced in NOFERT and CONMIN. The model satisfactorily simulated the dynamics of most of the treatments for both initialization with equilibrium runs or measured SOC fractions. Carbon loss in CONFYM was not fully captured by the model. Composition of organic fertilizers depended on the particular management, and a model adjustment of their relative stability improved the match between model and measurements. Model runs without management effects indicated that the observed increase in temperatures at the experimental site does not induce a change in SOC. Overall, the study does not support a benefit of organic farming on SOC contents compared with conventional systems with manure.(Source – Leifeld et al Agron J 101:1204-1218 (2009).

Earthworm populations under different tillage systems in organic farming - To understand how earthworms could improve soil porosity in no-tillage organic farming systems, the aim of this study was to compare the effect of different tillage

systems on earthworm populations, from conventional (traditional mouldboard ploughing, MP and shallow mouldboard ploughing, SMP) to conservation tillage (reduced tillage, RT, direct drilling or very superficial tillage, NT) in three organic arable systems in France (sites A–C). In a second stage, the effect of earthworm activity on soil porosity under the four tillage systems was assessed at sites A and B. Earthworm abundance, biomass and diversity were measured over a 2–3-year period at the 3 sites. During the same period, soil structure (soil profile description and soil bulk density) and open worm burrows in the soil were assessed at sites A and B. After 3 years of experiments, it was found that at 2 sites earthworm abundance and biomass were higher in NT than with ploughing or reduced tillage. The increase of earthworms in NT is mainly due to anecic species increase. Earthworm abundance and biomass tend to decrease regardless of the tillage techniques employed at sites with a ley, and conversely, tend to increase in NT and RT at sites initially ploughed. In the short term, the increase of anecic species in NT has no effect on soil porosity evolution: NT soils were more compacted than those which were ploughed. A long-term experiment is required to assess the effect of biological activity on the physical components of soil in organic farming.(Source – Peigné et al Soil and Tillage Research Volume 104, Issue 2, July 2009, Pages 207-214)

Changes in earthworm populations during conversion from conventional to organic farming - The development of earthworms was investigated from 2001 to 2008 on the 176 ha arable fields of Ritzerau Farm (northern Germany) converted 2001–2004 from conventional to organic farming. Earthworms were recorded six times per year on a grid of 85 sampling points, whereas pH was determined in 2001 and 2005 and carbon content in 2001. Weak correlations between earthworm numbers and soil pH or organic matter of soil were found for few species, except for *Lumbricus castaneus* which was more abundant at pH > 6.5. *Lumbricus rubellus* benefited most from grain cultivation, *Lumbricus terrestris* from organic management. *Aporrectodea caliginosa* and *Aporrectodea rosea* were mainly related to rainfall and more abundant under 700–900 mm rain per year. Compensation of declined abundance after a period of heavy dryness lasted 0.5–1 year. The enhancement after conversion lasted 2–4 years and numbers increased from 0.2 to a maximum of 4.5 ind/m^2. (Source - Ulrich Irmler 2009, Agriculture, Ecosystems & Environment Volume 135, Issue 3, 31 January 2009, Pages 194-198)

Energy Analysis of Organic and Conventional Agricultural Systems - Energy parameters of a Swedish long-term field experiment comparing organic and conventional agricultural systems were evaluated. There is great potential for misinterpretation of system comparisons as a result of choice of data and how energy data are expressed. For example, reported yields based on single crops and not the whole rotation can result in significantly different interpretations. Energy use per unit yield was lower in organic crop and animal production than in the corresponding conventional system, as previously found in other studies. This is due to the exclusion of N fertiliser, the largest energy input in conventional cropping systems. Energy use per unit yield expresses system efficiency, but the term is insufficient to evaluate the energy characteristics of agricultural systems. Calculation of the most important energy component, net energy production per unit area, showed that conventional systems produced far more energy per hectare than organic systems. The energy productivity (output/input ratio), i.e. the energy return on inputs, was at least six in both types of agriculture, revealing the highly positive energy balance of crop

