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जैविक खेती सूचना पत्र, राष्ट्रीय जैविक खेती परियोजना के अन्तर्गत जारी एक बहुभाषीय तिमाही प्रकाशन है। जैविक खेती के उत्थान, प्रचार प्रसार व इसके नियामक तंत्र से जुड़े लेख, नयी सूचनाएं, नये उत्पाद, विशेषज्ञों के विचार, सफल प्रयास, नयी विकसित प्रक्रियाऐ, सेमिनार-कान्फ्रेन्स इत्यादि की सूचना तथा राष्ट्रीय व अर्न्तराष्ट्रीय समाचार विशेष रूप से आमंत्रित हैं। सूचना पत्र में प्रकाशित विचार व अनुभव लेखकों के अपने हैं जिसके लिए प्रकाशक उत्तरदायी नहीं है।

Organic Farming Newsletter (OFNL) is a multilingual quarterly publication under National Project of Organic Farming. Articles having direct relevance to organic farming technology and its regulatory mechanism, development of package of practices, success stories, news related to conferences, seminars etc, and national and international events are especially welcome. Opinions expressed in articles published in OFNL are those of the author(s) and should not be attributed to the publisher.

Editorial

प्रिय पाठको

८ वर्षों की निरंतर प्रगति के साथ आज लगभग १० लाख है. खेती क्षेत्र में जैविक खेती की जा रही है। इसके अतिरिक्त लगभग ३६.५ लाख है. जंगल क्षेत्र भी प्रमाणीकरण अधीन है। वर्ष २०१०-११ में कुल जैविक खेती उत्पाद का प्रमाण लगभग ३८ लाख टन था जिसका मूल्य लगभग रु ५४५० करोड रहा। परंतु उत्पादन में हुई सफलता के मुकाबले बाजार सुविधायें पीछे रहीं जिसके कारण कुल उत्पादन का लगभग १८-२० प्रतिशत ही जैविक उत्पाद के रुप में बेचा जा रहा है। शेष या तो स्थानीय खपत में जा रहा है या अन्य साधारण उत्पाद के साथ मिलाकर बेचा जा रहा है। यह एक चिंता का विषय है तथा आने वाले समय में जैविक खेती प्रणेताओं को इस पर विशेष ध्यान देना होगा।

तकनीकी विकास के क्षेत्र में अनेक अनुसंधान संस्थान लगातार प्रयासरत हैं तथा प्राचीन ज्ञान के मूल्यांकन का कार्य भी कर रहे हैं। इस अंक में होमा कृषि तकनीक के मूल्यांकन पर एक लेख प्रस्तुत है। साथ ही अनेक तुलनात्मक अध्यनों का सार भी दिया जा रहा है जिनसे यह इंगित होता है कि जैविक खेती समकक्ष उत्पादन के साथ अधिक टिकाउ व लाभदायी है तथा स्थानीय स्त्रोतों का संरक्षण भी करती है। अंतराष्ट्रीय स्तर पर बायोफाख जर्मनी २०१२ की अभूतपूर्व सफलता इस मंदी के दौर में भी जैविक खेती की महत्ता साबित करती है। भारत का कंट्री आफ दी ईयर होना जैविक खेती क्षेत्र में उसकी बढती साख का प्रतीक है।

Dear Readers

Organic Farming started with big bang about 8 years ago has grown over 1million ha in cultivated area and 3.65 million ha under wild harvest collection. Total organic production during 2010-11 was above 38 lakh tons valuing at Rs. 5,500 crores. But still marketing is not catching up with the production and producers are facining difficulties in accessing the marketing channels. Only 18-20% of total organic production is being sold as branded or labeled organic produce while remining is either being consumed by the local populace o being sold mixed with conventional. This is a serious situation where promoters of organic farming need to concentrate in the days to come.

On technology front information is being continuously added. Research Institutions have started validating the indigenous practices and the initial results are encouraging proving the scientific footing of traditional wisdom. This issues presents a validation study on Homa Farming technique. Various comparison studies and research studies published have further compounded the belief that organic system is equally productive with greater benefits, added sustainability and resource conserving. At international for a the BioFach Germany 2012 was a great success in under prevailing economic recession and India as country of the year was indicative of India's growing strength in International organic food and fiber trade.

डा. ऐ. के. यादव Dr. A.K. Yadav

संपादक Editor

Effect of Homa Organic Farming Practices on Soybean Crop

Kumari Namrata, H.B.Babalad and P.W. Basarkar
University of Agricultural Sciences, Dharwad (Karnataka)

Introduction

The success achieved in phenomenal growth in food production during past few decades is generally attributed to introduction of high yielding varieties, intensive use of chemical inputs and improved methods of irrigation. But excessive and imbalanced use of chemical fertilizers and pesticides in recent years has received severe criticism and it is being increasingly realised that, increase in agricultural production was achieved at the cost of natural resources, soil health and environment (Cooke, 1982). The ever growing environmental degradation has triggered a global alarm, resulting into search for ecologically sound, viable and sustainable farming system.

Modern science considers three areas in agriculture as most important, namely, ensuring adequate water supply, soil enrichment through chemical nutrient and, improved genetic stock. It hardly takes into account the environment and other associated factors. According to Vruksha Ayurveda, the ancient plant science, atmosphere is the biggest single factor which not only provides more than 75 per cent nutrition to the plants but also affects plant, soil and water. Control of pest and diseases, taking environment into consideration is totally a neglected area. Many of the critics of chemical input based agriculture realize that, organic farming, which aims at cooperating rather than confronting with nature is the only answer to many of our present day ills. Homa farming is a step ahead of organic farming and promises to address some of the issues of environmental pollution. The homa technique uses Agnihotra as a basic yajnya or homa and organic farming as a base in agricultural practices. The homa practice is an additive cultivation practice to organic agriculture to produce clean atmosphere by conducting homa in the field / garden / forest for the betterment of crops and plants in agriculture, horticulture, forestry and microbes. It is claimed to be helpful to animals and human beings too. Homa practice is a process of purifying the atmosphere through a specially prepared fire which is a special state of matter. As homa practice is non-specific in nature and mainly acts as environment purification process it can be clubbed with any form of ecological or organic farming practices.

Agnihotra process involves preparing a small fire with dried cow dung cakes in a copper semi-pyramid of fixed size and putting some whole unpolished grains of rice and ghee into fire exactly at sunrise and sunset. It has three requirements, namely burning of specific substances in a copper semi-pyramid, chanting of specific mantras and specific timings according to 'Circadian rhythm' of nature *i.e.* sun rise and sun set timings of a particular place depending upon longitude and latitude of that place. It has been used successfully in wheat, rice, sorghum, pulses, soybean, oil seed crops, horticultural crops etc. Soybean has shown good response to HOF at Indore in Madhya Pradesh registering a yield of 1800 kg per ha over only 350 kg per ha with conventional practices within one year of adopting HOF technique.

Soybean [*Glycin max* (L.) Merril], a grain legume, is considered as a wonder crop due to its dual qualities *viz*., high protein content (40-43%) and oil content (20%).It provides approximately 60 per cent of the vegetable protein and 30 per cent of cooking oil in the world. Soybean ranks second in vegetable oil economy of India after groundnut. It is

well suited to black soil. Transitional tracts of Karnataka in Belgaum, Dharwad and Bijapur districts are the major soybean growing area occupying 41.2 thousand ha with 28.3 thousand tons of annual production. However, the productivity of the crop in the state is much less compared to national average. It was, therefore, considered most appropriate to test HOF technique on soybean.