production in general. Lower yields in the organic systems, and consequently lower energy production per unit area, mean that more land is required to produce the same amount of energy. This greater land requirement in organic production must be considered in energy balances. When the same area of land is available for organic and conventional crop production, the latter allows for complementary bio-energy production and can produce all the energy required for farming, such as fuels, N fertilisers, etc., in the form of ethanol. In a complete energy balance, options such as combustion, gasification or use as fodder of protein residues from ethanol production must also be taken into account. There is a common belief that the high fossil fuel requirement in N fertiliser production is non-sustainable. This is a misconception, since the use of N fertilisers provides a net energy gain. If N fertilisers were to be completely replaced by biological N_2 fixation, net energy production would be significantly lower. In addition, N fertiliser production can be based on renewable energy sources such as bio-fuels produced by gasification. Conventional crop production is thus energetically fully sustainable. Energy analyses of agricultural systems presented in this chapter illustrate that published data may require recalculation in relation to the background, prevailing trends and boundary conditions, and subsequent re-interpretation. New perspectives on energy use must also be considered. (Source – Bertilsson et al 2008 in Organic Crop Production – Ambitions and Limitations, Publ Springer Netherlands pp-173-188)

Impact of organic farming systems on runoff formation processes—A long-term sequential rainfall experiment - Nearly 50% of the agricultural used areas of the European Union can be classified as having a high or very high risk for soil surface sealing and erodibility. The objective of this long-term sequential experimental rainfall study was to identify the soil surface aggregation and crusting as well as runoff and infiltration effects of organic management systems (with different dates of conversion from conventional to organic farming) in comparison to a conventional management system. The experimental data received from the rainfall experiment showed that the soil surface crusting process started earlier in the conventionally managed soil than in the soils from the organic farm. Additionally the soil surface of the conventional and organic managed soils was similarly sealed, but the well-established organic farming management showed lower runoff than the recently established organic farming management. Both organic farming systems showed lower surface runoff and higher water infiltration capacity than the conventional management system. The conversion from conventional to organic farming resulted in lower soil surface runoff and higher infiltration which is a benefit of long-term organic farming systems to reduce erosion hazards and floods. (Source – Zeiger and Fohrer Soil and Tillage Research Volume 102, Issue 1, January 2009, Pages 45-54)

Economics of Organic Vs Inorganic Carrot Production in Nepal - During February-April 2008, a study was conducted to compare the yield and economics of organic and inorganic carrot production and its profit volume in Chitwan district of Nepal. Face to face interview method was used to collect the primary information from randomly selected organic and inorganic carrot producers. Among the cost components, per unit cost on female labor and organic fertilizer were found to be higher in organic production system where as higher per unit cost on seed, tillage operation and male labor were found in inorganic production system. Higher cost and higher revenue was found in inorganic production system but higher benefit cost ratio was found in organic production system. This

revealed that adoption of organic carrot production system was economically profitable than inorganic production system. (Source - *Raj Kumar Adhikari* Journal of Agriculture and Environment, Vol 10 (2009)

Soil Fertility and Biodiversity effects from Organic Amendments in Organic Farming - Organic farming strives for a balance between a reasonable good yield, a high produce quality and a limited environmental impact. Inputs include plant residues and plant based composts, animal manures from various origin and stages of decomposition and additional fertilizers like rock dust (Anonymous, 2005). Soil fertility and especially soil biological fertility is promoted within organic farming for reasons of nutrient cycling, structure improvement or biodiversity (von Fragstein, 2006). Very little research has been done to facilitate farmers to make choices between available amendments and improve soil fertility within the legal framework of organic farming. In this study authors evaluated the effects of eight (out of thirteen) different organic amendments applied within the legal framework of organic farming in the Netherlands. Effects on crop and soil fertility are evaluated in terms of yield and in terms of physical, chemical and soil biological properties. After seven years the use of FYM resulted in the highest yields. The Biowaste compost (GFT) and GFT+ cattle slurry (CS) treatments showed similar yields indicating that higher nitrogen availability in the GFT+CS treatment did not result in higher yields. The results confirm a trend observed in the past seven years in which yields in the MIN treatment diminished, yields in the Cattle slurry (CS) and Chicken manure (CM) treatments remained at the same level and yields in the FYM and GFT treatments increased if compared to averages of all treatments. Soil physical, chemical and biological properties were affected by the amendments. NC resulted in the highest C-total content, CM in the lowest. Nitrogen mineralization was relatively low in all treatments. Significantly lower values were found in MIN and GFT No significant effects were found on the biomass of bacteria, fungi and earthworms. However, earthworm pores, counted at 20 cm depth were significantly higher in the FYM as compared to the other treatments (data not shown). Amendments mainly had an effect on the number of plant feeding nematodes with MIN and NC resulting in the highest numbers (Source – Zanen et al 16th IFOAM Organic World Congress, Modena, Italy, June 16-20, 2008).

Biological indicators of soil quality in organic farming systems - The health of the soil, recognized by its active role in the linked processes of decomposition and nutrient supply, is considered as the foundation of agriculture by the organic farming movement. Nutrient management in organically managed soils is fundamentally different from that of conventional agricultural systems. Crop rotations are designed with regard to maintenance of fertility with a focus on nutrient recycling. Where nutrients are added to the system, inputs are in organic and/or non-synthetic fertilizer sources that are mostly slow release in nature. Hence a greater reliance is placed on soil chemical and biological processes to release nutrients in plant-available forms. In this respect, nutrient availability in organically farmed soils is more dependent upon soil processes than is the case in conventional agriculture. The development and use of biological indicators of soil quality may therefore be more important in organic (and other low input) farming systems. The aim of this paper was to evaluate current evidence for the impact of organic farming systems on soil biological quality and consider the identification of appropriate biological indicators for use by organic farmers and their advisors. Organic farming systems are generally associated

with increased biological activity and increased below-ground biodiversity. The main impacts on biological fertility do not result from the systems *per se* but are related to the amount and quality of the soil organic matter pool and disruptions of soil habitat via tillage. Even within the constraints of organic farming practices it is possible for farmers to make changes to management practices which will tend to improve soil biological quality. It is, however, by no means clear that distinct indicators of soil biological quality are needed for organic farming systems. It is important not only to identify the most appropriate indicators but also to ensure that farmers and land managers can understand and relate to them to support on-farm management decisions. (Source – Stockdale and Watson 2009 Renewable Agriculture and Food Systems, 24:308-318 Cambridge University Press)

Comparison of soil quality and nutrient budgets between organic and conventional kiwifruit orchards - Three long-term (>10 years) systems of kiwifruit production were compared at 36 sites with respect to simple input/output nutrient budgets, extractable soil nutrient levels, soil organic matter status, the size and activity of the soil microbial biomass, earthworm numbers and key soil physical properties. These systems were (i) conventional production of the green-fleshed variety 'Hayward' (Green), (ii) organic production of 'Hayward' (Organic) and (iii) conventional production of the yellow/gold-fleshed variety 'Hort 16A' (Gold). Crop yields and nutrient removals were least for Organic and greatest for Gold, with Green being intermediate. The major nutrients removed in the harvested crop were K and N. Simple input/output nutrient budgets showed that inputs greatly exceeded removals in the harvested crop for all nutrients considered (i.e. N, P, S, K, Mg, Ca) in all three systems, suggesting nutrient inputs could be reduced. Soil organic C and total N content were greater under Organic and Gold than Green whilst extractable P was least under Organic. Soluble C, basal respiration and metabolic quotient were unaffected by production system whilst microbial biomass C and N were greatest under Organic. Within systems, organic C, total N, microbial biomass C and N and mineralisable N were greater between plant rows than below the vine canopies whilst the reverse was the case for metabolic quotient and extractable P. Soil bulk density was least and water content at field capacity and earthworm numbers were greatest under the organic systems. It was concluded that long-term soil fertility can be maintained adequately under organic management and added benefits are increased organic matter content, a larger microbial biomass and improved soil physical condition. Although Organic orchards generally produce less fruit than their Green counterparts, mainly because of fertiliser differences and the absence of synthetic growth regulators, comparatively good returns and surpluses can still be achieved. (Source – Carey et al 2009, Agriculture, Ecosystems & Environment Volume 132, Issues 1-2, July 2009, Pages 7-15)