Material and Methods

A field experiment was conducted during *Kharif* 2009 to study the effect of Homa organic farming (HOF) practices on soybean crop. The experiment was conducted in the C-block of the Institute of Organic Farming, Main Agricultural Research Station (MARS), University of Agricultural Sciences (UAS), Dharwad. The G-block of the same farm at UAS, Dharwad which is 1 km away from C-block served as control where conventional control (T9) and non homa control (T10) were maintained. The soil of the experimental site and control was of mixed red and black type. The experiment was laid out in completely randomized block design with three replications. Organically raised soybean seeds of variety JS-335 were used. Out of total 10 treatments, T1-T8 were imposed at the C-block of the Institute of Organic Farming where daily Agnihotra homa at sunrise and sunset and Om Tryambakam homa, which does not have specific timings, was performed for 3-4 h in a day throughout the experimental period. The conventional control (T9) wherein agrochemicals were used and non homa control (T10) were maintained 1 km away at G-block, where no homa was performed. Details of treatments from T1 to T10 are given in Table 1.

Seeds used for homa treatments except seeds of all the control treatments (T1, T9 and T10) were treated with fresh cow urine for 5-10 seconds and dipped in fresh cow dung slurry for 10-15 min and dried in shade. The seeds used in T1 treatment were not given any homa ash treatment and sown in the C-block of Organic farm. It was considered as homa control. Along with other specific treatments, seeds used in T2, T4 and T6 were treated with Agnihotra homa ash (Table 1) and that of T3, T5 and T7 with Om Tryambakam homa ash. A special bio-digestate called Biosol was prepared and used for soil (T4 and T5) and foliar (T6 and T7) application. Agnihotra homa was performed daily in Agnihotra hut (Fig.1, see inside back cover p. 25) while chanting specific mantras in a copper semi-pyramid of specific size using dried cow dung cakes, whole unpolished raw organically grown rice grains and cow's ghee at specific sunrise and sunset timings (Anon, 2009).

Agnihotra mantra

At sun rise

Sooryaya swaha, sooryaya idam na mama|
Prajapataye swaha, prajapataye idam na mama ||

At sun set

Agnaye swaha, agnaye idam na mama |
Prajapataye swaha, prajapataye idam na mama ||

Om Tryambakam homa mantra

Om tryambakam yaja mahe, sugandhim pustivardhanam |
Urva rukamiva bandhanan,
mrutormuksheeya ma mrutat, swaha |

The ash collected from daily performance of Agnihotra homa and Om Tryambakam homa were stored separately in earthen pots and used for different treatments.

For the conventional control (T9) in G-block, Thiram and Carbandazin were used as seed treatment to control soil borne diseases. Seeds were dibbled at a spacing of 30 cm x 10 cm. FYM @ 5 tons per ha and N:P:K @ 40:80:25 kg per ha was applied before sowing as basal application. For controlling weeds, two hand weeding and two hoeing were carried out. Hexaconozole @ 1 ml per liter of water for rust and Chloropyriphos @ 2 ml per liter of water with Neem based pesticide @ 5 ml per liter of water were sprayed at 40 and 60 DAS. All the treatments in controls and experimental plots received same crop care during the experimental period.

For higher coverage of effects of homa, a new technique called as **Resonance Point**

(RP) technique developed by the Bio-farms, Fivefold Path Mission (FFPM), Dhule, Maharashtra (India) was used. The RP technique extends the zone of effectiveness of Agnihotra homa from a few feet to nearly 1000 feet in all the directions and covers 150-200 acres of area. The RP is a part of 'Homa therapy' through which large areas of land are healed in a short time.

Two huts were constructed in the C-block of Organic farm, one for performing Agnihotra homa (Fig.1, p 25) and the other one for Om Tryambakam homa (Fig.2, p 25) using inexpensive, natural material available locally like wood, bricks, bamboo, stones etc. which protected the person performing the fires of 'Homa therapy' from hot sun, rain and blowing wind and prevented interference from animals like dogs, cats, rats etc. (Anon., 2009). The Agnihotra homa was performed daily at sunrise and sunset. The timings were obtained from the software developed by FFPM based on the latitude and longitude of the place. The Agnihotra hut was built in the centre of the C- block. The size was approximately 3 m x 4 m and longer side was aligned with east/west axis. The hut had an opening in the west. Near the east wall and parallel to it, 18" deep pit of approximately 2' x 2' size was dug. All this was done before the 'Homa therapy' volunteer visited the field to install and activate the Resonance point. The Resonance point volunteer chanted specific mantras of *Purushasookta* while activating 10 copper semi-pyramids by letting fire with the help of dried cow dung cakes and cow ghee. After the activation, one activated copper semi-pyramid was buried at the bottom of the column. A column of mud and bricks was built on the top of it to an approximate height of 18" and another activated semi-pyramid was placed at the top of it, directly above the buried semi-pyramid.

Om Tryambakam homa hut was slightly larger than the Agnihotra homa hut (4 m x 5 m.) In this hut, two pyramids were placed on small mud-brick columns, one on the left for Agnihotra homa at sunrise and sunset and one on the right for performing Om Tryambakam homa. This hut was constructed at the entrance of the farm, so that outsiders could come and go without disturbing performance of Agnihotra homa in the farm. This way, a semi-pyramid on the column was placed at the heart level of the person sitting on the floor in front of the column. The semi-pyramid on the top of the column served as the resonance semi-pyramid and was not used for any homa. Two other activated semi-pyramids were placed on smaller mud-brick platforms on the right and left hand side, in front of main column. The one on the left was used for the performance of daily Agnihotra and one on the right was for the performance of other occasional fires like Vyahruti homa. There were four semi-pyramids in the Agnihotra homa hut. By maintaining silence inside, no interference with subtle healing energies in the hut was ensured.

After utilizing four activated semi-pyramids, other activated semi-pyramids were installed on the boundary of the farm up to a maximum distance of 350 meters exactly North, South, East and West of the central point of Resonance i.e. Agnihotra hut. On each point, a column of mud bricks and mud was build which was at the heart level of person standing approximately 4' (Fig.3p 25) and an activated semi-pyramid was placed on the top of the column. This was referred to as Resonance column. The semi-pyramids were covered with tiles to maintain the pyramid clean and safe when they were not in use. Ten new copper semi-pyramids were charged with specific mantras and placed on the farm in the specific configuration by 'Homa therapy' volunteer who was authorized by Fivefold Path Mission (FFPM), to install it. The ash collected from daily performance of Agnihotra homa and Om Tryambakam homa were stored separately in earthen pots and used for different treatments (Table 1). All the treatments were imposed in plots of 18 sq. m. (3.6 m x 5 m) size each with 30 cm x 10 cm spacing. Ninety grams of Agnihotra homa ash (T2) and Om Tryambakam homa ash (T3) each were used for soil application.

Number of pods per plant was counted and total protein (%) and oil content (%) was determined in the harvested seeds. The

nodule count and nodule dry weight (g) per plant at 45 DAS was determined by uprooting five plants randomly from each plot. The incidence of rust, pod borer and larvae of *Spodoptera litura* per row meter were noted. The organic carbon (%), available N, P, and K (kg/ha) and micronutrients Cu, Zn, Mn and Fe (mg/kg) were estimated in the soil samples collected after harvest of the crop by standard methods. Soil dehydrogenase activity in the rhizosphere soil collected after harvest of the crop was estimated using 3,5-triphenyl tetrazolium chloride by standard procedure. Microbial count in Biosol was determined up to 120 days after its preparation at 30 days interval.