National and International Events

BioFach India Togather With India Organic 2009 - "BioFach" World Organic Trade Fair originated from Nuremberg, Germany was being organized in five countries across the globe (Germany, USA, Brazil, China, Japan) till 2008. Keeping in view of the growing importance of India in organic food production, it was the obvious choice for the NürnbergMesse, the organizers of BioFach Trade fairs to choose their next destination at Mumbai. It was a historical moment reckoned as a golden event for development of organic sector in the country. The constant and foresighted efforts of International Competence Centre of Organic Agriculture, ICCOA has resulted in merger of India Organic Trade Fair with this International Organic Trade Fair to be known as BIOFACH INDIA together with INDIA ORGANIC. ICCOA agreed for this arrangement for the benefit of entire organic stakeholders in the country and to facilitate a truly world-class event. The first BioFach India took place together with the fifth India Organic Trade Fair (IOTF), at the Bombay Exhibition Centre from 18–20 November. The two exhibitions reflected the entire spectrum of the Indian organic market: from production, certification and processing to trade. 129 exhibitors were delighted with the lively interest shown by the 3,044 trade visitors on the 1,332 m^2 net space at the event. The international players and experts from all over the world agreed that, the time is ripe for giving India's organic sector a comprehensive exhibition platform and for creating stronger international market connections. Local players and experts agreed that, the time has come to offer India's high organic products potential its own platform and provide the Indian market with an even stronger international networking. India's Government is supporting the organic products sector with financial packages and funding programmes aimed at rapidly expanding it. The target by 2012 is set at 2,000,000 hectares of certified organic farming land and organic products sales worth one billion US Dollars. IFOAM (International Federation for Organic Agriculture Movement) were co-sponsors of this BioFach subsidiary in Mumbai. Exhibitors, visitors and the organizers were delighted to witness that, BioFach India and the India Organic Trade Fair have proved their worth in their very first joint appearance. "A really very inspiring and successful exhibition. We made valuable new contacts," says Gerald Edler from the Inter-Naturales Handelsagentur and the agent for Umalaxmi Organics, an association of various groups of farmers from Rajasthan. Dr. A.K. Yadav, Director, NCOF while elaborating growth of organic farming in India declared the joint organization of BioFach India and India Organic as a milestone for India's organic sector. The successful premiere of the exhibition duo in Mumbai makes it clear that things are moving in India, not only in the technology sector, but in the organic products segment too. The time was ripe for BioFach India as is proved by the three successful days of the exhibition with enthusiastic exhibitors and visitors. BioFach India together with the India Organic Trade Fair reflected the products available on the Indian sourcing market. International exhibitors and visitors had the opportunity to publicise their products in India and to get to know competent business partners and the Indian sector on the ground. The exhibition duo lines up at the Bombay Exhibition Centre for the second time from 7–9 December 2010.

International Workshop on the Development of Commercial Organic Farming – An international Workshop on the Development of Commercial Organic Farming, sponsored by the Asian Productivity Organization (APO), Japan and Ministry of Agriculture, Government of India was organized by the National Productivity Council (NPC), New Delhi during 9th to 15th December 2009 at India International Centre, New Delhi, India. 24 trainees belonging to 12 Asian countries participated in the workshop. Korea,

Taiwan, Indonesia, Iran and Vietnam were represented by two participants each while Cambodia, Lao-PDR, Malaysia, Philippines and Sri Lanka were represented by one trainee each. Thailand nominated four participants while there were six participants from India. All Indian participants were from Ministry of Agriculture and National Centre of Organic Farming (NCOF). Five experts, three from India, one from South Korea and one from Taiwan conducted the workshop. The workshop was co-inaugurated by the Director General of NPC, New Delhi and APO representative from Japan. Experts from other countries include Dr. Shan-Ney Huang, Director, Taiwan Banana Research Institute, Taiwan and Dr Kim Dong Hwan, President, The Agro Food New Marketing Institute, Seoul, Korea. Indian experts include Dr. A.K. Yadav, Director, NCOF, Dr Sunil Pabbi, Principle Scientist, IARI, New Delhi and Dr. Manish Pande, SGS Certifications Pvt Ltd, Gurgaon. Intense deliberations were organized in first two days during different technical sessions with following core issues:

- Overview of organic farming-Principles and practices
- Organic farming for sustainable agriculture – Experiences of Asian countries.
- Commercialization of agricultural produce: Prospects and challenges
- Market, marketing and PR of organic produce: Direct marketing vs wholesale marketing
- Development of reliable and safe organic food supply chains
- Policies and institutional settings for commercialization of organics – organic food standards and certification programs.

Excursion visits were hosted by the National Centre of Organic Farming on third day and participants visited NCOF and a practicing organic farming, Mr Bharat Bhushan Tyagi at Village Behata, Distt Bulandshahar, UP. Fifth day of the workshop was devoted to the country presentations by the trainees. Syndicate group discussions and out come presentations were the highlights of last two days. On Sunday the fourth day, participants visited Taj Mahal at Agra. Workshop concluded with thanks to sponsors and organizers. It was a great learning and knowledge sharing experience, said majority of the participants. Foreign delegates also tasted different Indian cuisines during their stay at New Delhi.

Fostering healthy food systems through organic agriculture - Focus on Nordic-Baltic Region International Scientific Conference 25-27 August 2009 Estonia - Organic agriculture is growing at a high rate worldwide as well as in Nordic and Baltic countries. Demand for organic products is increasing because of consumers' concern about their health and the environment. The Baltic and Nordic countries share many similarities when it comes to climate and growing conditions; however, they are very different when it comes to markets and structure of agriculture. At this conference we want to share experiences of different countries and find solutions for the challenges the organic food systems face – from farm to fork. The scientific programme of the Conference is open to all fields of research involved in organic agriculture, the main topics being: (a) Soil fertility and nutrient management, (b) Organic field crop production, (c) Organic horticulture, (d) Farming systems and environmental impacts, (e) Animal health and husbandry, (f) Food quality and human health, (g) Marketing, economy and policy and (h) Education.

The 3rd IFOAM Trade Symposium entitled "Finding the Competitive Advantage, A Challenge in these Uncertain Times" - scheduled for February 16th, 2010, prior to the opening of the BioFach, in the Shanghai Room of the Nuremberg Congress Center in Germany will feature experts in market research and retailers who will explore the impacts of the financial crisis on organic markets and highlight the attitudes of today's consumers. During the Symposium, attendees will be given the opportunity to ask questions and interact with the speakers. For more information log on to www.ifoam.org.

IFOAM at the UN Climate Change Conference in Copenhagen - IFOAM is actively lobbying for Organic Agriculture at the United Nations Climate Change Conference in Copenhagen (COP15) from December 7-18, 2009. A side event under the title "Bio-sequestration vs. geo-sequestration (CCS) - Organic solutions to Climate Change and Food security" will be held jointly with the World Future Council, on Thursday, December 17, at 4:30pm in Liva Weel room. A press conference was scheduled for Tuesday, December 15 at 14h (room tbd). There will be a Roundtable on Organic Agriculture and Climate Change, convened by FiBL. Throughout the conference, IFOAM will be running a stand in the exhibition area, to provide a meeting point and a place for sharing information - specifically, our new set of publications - the IFOAM Guide on Organic Agriculture and Climate Change, the African Case Studies on Adaptation and the Collected Case Studies on Mitigation. In addition, the team of experts assembled by IFOAM for COP15 will provide policy advice to delegates at the conference on how to integrate Organic Agriculture into national action plans. IFOAM will be reporting daily from the conference with short video updates and news posts on its website.

Organic milk convention wows India on Children's Day - Most Indian children begin their day with a glass of milk, and mothers have been worried about the quality of milk they have been sourcing. If the milk that is being given to children is to be made healthier and more nutritious, switching to organic milk is the only option, said Dr. Selvam Daniel and other participants at "First Organic Milk Convention" organized on Children's day at Ahamdabad. The speakers on the occasion echoed that "The existing policy of mankind propagating 'wellness to man and illness to nature' is an evil one. Promotion of organic lifestyles among consumers is the only way to ensure the safety to all in nature." The convention, organized on Children's Day, has received overwhelming response from the Indian dairy industry. Among those who participated in the convention were major Indian and global brands like Amul, Nestle, Mother Dairy, Govind Dairy, Madhavi Dairy and Gourmet. Several dairy cooperatives, academicians, retailers, individual milk producers and farmers also attended the convention. "Organic milk is the nearest option to mother's milk," said eminent eco-nutritionist Kavita Mukhi in her keynote address. "Consumption of organic milk is crucial as it is minimally processed and keeps the very nutrition intact. Highly processed and highly refined food is not safe." "According to a recent survey in India, milk is among the most preferred commodity in the organic category," said Dr Daniel. "It is for this reason that the organic milk and milk products' business is going to be most profitable in the coming days in India." Dr Sushat Parekar, Product Manager, Organic Milk and Milk Products, ECOCERT India, explained India's national standards for organic milk and milk products' production. Dr Amol Nirban, Inspector, Organic and Fair Trade Certification, ECOCERT India, highlighted the importance of organic fodder production in the dairy industry. He discussed issues like bioaccumulation and several ailments in humans because of the ingestion of harmful agrochemicals as a result of consumption of conventional milk and milk products.