Results and Discussion

The soil application of Agnihotra homa ash (T2) and Om Tryambakam homa ash (T3) registered higher nodule count and nodule dry weight per plant than homa and non homa controls (Table 1). Biosol applied to soil with these homa ashes (T4 and T5) further improved the nodule count and nodule weight per plant to a maximum extent. However, foliar application of Biosol with homa ashes (T6 and T7) was not as effective as its soil application. In nodule count per plant, only homa treatments (T2-T6) were superior, whereas all the homa treatments increased the nodule weight significantly over conventional control (T9). Similarly, seed treatment with cow dung and cow urine (T8) also increased these characters indicating efficacy of cow dung and cow urine in increasing nodule count and nodule dry weight per plant.

Soil microbial count was not different from each other in homa and non homa controls (T1 and T10) indicating that only exposure to homa atmosphere was not sufficient to increase the microbial count of soil. Seed treatment and soil application of both the homa ashes (T2 and T3) increased all the microbial counts as compared to both the controls. The soil application of Biosol and seed treatment with homa ashes (T3 - T5) was superior over all the homa treatments followed by its foliar application (T6 and T7) with respect to soil microbial count. The microbial count of Biosol (Table 2) did not show any variation up to 60 days after its preparation except in bacterial count which showed $4x10^4$ CFU per g increase. The microbial count however, declined beyond 60 days after preparation of Biosol when studied up to 120 days.

Maximum soil organic carbon content (Table 3) was registered under T2, followed by soil and foliar application of Biosol and different ash treatments which did not differ among themselves (T3 - T7). The homa control (T1) registered higher organic carbon as compared to non homa control (T10) indicating effectiveness of exposure to homa atmosphere over no exposure to homa in increasing soil organic carbon content. It is evident that the homa treatments were superior in increasing the organic carbon content of the soil than conventional practices which is a positive sign for the fields managed by organic farming practices.

The macro and micronutrient status of the soil receiving different treatments like seed treatment with homa ashes and soil application of Biosol homa ashes and Biosol reveal that they were effective in increasing the macro and micro nutrient status of the soil (Table 3). In case of N, P and K, both the controls (homa and non homa) did not differ among themselves indicating thereby that only exposure to homa atmosphere was not sufficient to significantly increase the macronutrient status of the soil. Significant increase in the N, and K content was observed in seeds treated with homa ashes and application of Biosol (T4 and T5) as compared to homa control (T1) and foliar application of Biosol (T6 and T7). The available P content in the soil was significantly higher where seeds were treated with Agnihotra ash (T2) alone followed by Om Tryambakam homa ash (T3) over all other homa treatments. In light of the report that Agnihotra ash contains 97 per cent P_2O_5 (Potdar, 1992), 55 per cent increase observed in soil available P content in this study may be attributed to contribution of P by Agnihotra homa ash and due to copper ions made available by the presence of Shree Yantram in Biosol. It has been observed that Shree Yantram gets

completely dissolved in Biosol during the process of incubation.

Only Fe content increased in T1 over T10 indicating thereby that homa smoke alone could increase the Fe content of the soil but not other micronutrients. The homa ashes and Biosol treatments significantly increased the soil Cu, Zn, Mn and Fe content. However, foliar application of Biosol was not effective in significantly increasing any of the soil micronutrients. It may be noted that soil application of Biosol increased soil micronutrients studied from 24-141 per cent (Cu-48, Zn-141, Mn-51 and Fe-24) over homa and non homa control. However, the conventional practices using chemicals increased soil micronutrients from only 10-76 per cent only (Cu-35, Zn-76, Mn-40 and Fe-10). A similar trend was found in case of macronutrients also. Soil application of Biosol increased the N, P and K content by 14, 55 and 4 per cent, respectively whereas conventional practices increased their content by only 6, 41 and 3 per cent, respectively. The observations of Palekar, (2006) on Jeevamruta and Beejamruta and Swaminathan *et al*. (2007) on Panchagavya lend support to the observations on enhancement in the availability of macro and micronutrients due to organic inputs.

Quantification of dehydrogenase activity has been recommended as a useful indicator of biological activity in soil (Schaffer, 1993). The observation on 141 per cent increase in Zn content in T2 - T4 goes well with the observation on soil dehydrogenase activity which registered 240 and 430 per cent increase in T2 and T4, respectively but only 40 per cent increase in conventional control (T9) over homa control. Many fold increase in the soil Zn content assumes importance since Zn functions as a cofactor for dehydrogenases. Since Zn is an integral part of NAD^+ and $NADP^+$ dehydrogenases, it may be inferred that homa ashes in combination with Biosol might have increased the Zn availability in the enriched soil which in turn, might have resulted in higher activity of soil dehydrogenase.

The study further reveals that, RP technique registered 22 per cent increase in number of pods, 17 per cent higher 100-seed weight, 19 per cent each higher straw and grain yield compared to homa and conventional controls. The cost of cultivation, net returns and B:C ratio were comparable with that of conventional control. The results of Singaram and Kamalakumari (1995) lend support to the observations of this investigation on the activities of dehydrogenase and other enzymes that higher activities of dehydrogenase, urease and phosphatase were recorded in FYM treatment over inorganic treatment in a long term experiment on soil enzymes related to C, N, and P cycling.

The 'Homa therapy' gives two products, homa ash and smoke with medicinal properties. Cow dung is rich in menthol, phenol, formalin, phosphoric acid, potash, ammonia and nitrogen. Agnihotra smoke is rich in formaldehyde and other gases like ethylene oxide, propylene oxide, β-propiolactone (Potdar, 1992). The role of different gases and formaldehyde with CO_2 and water vapour in the air in reducing aerial micro-flora has been demonstrated by Mondkar (1982). Agnihotra reduces pest problems and aromatic substances produced during homa get diffused in the air and offer protection to the plant life against harmful organisms (Anon, 2009).

The significant increase in the organic carbon, available N, P and K and in Cu, Zn, Mn and Fe (Table 3) content points towards the positive effects of Agnihotra ash and Biosol in making the soil rich by way of making available more macro and micronutrients. The homa control (T1) registered significantly higher number of pods per plant (Table 4) over non homa control. The soil application of Biosol (T3) increased the number of pods maximally followed by its foliar application (T4) and homa ash application alone (T2) indicating thereby superiority of Biosol among all the homa treatments. With respect to total protein and oil contents of soybean seeds, all the controls did not differ from each other. However, the protein content increased from 2-5 per cent and oil content from 5-9 per cent due to homa treatments (T2-T4) against 2 and 4 percent increase registered,

respectively by conventional control (T5), when compared with non homa and homa controls.

The homa control (T1) was significantly superior over non homa control (T10) in decreasing the incidence of rust and pod borer on soybean crop by 43 and 53 per cent, respectively and pod borer by 41 and 26 per cent over conventional control (Table 4). In case of *Spodoptera litura* larvae, the homa control reduced caterpillar larvae by 14 per cent at 45 DAS over non homa control, whereas conventional chemical control reduced it by only 8 per cent when compared to homa control. The foliar application of Biosol (T6 and T7)) was superior over its soil application (T4 and T5) and Agnihotra homa ash treatment (T2) in this respect. The conventional control could not reduce the incidence of rust but reduced the incidence of pod borer by 37 per cent.