XIV Shri Vasantrao Naik Memorial National Agricultural Seminar: Soil Security for Sustainable Agriculture 27-28, February, 2010- The climate change, particularly, an increase in temperature and variability in rainfall accelerate the soil degradation, creating the complexities in securing the soil quality and environment. The exploitation and much understanding of crop diversification, soil health awareness, tillage and conservation agriculture and soil and climate intersections will certainly help solving these problems for better security of soil and ultimately the sustainability of agriculture as whole. The seminar will be organized at College of Agriculture, Nagpur and aims at bringing together, researchers, scientists, policy makers, planners, administrators, and NGOs on a common platform to share and discuss technological advancements,

experiences and other issues related to soil security for sustainable agriculture. For more details contact: Director of Research, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, P.O. Krishi Nagar, Akola- 444 104 (Maharasthra)

National Seminar on Organic Farming for Sustainable Agriculture and Livelihood Security, 23-24, December, 2009 – Intensive agriculture with imbalanced use of fertilizers and indiscriminate use of pesticides is leading to degradation of soil, water and genetic resources. The growing imbalances are not only adversely affecting the long term sustainability of the system but are also posing threat to livelihood security of the farming community. Keeping the above facts in mind and to share the experience and expertise at national level, a National Seminar on organic farming was organized at Rajmata Vijayaraje Scindia, Krishi Vishwa Vidyalaya, Gwalior during 23-24 December 2009 with the following objectives:

- To know the retrospect and prospects of organic farming in India
- To standardize the adoption model of organic farming
- To determine the role of microbes, their production and efficient utilization
- To assess the status and strategies of organic standards and
- To explore the economic and social policy initiatives for the development of road map and action plan to promote organic agriculture

The event was sponsored by the National Centre of Organic Farming, Ghaziabad under National Project on Organic Farming. Dr. Krishan Chander, Regional Director, RCOF, Bangalore and Dr. V.K. Verma, JSO, NCOF Ghazibad participated in the seminar as DAC representatives.

Maha-Organic 2009 – A mega event of organic farmers, Government officials and scientists kicked off to a glittering start on 18th December 2009 at Agriculture College Grounds, Pune, Maharashtra. Maha-organic is an annual event being organized by the Department of Agriculture, Govt of Maharashtra. This was the fifth edition of the event. Maha-organic comprised of two parallel events. A grand organic farmers and organic food products mela was organized from 18.12.2009 to 21.12.209. A two days interactive workshop was organized during 19th -20th December 2009 at Sirnamy Hall of College of Agriculture, MPKV, Pune. More than 250 practicing organic farmers and farmer groups displayed their technology, developments and organic products in the mela. There was tremendous response from local consumers. Thousands of Pune residents witnessed the first hand information on organic foods and interacted with farmers. Interactive workshop was attended by more than 450 farmers, scientists, experts and Central and State Government officials. Important dignitaries visited the Mela and Workshop include Hon'ble Minister of Agriculture, Govt of Maharashtra, Hon'ble Minister of Rural Development and Cooperation, Govt of Maharahtra, Commissioner of Agriculture, Govt of Maharahtra, Dr. A.K. Yadav, Director, NCOF and Manoj Menon, ICCOA, Bangalore.

प्रकाशन व मुद्रण
निर्देशक राष्ट्रीय जैविक खेती केन्द्र
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Book Reviews

Handbook of Composite Organic Farming By Himadri Panda and Dharamvir Hota, Publisher Gene-Tech Books ISBN: 9788189723813, 2008, Pages: 288, Price Rs. 1150 - Our concern about environmental safety and sustainability of land productivity is increasing among the scientists, environmentalists and higher officials. With the increasing population, it is also becoming clear that food security for the millions will not be possible unless the available resources are efficiently utilized for increasing the productivity. The strategy adopted during the green revolution cannot be valid anymore under the present conditions. A new strategy of living with the nature and nurturing it for sustainable high productivity should be evolved. Though the use of chemical inputs cannot be altogether avoided, but their use in agriculture has to be minimized or rationalized. So organic farming shows us the way to effectively use the available natural resources for the benefit of mankind. But unfortunately there is lot of misunderstanding. A compilation of the available information with upgrading technology has been felt for students, research workers, agriculturists, environmentalists and scientists in the field of agriculture. In this handbook almost all the aspects related to organic farming are covered with a balanced approach. The author demonstrates the newness of the organic concept for readers. This will help readers to discover easily the philosophical and technical differences between organic and conventional farming system. (AKY)