Conclusion

It may be concluded that Agnihotra homa atmosphere alone was not sufficient to increase nodule number, higher nodule weight per plant and microbial count, dehydrogenase activity and macro and micronutrient status of the soil and also seed protein and oil content. The only remarkable increase registered in case of macronutrients by homa control was in organic carbon, whereas in case of micronutrients it was in Fe content as compared to control without homa. The many-fold increase in the soil dehydrogenase activity indicated the fertile status of the soil and its richness in microbial status after receiving homa treatments. Among all the homa treatments (T2-T7), the soil application of Biosol (T4 and T5) was superior in increasing all the parameters studied. The foliar application of Biosol (T6 and T7) was, however more effective in reducing the incidence of pest and diseases. Soil application of Biosol also increased root nodules maximally as compared to other homa treatments and homa control. Notable increase in the organic carbon, available N, P and K and Cu, Zn, Mn and Fe (Table 3) points towards the positive effect of homa ashes in making the soil rich by way of making available more macro and micronutrients. The use of Biosol along with homa ashes, especially Agnihotra homa ash provides a promising supplement at a very low cost affordable even by poor and marginal farmers.

The study clearly indicates the usefulness and potential of 'Homa therapy' or HOF practices over conventional chemical methods of cultivation in soybean. Studies on other grains, vegetables and fruits are in progress under HOF.

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Table 1.Nodule count and nodule dry weight per plant at 45 DAS and soil microbial count after harvest of soybean crop as influenced by different homa treatments

Treatment details	Nodule count / plant	Nodule dry weight / plant (g)	(CFU x 10^3/g)		
			Bacteria	Fungi	Actinomycetes
T_1 – Homa control	21	1.01	81	16	26
T_2 - Seed treatment with Agnihotra homa ash, fresh cow dung and cow urine-furrow application of Agnihotra homa ash	35	1.53	99	20	35
T_3 - Seed treatment with Om Tryambakam homa ash, fresh cow dung and cow urine- soil application of Om Tryambakam homa ash	31	1.50	95	18	31
T_4 - Seed treatment with Agnihotra homa ash, fresh cow dung, cow urine-soil application of Biosol	42	1.74	104	24	39
T_5 - Seed treatment with Om Tryambakam homa ash, fresh cow dung and cow urine- soil application of Biosol	39	1.36	102	22	37
T_6 - Seed treatment with Agnihotra homa ash , fresh cow dung and cow urine-foliar application of Biosol	27	1.19	91	19	35
T_7 - Seed treatment with Om Tryambakam homa ash, fresh cow dung and cow urine- foliar application of Biosol	22	1.18	90	18	34
T_8 - Seed treatment with fresh cow dung and cow urine	31	1.34	85	18	29
T_9 - Conventional practices without homa	20	0.88	83	19	29
T_{10} – Non homa control	15	0.64	80	15	27
S. Em. ± CD at 5%	1.54 4.56	0.06 0.17	1.07 3.16	0.71 2.12	1.05 3.08

Table 2. Microbial count of Biosol

Days after preparation	Bacteria	Fungi	Actinomycetes	N_2-Fixers	Phosphorus solubilizing bacteria
	(CFU $\times$ 10^4/g)	(CFU $\times$ 10^3/g)			
30	89	13	45	50	26
60	93	11	46	51	27
90	76	10	23	33	17
120	68	10	23	28	17

Table 3. Soil macro and micronutrient status and dehydrogenase activity after harvest of soybean crop as influenced by different homa treatments

Treatment details	Macronutrients				Micronutrients				Soil dehydrogenase activity (µg of TPF formed / g / 24 h)
	Organic carbon (%)	Available N	Available P	Available K	Cu	Zn	Mn	Fe	
		(kg / ha)			(mg / kg)				
T1	0.75	168	22	481	0.99	0.27	6.46	7.25	1.0
T2	0.83	185	34	499	1.44	0.68	7.86	9.41	4.0
T3	0.79	184	30	492	1.08	0.61	7.55	9.00	3.4
T4	0.78	192	24	501	1.47	0.65	9.76	8.98	5.3
T5	0.77	189	22	491	1.44	0.44	9.29	8.89	3.6
T6	0.77	180	23	482	1.03	0.37	6.95	7.33	2.6
T7	0.77	180	22	486	1.02	0.28	6.74	7.61	1.5
T8	0.76	178	24	481	1.01	0.27	6.74	7.65	1.2
T9	0.72	181	24	485	1.09	0.37	6.98	8.18	1.4
T10	0.68	167	21	481	0.93	0.26	6.46	6.27	0.9
S. Em. ±	0.01	1.39	0.73	2.40	0.13	0.04	0.29	0.27	0.23
CD at 5%	0.04	4.13	2.16	7.15	0.39	0.11	0.87	0.79	0.68

Table 4. Number of pods per plant, total grain yield, total protein and oil content, incidence of rust pod borer and *Spodoptera litura* larvae on soybean crop as influenced by different homa treatments

Treatment details	No. pods / plant at 75 DAS	Grain yield (Kg/ha)	Total protein	Oil content	Rust incidence	Pod borer	*Spodoptera litura* (larvae / row meter)	
			(%)				45 DAS	60 DAS
T1	37	837	38.2	18.0	15.68	11.11	3.52	3.58
T2	41	870	39.0	18.9	17.69	11.63	3.19	3.29
T3	39	881	38.8	18.4	14.92	9.60	3.59	3.36
T4	45	940	39.9	19.6	14.66	11.16	3.68	3.41
T5	41	964	39.1	18.5	15.83	10.00	3.10	3.00
T6	42	981	39.4	19.6	11.00	8.16	2.53	2.46
T7	38	994	38.2	19.4	13.33	10.60	2.78	3.06
T8	37	840	38.7	18.3	21.03	14.86	3.58	3.77
T9	41	938	38.9	18.7	26.77	15.00	3.83	3.85
T10	30	788	37.9	17.9	27.73	23.83	4.08	4.60
S. Em. ±	0.80	7	0.24	0.14	0.86	1.01	0.05	0.14
CD at 5%	2.50	21	0.72	0.41	1.67	3.17	0.15	0.40

India Organic News

Bihar farmer sets 'world record' in potato production through Organic farming - The potato farmer, Nitish Kumar, has harvested 72.9 tonnes of tuber per hectare. The world record so far was 45 tonnes per hectare held by farmers in the Netherlands. Nalanda District Magistrate Sanjay Kumar Agrawal said that several officials and agricultural experts were present in the field at the harvest time to verify the claim and record it. "The world record is the result of hard labour and experiment with organic farming". Kumar Kishore Nanda, a soil scientist, who helped Nitish in his farming, said success was a result of the organic method of farming. "Once again the organic method of farming proved superior to other methods of farming." Nanda said that the loam soil of the village is suitable for several crops, including the potato. Rajesh Umath, a District Horticulture Officer, said the new record will certainly go a long way in removing doubts about low production associated with organic farming and encourage other farmers to adopt it. Nalanda, the home district of Chief Minister Nitish Kumar, is already the leading potato producing district in Bihar with farmers growing the crop on over 27,000 hectares. Bihar is the third largest potato producing state after Uttar Pradesh and West Bengal. Last year, five farmers of the village are said to have created a world record when they produced 224 quintals of paddy per hectare. A young farmer, Sumant Kumar, produced 224 quintals of paddy per hectare beating the world record of Yuan Longping of China with 190 quintals of paddy produce per hectare. The Indian Council of Agricultural Research (ICAR) has certified Sumant Kumar's record. The SRI method of paddy cultivation was introduced in the state three years ago. Initially the farmers were reluctant to adopt this new technique despite the state government providing free seeds, fertilisers and experts to guide them. But now more farmers are interested in adopting this method in paddy cultivation. An upbeat chief minister had then termed it "a big achievement" in the agriculture sector in the state. The next green revolution in the country would be ushered in from Bihar, he had said (The Economic Times, March 14, 2012)

Support Biodiversity and Bio-Cultural Heritage - Endorse the Seed Declaration - During the Seed Festival, that took place in Mumbai-Pune, February 19-21, 2012 people came together to celebrate the rich diversity of the Indian seed and bio-cultural heritage. The program of the conference included exhibitions, meetings with seed savers, the screening of documentary movies, music and discussions over seed diversity conservation and promotion, urban agriculture, as well as tradition and culture. One outcome of the event was the drafting of a Seed Declaration, with which the petitioners stand up for the sovereign rights of farming communities and indigenous people over their collective bio-cultural heritage, against any private or corporate proprietary claim of ownership over any variety of seed, crop, plant or life form and against genetically engineered seeds and species. The declaration also urges the Indian Government to partner up with the farmers and civil society organizations, in order to jointly protect the country's rich biodiversity, as well as the health of croplands and ecosystem, by pro-actively promoting and supporting bio-diverse and holistic ecological agriculture practices.

Indian Organic Food Market Analysis - India has emerged as one of the largest potential markets for organic food consumption globally, owing to the fact that organic foods or products are healthy, contain no chemicals or preservatives, and are completely natural. With growing awareness towards healthy food, surging income levels, and shifts in consumer behaviour, the country’s nascent organic food market is fast transforming into the world’s fastest growing organic food market. In addition, increasing export market coupled with Government’s support has driven the market that will further boost the demand for organic food products in the country. According to new research report,

"Indian Organic Food Market Analysis", organic food is invariably catching up pace among the Indian retailers, especially with the niche retailers owing to wide awakening among Indian consumers towards leading a healthy life. It is anticipated that the sector will post significant growth during 2011-2013, invariably growing at a CAGR of 15%. Presently, surmounted growth is being witnessed from new demand pockets, arising from the Tier-I and Tier-II cities, thus, signalling huge acceptance among the masses. The report has studied the Indian organic food market from various perspectives. It entails a detailed analysis of the market in terms of state-wise developments. The report has also included the current and future Government initiatives in every state along with the ongoing developments in the Indian organic food market. The study also foresees immense opportunities for various international and domestic players in this segment. The report, "Indian Organic Food Market Analysis", is an outcome of widespread research and objective analysis of organic food market potentials in India. It provides extensive information and rational analysis on emerging market trends and drivers along with regulatory initiatives, which are collectively uplifting the industry outlook of India. Overall, the report presents a comprehensive and complete analysis of the Indian Organic food industry, which will prove decisive for intending clients. (Source – RNCOS Industry Research Solutions, www.rncos.com/Report/IM365.htm)

Comparing conventional and organic agriculture in Karnataka, India: Where and when can organic farming be sustainable? - Karnataka is one of the south-western Indian states where agrarian distress is a major problem. Crop yields have been stagnant in the last decade, and coupled with increased input costs, this has led to reduced incomes and increased debts. There is an urgent need to study options to improve the sustainability of farming systems in Karnataka. One adopted strategy to stabilize agriculture in the state is organic farming, which is less dependent on external inputs. In this paper, authors assess the sustainability of conventional and organic farming practices using the model TechnoGIN. TechnoGIN calculates inputs and outputs of farming practices, allowing assessment of its impacts on economic and environmental indicators. Data on inputs and yields have been collected in two districts in 2009 from farms with conventional and organic cultivation at the same time. Additional data were collected from literature and experts. Next, the current situation was assessed and projections were made towards 2015 for two scenarios per village, using either conventional or organic practices. Modelling results show that for the study site situated in a dry region, Chitradurga, profits with organic farming are higher than in conventional farming, except for rotations that include onion. Input costs are lower resulting in lower financial risks with organic farming. Nutrient balances in organic agriculture were however found to be negative for all crop rotations indicating imbalanced supply of nutrients. This suggests it may not be possible to sustain current yields in the long term with current nutrient applications. In the second site situated in a transition zone with intensive cultivation of commercial crops, yields and profits were similar in organic farming compared to those under conventional practice, except for commercial crops like cotton and coconut where the profits are lower. The debt risk in case of crop failure appears to be practically similar for both types of farming practices. Nutrient balances are generally positive, indicating that NPK supplies are not the main yield limiting factor. It is concluded that organic farming can be a sustainable farming practice in Karnataka depending on regional conditions and the crops cultivated. Policies stimulating organic farming should therefore consider the regional differences and farmer's preferences.

Highlights of the study - ► Organic farming can be sustainable farming practice in the state depending on regional conditions and crops cultivated. ► Organic farming has potential to increase net returns, reduce the risk of crop failure and reduce environmental impacts. ► Nitrogen balance in most crop rotations with organic cultivation results in negative in dry region, indicating need to improve Nitrogen supply. ► Net losses in

case of crop failure are much less in organic practice compared to conventional in both dry and wetter regions. ► Sustainability in both dry and wetter regions can be increased in future with improved nutrient management. (Source - Sheetal Patil, Land Use Policy, Available online at www.sciencedirect.com)

Organic Farming can create 60 lakh jobs in Madhya Pradesh - Madhya Pradesh (MP) accounts for nearly 40 per cent of the total area under certified organic farming in the country. Though most of it is due to cotton fields, the state has an immense potential to bring even food crops under organic cultivation. The Associated Chamber of Commerce and Industry of India (ASSOCHAM) submitted a study titled, "Madhya Pradesh: Inching towards organic farming", to the state Government during January 2012. The report claims that organic farming can lead to wealth accumulation of a whopping Rs 23,000 crore, generate exports worth Rs 600 crore and create 60 lakh employment opportunities across the state over the next five years. For its part, the state Government of Madhya Pradesh has already come out with an Organic Policy, and has promised to implement it soon. According to the ASSOCHAM study, adoption of organic farming will bring down input costs and the produce will fetch a 50 per cent premium over the normal price and nearly 100 per cent in retail market. "The demand comes mainly from developed countries and MP has the potential to take India's global share in organic exports from less than one per cent to about 2.5 per cent by 2013," says D S Rawat, ASSOCHAM's National Secretary General. The study recommends that the state should increase cultivation through a cluster approach to generate marketable surplus and provide economy of scale in marketing the produce. The state will have to map the status of organic farming and certification along with agro-climatic zones to tap the potential of organic crops and understand micro level production potential. "There is no alternative to organic farming and the state has a huge untapped potential but the Government will have to do a lot more than only framing a policy," says former Director of Agriculture (MP) Dr G S Kaushal, who was one of the two members on the committee. Kaushal says the use of pesticides in districts like Mandla and Dindori is negligible and organic farming should be promoted in a big way there. The use of Bt cotton has increased exponentially in the state over the last few years, sparking a doubt if areas believed to be under organic farming are actually so. "The state should get its act together before its organic cotton gets a bad name," says Kaushal. The recommendations made by the committee include: Government should procure organic produce by giving 20 per cent bonus; subsidy for setting up bio-gas plants; agriculture colleges and universities should provide information and practical tips to farmers and set up experimental farms on their campuses; setting up of Organic Agriculture University; Government should bear the costs and make arrangements for verification of certified areas; and create a market for these produce and buy the surplus in the initial years. Additional Chief Secretary (Farmers Welfare and Agriculture Development) R Parshuram admits that promoting organic farming is a huge challenge. "We will have to promote farm practices that bring down the cost. We cannot impose but only persuade farmers to adopt them. Unless farmers see benefits and a clientele emerges they won't go for it. The MP Government began its tryst with organic farming nearly a decade ago in 1,565 villages selected from 313 development blocks in then 48 districts. Not only was the use of agro-chemicals in these villages prohibited, nutrients for crops were provided through green manuring and composts. (The Indian Express January 27, 2012)