Organic Farming Biocontrol and Biopesticide Technology, By P. Bhattacharyya and S.S. Purohit, Publ. Agrobios (India), 2008, ISBN No. 81-7754-369-5 Price Rs. 850 – Organic farming uses the earth's natural resources for sustainability. It follows the principals of nature, which are self sustaining developing system and promises maintenance of soil fertility and control of pests and diseases by enhancing natural processes and cycles in harmony with the natural environment. Based on this concept organic farming is practiced in approximately 130 countries with total area of 35 million ha around the world. Although India has made wide strides in attaining food security through green revolution, but it has given rise to second generation problems like soil degradation, resurgence of pests and diseases, environmental pollution and decline in farm profit. The ill effects of pesticides could be related to many human and animal diseases like hepatitis, influenza, gastrointestinal troubles, allergy, cardiovascular problem and even cancer. According to WHO, 20,000 to 25,000 people die every year in third world countries due to pesticide poisoning. Use of biopesticide and biocontrol agents can minimize this problem. The biocontrol agents and biopesticides of microbial or plant origin play important role in protecting crops against pests and diseases under organic farming systems. More than 400 biocontrol laboratories are now functioning in the country. The present book covers overall information on biological control and biopesticides. It includes chapters like basic introduction to pest management and biological control, target pests and its biological control, principals of biological control and botanical pesticide, biotic agents and microbial pesticides, neem, bacteria, fungi, viruses, nematodes and protozoa as biopesticide, agricultural antibiotics from microbes, quality control of biopesticides, botanical pesticides and biocontrol agents, biopesticide research, development and progress and data base of biopesticides and biocontrol agents. (AKY)

Health Benefits of Organic Food: Effects of the Environment Edited by D.I. Givens, Baxter S, Minihane A M, Shaw E, S. Baxter, A. M. Minihane, E. Shaw, CABI Publishing, pages 352, Price – 80.75, ISBN-10: 1845934598 - Public concern over impacts of chemicals in plant and animal production on health and the environment has led to increased demand for organic produce, which is usually promoted and often perceived as containing fewer contaminants, more nutrients, and being positive for the environment. These benefits are difficult to quantify, and potential environmental impacts on such benefits have not been widely studied. This book addresses these key points, examining factors such as the role of certain nutrients in prevention and promotion of chronic disease, potential health benefits of bioactive compounds in plants, the prevalence of food-borne pesticides and pathogens and how both local and global environmental factors may affect any differences between organic and conventionally produced food. (AKY)

Organic Production and Use of Alternative Crops By Martina Bavec, CRC Press 2007, ISBN1574446177, 9781574446173, pages-241 - Merging coverage of two increasingly popular and quickly growing food trends, Organic Production and Use of Alternative Crops provides an overview of the basic principles of organic agriculture and highlights its multifunctionality with special emphasis on the conservation of rare crops and their uses. Considering more than 30 disregarded and neglected crops suitable for growth in temperate climates, each chapter covers the botany, climate conditions, cultivars, production and yield, growth and ecology, organic cultivation, harvesting, handling and storage, and utilization where the information is available and applicable to the crop under discussion. Other topics include organic production systems, the nutritional and health benefits of products, food processing, and suggestions for some homemade foods. The authors have a wide range of experience in the growing and processing of alternative crops, the management of the processing projects, and the marketing of organic products. They have worked in close cooperation with many small scale processing activities on farms and in the food industry. Drawing on their combined experience, they provide a summary of the major problems and the knowledge base for utilization of alternative crops in new products. The broad range of coverage and interdisciplinary approach make this book a comprehensive reference and useful tool not only for the production of alternative crops but also for the development of new niche market products. (AKY)

Production Technology for Organic Spices, Edited by M. Tamil Selvam, H. Cheriyan, K Manojkumar and B.L. Meena, Publ – 2007, Directorate of Arecanut and Spices Development, Calicut, India, pages-297 – The book is a compilation of all important papers presented during the "National Seminar on Organic Spices and Aromatic Crops". The seminar was conceived to bring together all stakeholders to take stock of the relative work done in each front comprising of production, certification, value addition, marketing and export. The contents comprise of 33 papers touching all the core issues. Important chapters include: Production technology of various spices and aromatic plants, standardization of manures, Bio-inputs, certification issues, good agricultural practices, Government interventions and marketing and value chain aspects. Authors hope the book will be a good source of information for farmers, scientists, industrialists and marketing people. (AKY).