Organic Food: An Assessment of Knowledge of Homemakers and Influencing Reasons to Buy / Not to Buy - Serious concerns expressed during the last decade regarding the use of chemicals in agriculture in terms of their adverse impact on the human health, environment and sustainable agricultural production has been encouraging organic food production world over. Hence apart from being environment friendly, organic foods are believed to be having high nutritional value and safe for

human health. But how far the women, the health providers of families, are aware of various aspects of organic food needs to be investigated so as to increase the consumption of organic food products. Some areas of India have popularized organic food. With a view to find out the scenario in Gujarat, a small study was conducted in Vadodara city to assess the knowledge of homemakers about organic food and the reasons for buying /not buying organic food. Majority of the respondents (77.3%) belonged to nuclear family. More than half of the respondents were graduate and very few were undergraduate. Little more than half (64%) of the respondents were not employed. More than one third of the homemakers (38.18%) belonged to an income group ranging from Rs.10,001 to Rs.20,000. About 16% of the respondents belonged to the income group of more than Rs.40000 per month. About 91 percent of respondents correctly knew that "Organic food helps to improve quality of soil" and "Organic crops appear to be richer in nutrients than the conventional crops". Approximately the same percentage of respondents knew that "The primary goal of consuming organic food is to optimize health and work productivity" and they also knew that "A certified organic label is the only way for consumers to trust that product is organic". About 85 percent of the respondents knew that "The organic food is available at selected outlets only. The weighted mean score reflected that respondents had poor knowledge regarding a few aspects of organic food. They had poor knowledge regarding the "Appearance of organic food as compared to conventional food", "The shelf life of organic food" and regarding "The surety of the food being sold in the outlets as being certified organic food". While asking reasons of buying organic food, respondents gave varied answers. About 90 percent of the respondents bought organic food because "Organic food is good for health" and "Organic food is nutritious." This showed that good knowledge of nutrients contents is a driving force to buy organic food. The obstacles in buying organic food were also identified in the present study. The most common hindrance experienced by about 71 percent of respondents was that "The market price of organic food is very high as compared to conventional food. About 74 per cent replied that they did not buy organic food because, "In absence of certification process, it is difficult to judge a true organic food product." (Source - Dholakia and Shukul, 2012, J Hum Ecol, 37(3): 221-227)

***Kaipad* rice farming in North Kerala-An indigenous saline resistant organic farming system** - Rice, the most important cereal and staple carbohydrate source of Asia is cultivated in diverse ecological conditions and many such agro-ecosystems are fragile and critically endangered. Some such systems are very special in terms of their ecological singularity and subsistence value and their conservation would invariably add to availability of food and protection of genetic diversity. The present study is an investigation in to a very unique rice farming system in Kerala state of India in which rice is cultivated in the first crop season in saline wetlands that are subjected to regular tidal action, taking advantage of the heavy South west monsoon which results in flushing out the salt content from the farmland. In Central Kerala the system is known as *pokkali* and in North Kerala as *kaipad*. *Kaipad* system of rice farming has been studied presently, based on specialities of the area, soil and water conditions and the varieties used. The study showed that soil salinity of the area in summer varied from 10.9 mmhos/cm to 19.9 mmhos/cm and water salinity in summer varied from 35.9 mmhos/cm to 49.9 mmhos/cm and in the month of July in the middle of the South west monsoon it varied from 1.6 mmhos/cm to 4.7 mmhos/cm. Soil *p*H during April ranged from 4.9 to 6.6. Water *p*H ranged between 6.71 and 7.45 in April and in July it ranged from 6.15 to 6.71. Availability of NPK in the soil ranged as follows in April: N: 1.12% to 2.0%; P: 7.2 kg/ha to 34.2 kg/ha; K: 480 kg/ha. The major rice varieties cultivated in the area are the cultivars *Kuthiru*, *Orkazhama*, *Kuttusn*, *Ortha diyan* and *Chovverian* among which *Kuthiru* is the most popular and the best performing. (Source – Chandramohan and Mohanan 2012 Indian J. Traditional Knowledge, 11(1) : 185-189).

Global Organic News

'The World of Organic Agriculture 2012' - According to the latest FiBL-IFOAM survey on certified organic agriculture worldwide (as on end of 2010), data on organic agriculture are available from 160 countries. There are 37 million hectares of organic agricultural land (including in-conversion areas). The regions with the largest areas of organic agricultural land are Oceania (12.1 million hectares), Europe (10 million hectares), and Latin America (8.4 million hectares). The countries with the most organic agricultural land are Australia, Argentina, and the United States. Currently 0.9 percent of the agricultural land is organic. By region, the highest shares are in Oceania (2.9 percent) and in Europe (2.1 percent). In the European Union, 5.1 percent of the farmland is organic. However, some countries reach far higher shares: Falkland Islands: 35.9 percent; Liechtenstein: 27.3 percent; Austria 19.7 percent. In seven countries, more than ten percent of the agricultural land is organic. Compared with the previous survey (2009), the organic agricultural land decreased slightly (by 50'000 hectares, -0.1 percent). There was strong growth in Europe, where the area increased by 0.8 million hectares (+9 percent). In Asia, however, the organic area decreased, mainly due to a major decline of organic farmland in India and China. The countries with the largest increases were in Europe: France (+0.17 million hectares), Poland (+0.15 million hectares), and Spain (+0.13 million hectares). Apart from agricultural land, there are further organic areas, most of these being areas for wild collection. Other areas include aquaculture, forests, and grazing areas on non-agricultural land. They constitute 43 million hectares. In total, 80 million hectares (agricultural and non-agricultural areas) are organic. There were 1.6 million producers in 2010. Thirty-four percent of the world's organic producers are in Africa, followed by Asia (29 percent), and Europe (18 percent). The countries with the most producers are India (400'551), Uganda (188'625), and Mexico (128'862). About one third of the world's agricultural land (12.5 million hectares) and more than 80 percent of the producers are in developing countries and emerging markets. For almost 90 percent of the organic agricultural land, land use details were available. About two-thirds were grassland/grazing areas (23.7 million hectares). With a total of at least 6.1 million hectares, arable land constitutes 17 percent of the organic agricultural land. An increase of six percent compared with 2009 was reported. Most of this category of land is used for cereals including rice (2.5 million hectares), followed by green fodder from arable land (2 million hectares), oilseeds (0.5 million hectares), protein crops (0.3 million hectares), and vegetables (0.2 million hectares). Permanent crops account for approximately seven percent of the organic agricultural land, amounting to 2.7 million hectares. Compared with the previous survey, this is an increase of six percent. The most important permanent crops are coffee (with 0.64 million hectares), constituting almost one-fifth of the organic permanent cropland), followed by olives (0.5 million hectares), cocoa (0.29 million hectares), nuts (0.26 million hectares), and grapes (0.22 million hectares). Regarding the wild collection area (including areas for beekeeping), most of this is in Africa (39 percent of the global total) and Europe (30 percent). Not much detail on the crops harvested is available. Wild berries, medicinal and aromatic plants as well as wild fruits are among the most important ones.

Global market

Global sales of organic food & drink reached 59 billion US dollars in 2010 according to Organic Monitor. The market has expanded over three-fold in ten years (2000: 17.9 billion US dollars). Although growth has slowed since the financial crisis started in 2008, sales have continued to increase at a healthy pace. Demand for organic products is concentrated in two regions; North America and Europe comprise 96 percent of global revenues. The high degree of sales concentration highlights the disparity

between production and consumption. Indeed, most organic food production in regions such as Africa and Latin America is export-geared. In 2010, the countries with the largest markets were the United States, Germany, and France, and the highest per capita consumption was in Switzerland, Denmark, and Luxemburg.

Standards and regulations

The year 2011 was a year of further consolidation in the field of standards and regulations. Relevant work has been carried out to facilitate the international organic trade and reduce trade barriers. The European Union and the United States achieved a breakthrough in their negotiations concerning the mutual recognition of their organic standards and control systems. The formal arrangements are expected to be finalized and implemented in early 2012. These arrangements will lead to a considerable reduction of bureaucracy for trading organic products between the EU and the US. Furthermore, after two years of assessment and internal negotiations, the European Commission published the first list of control bodies recognized for operations in countries outside the European Union. According to the FiBL survey on organic rules and regulations, the number of countries with organic standards has increased to 84, and there are 24 countries that are in the process of drafting legislation. A special case is Ukraine, where the parliament adopted an organic legislation in 2011, but it did not come into force due to a veto of the Ukrainian president. The International Federation of Organic Agriculture Movements (IFOAM) recently revised its Organic Guarantee System (OGS). The new system approved in July 2010 contains several services: The IFOAM Family of Standards, the Global Organic Mark, and the IFOAM Accreditation & the Global Organic System Accreditation (GOSA). There has been modest growth in the number of certification bodies in most regions of the world, although the number has increased rapidly in some Asian countries, mainly in India. Many of the new certifiers are branch offices of international certification bodies that have gained approval, for instance, by the European union or the local government. The total number of certification bodies is 549, up from 532 in 2010. Most certification bodies are located in the European Union, Japan, the United States, South Korea, China, Canada, India, and Brazil. Participatory Guarantee Systems (PGS) are locally focused quality assurance systems. They certify producers based on active participation of stakeholders and are built on a foundation of trust, social networks, and knowledge exchange. IFOAM is the only organization compiling global data about PGS, and first estimations show about 40 PGS initiatives have been established worldwide and more than 20 are currently under development. Latin America and India are the leaders in terms of the number of farmers certified through PGS as well as of the level of recognition achieved towards the national governments.

Developments within IFOAM

In 2011, two major publications from the United Nations Conference on Trade and Development (UNCTAD) and from the UN Special Rapporteur on Food supported the view that organic agriculture is a good farming system and development concept for achieving sustainability in agriculture. At the United Nations Conference on Sustainable Development (UNCSD, the Rio+20 Earth Summit), to take place in June in Rio de Janeiro in 2012, IFOAM and other actors from the organic movement will be actively lobbying for the implementation of the findings of the 2008 IAASTD report.

Organic equivalence arrangement between EU and USA - European Commissioner Dacian Ciolos for the European Union's (EU) Agriculture and Rural Development and Deputy Secretary Kathleen Merrigan of the US Department of Agriculture have announced the signing of an organic equivalence arrangement between the world's two largest markets for organic food at BioFach Germany. Under the proposed arrangement, the EU and United States of America will work together to promote strong organic programs, protect organic standards, enhance cooperation, and facilitate trade in organic products.

Officials noted the organic equivalence cooperation arrangement will expand market access for organic producers and companies by reducing duplicative requirements and certification costs on both sides of the ocean while continuing to protect organic integrity. “This monumental agreement will further create jobs in the already growing and healthy organic sector in the USA, spark additional market growth, and be mutually beneficial to farmers both in the United States and European Union as well as to consumers who choose organic products,” said Christine Bushway, Executive Director and CEO of the US-based Organic Trade Association (OTA). “Equivalence with the EU will be an historic game changer.” As a result, certified organic products as of 1 June 2012 can move freely between the United States and EU borders provided they meet the terms of the new arrangement. Under the agreement, the EU will recognize the USDA National Organic Program (NOP) as equivalent to the EU Organic Program and allow products produced and certified as meeting USDA NOP standards to be marketed as organic in the EU. Likewise, the United States will allow European products produced and certified under the EU Organic Program to be marketed as organic in the USA. The agreement will allow access to each other’s markets provided antibiotics were not administered to animals for products entering the United States, and antibiotics were not used to control fire blight in apples and pears for products entering the European Union. To facilitate trade, the EU and United States have agreed to work together to promote electronic certification of import transaction certificates. The arrangement is limited to organic products of USA or EU origin produced, processed or packaged within these jurisdictions. Additionally, both programs have agreed to exchange information on animal welfare issues, and on methods to avoid contamination of organic products from genetically modified organisms. General country labeling requirements must still be met. More information is available at OTA’s US EU Equivalency page, or USDA’s website.

WORLD: Organic cotton market jumps 20% in 2010 - Neither the recession nor unstable economies have put a damper on the fast-growing organic textiles industry, according to a new report, which shows the sector grew by 20% to an estimated $5.61bn in 2010. The research released in September 2011 by Textile Exchange (formerly Organic Exchange) also names H&M, C&A, Nike, Inditex (Zara), Adidas, Greensource, Anvil Knitwear, Target, Disney Consumer Products, and Otto Group as the top ten organic cotton-using brands and retailers. "Consumers continue to be committed to supporting the use of organic cotton and other sustainable fibres, while brands and retailers continue to make their product lines more sustainable by continuing to increase their use of such fibres and safer and more innovative manufacturing processes," says LaRhea Pepper, Textile Exchange Managing Director. Several brands and retailers more than doubled their usage of organic cotton alone and plan to do so in 2012 as well, says the '2010 Global Market Report on Sustainable Textiles.' Others with large programmes are staying the course. As a result, Textile Exchange projects the global organic cotton market will increase another 20% in 2011 to result in an estimated $6.2bn market in 2011 and $7.4bn market in 2012. (Source – www.mrketplace.com)

India remains world’s biggest producer of organic cotton - The Irish market research company Research and Markets has recently published the study “Global Organic Cotton Market: An Analysis”. This shows that India remains the leading producer of organic cotton in 2010 – for the third year in succession. For 2011, the market researcher forecasts a slight weakening in the rapid market growth of organic cotton, as the crops in India are smaller. On the other hand, the forecast for the subsequent years is promising: the study shows a continuously rising consumer demand for organic cotton products. Moreover, brand manufacturers and the trade are extending their collections, and other producer countries like China, Syria, Turkey and the USA are also on the up. Organic cotton has achieved a market share

of 1.1 % of world market production until now. (Source - oneco.biofach.de/en/news)

Evaluation of the Micronutrient Composition of Plant Foods Produced by Organic and Conventional Agricultural Methods - The aim of the present analysis was to evaluate the micronutrient content of plant foods produced by organic and conventional agricultural methods. Studies were identified from a search of electronic databases (1980–2007, inclusive) as well as manual searches. A total of 66 studies (describing 1440 micronutrient comparisons) were identified. Thirty-three studies (908 comparisons) satisfied the screening criteria which considered cultivar, harvesting, and soil conditions. In studies that satisfied the screening criteria, the absolute levels of micronutrients were higher in organic foods more often than in conventional foods (462 vs 364 comparisons, $P = 0.002$), and the total micronutrient content, expressed as a percent difference, was higher in organic (+ 5.7%, $P < 0.001$) as compared to conventionally grown produce. The micronutrient content of food groups was more frequently reported to be higher for organic vegetables and legumes compared to their conventional counterparts (vegetables, 267 vs 197, $P < 0.001$; legumes, 79 vs 46, $P = 0.004$). This trend was supported by a mean percent difference in micronutrient content favouring organic vegetables (+ 5.9%, $P < 0.001$) and legumes (+ 5.7%, $P < 0.001$). Further research is required to determine the effect of organic agricultural methods on a broader range of nutrients and their potential impact on health (Source Hunter et al 2011Critical Reviews in Food Science and Nutrition Volume 51(6) : 571-582)

The crop yield gap between organic and conventional agriculture - A key issue in the debate on the contribution of organic agriculture to the future of world agriculture is whether organic agriculture can produce sufficient food to feed the world. Comparisons of organic and conventional yields play a central role in this debate. Authors of this study compiled and analyzed a meta-dataset of 362 published organic–conventional comparative crop yields. The results show that organic yields of individual crops are on average 80% of conventional yields, but variation is substantial (standard deviation 21%). In the dataset, the organic yield gap significantly differed between crop groups and regions. The analysis gave some support to the hypothesis that the organic–conventional yield gap increases as conventional yields increase, but this relationship was only rather weak. The rationale behind this hypothesis is that when conventional yields are high and relatively close to the potential or water-limited level, nutrient stress must, as per definition of the potential or water-limited yield levels, be low and pests and diseases well controlled, which are conditions more difficult to attain in organic agriculture. Authors discuss findings in the context of the literature on this subject and address the issue of up-scaling results to higher system levels. This analysis was at field and crop level. Authors hypothesize that due to challenges in the maintenance of nutrient availability in organic systems at crop rotation, farm and regional level, the average yield gap between conventional and organic systems may be larger than 20% at higher system levels. This relates in particular to the role of legumes in the rotation and the farming system, and to the availability of (organic) manure at the farm and regional levels. Future research should therefore focus on assessing the relative performance of both types of agriculture at higher system levels, i.e. the farm, regional and global system levels, and should in that context pay particular attention to nutrient availability in both organic and conventional agriculture. (Source Ponti et al Agricultural Systems Volume 108, April 2012, Pages 1–9)

How sustainable is organic farming? - Organic farming is supposed to be environmentally friendly due to abandonment of external inputs such as mineral fertilizers or pesticides. Albeit conversion to organic farming frequently comes along with a decline in crop yields, proponents of organic farming emphasize the sustainability of that system particularly because of improving organic matter-related soil quality. Based on recent research on mechanisms driving soil organic matter

turnover, however, it rather appears that low-input agro ecosystems may convert to smaller efficiency in terms of substrate use by heterotrophs which may affect soil organic matter storage in the long run. A compilation of field data confirms an inferior use efficiency in some organic soils and thus questions the claim of an overall sustainable use of the soil resource in organic farming systems (Source - Jens Leifeld 2012 Agriculture, Ecosystems & Environment Volume 150, 15 March Pages 121–122

Scenarios of the organic food market in Europe - Scenario analysis is a qualitative tool for strategic policy analysis that enables researchers and policymakers to support decision making, and a systemic analysis of the main determinants of a business or sector. In this study, a scenario analysis is developed regarding the future development of the market of organic food products in Europe. The scenario follows a participatory approach, exploiting potential interactions among the relevant driving forces, as selected by experts. Network analysis is used to identify the roles of driving forces in the different scenarios, and the results are discussed in comparison with the main findings from existing scenarios on the future development of the organic sector. (Source **-** Raffaele Zanoli Food Policy Volume 37, Issue 1, February 2012, Pages 41–5)

Product labelling in the market for organic food: Consumer preferences and willingness-to-pay for different organic certification logos - Product labelling with organic certification logos is a tool for signalling consumers that a product is a certified organic product. In many European countries, several different organic labelling schemes exist in the market. The aim of this paper is to elicit whether consumers prefer certain organic labelling schemes over others, to give recommendations for market actors in the organic sector. By means of choice experiments and structured interviews with 2441 consumers of organic food in six European countries, consumer preferences and willingness-to-pay (WTP) for different organic logos were analysed. The results of the random parameter logit models showed that the WTP differed considerably between the tested logos. Consumer perceptions of organic labelling schemes turned out to be of subjective nature and in many cases not based on objective knowledge. Authors conclude that it is advisable to label organic products with well-known organic certification logos that consumers trust. Organisations owning an organic labelling scheme should put effort into measures for increasing consumer awareness of the logo and forming consumer perceptions and attitudes regarding the underlying scheme in terms of standards and control regime. (Source – Janseen and Hamm, 2012, Food Quality and Preference Volume 25, Issue 1, Pages 9–22)

The influence of organic and conventional cultivation systems on the nutritional value and content of bioactive compounds in selected tomato types - Tomato fruits contain a high level of antioxidants such as vitamin C, polyphenols (including flavonoids), and carotenoids (such as lycopene and β-carotene). Some studies have shown higher level of bioactive compounds in organically produced tomato fruits compared to conventional ones, but not all studies were consistent in this respect. The levels of carotenoids and phenolics are very variable and may be affected by ripeness, genotype and cultivation. The aim of the study was to compare the effects of organic and conventional production systems on chemical properties and phenolic compounds of two tomato types (standard and cherry). The experiment was carried out in two growing seasons of 2008 and 2009, and in three organic and three conventional farms. The results obtained have shown that, in 2008, organic tomatoes presented a higher ratio of reducing sugars/organic acids, and contained significantly more total sugars, vitamin C and total flavonoids, 3-quercetin rutinoside, and myricetin in comparison with the conventional fruits. In 2009, organic tomatoes contained significantly more vitamin C, quercetin-3-*O*-glucoside and chlorogenic acid, myricetin and kaempferol in comparison with the conventional fruits. The organic growing system affects tomato quality parameters

such as nutritional value and phenolic compound content. The second significant factor of nutritional value of tomato is the type of fruits. It would be necessary to continue this study as a long-term experiment in order to eliminate the influence of seasonality. (Source - Ewelina Hallmann 2012 J Science of Food and Agriculture

The Feasibility of Organic Nutrient Management in Large-scale Sweet Corn Production for Processing - There is significant interest from vegetable processors, growers, and consumers in organic sweet corn (*Zea mays*) production. Organic nitrogen (N) management is particularly challenging in high N consuming crops such as sweet corn because of the low N content and low N to phosphorus (P) ratios of organic soil amendments. Various management programs were compared to determine the optimal combination of soil amendments and green manure crops for organic sweet corn production. Alfalfa (*Medicago sativa*), rye (*Secale cereale*), and field pea (*Pisum sativum*) were used as green manure crops. Composted poultry manure and a high N content organic fertilizer were used as organic amendments. Ammonium nitrate was used in a conventional management program for comparison. Treatments were designed to deliver a full rate of N (150 lb/acre), a half rate of N (75 lb/acre), and to limit the amount of P applied. Phosphorus can become a source of pollution when applied to erodible soils, particularly when soils already contain excessive P. Sweet corn yield in many of the organic programs was highly variable among years while the yield was more consistent in the conventional program. This was attributed to differences in organic N mineralization in both the green manure crops and the amendments. The most stable yield from an organic treatment, among years, was achieved using the commercially available organic N fertilizer. Commercially available amendments were costly, and although organic sweet corn received a premium price in years when organic yields were lower, profit was reduced by the high cost of N management.**(**Source - Heidi et al Hort. Technology, 2012 vol. 22 no. 1 25-36)

Effect of organic and inorganic fertilizers on nutrient concentrations in plantain (Musa spp.) fruit pulp - The number of fruits per bunch and nutritional quality of the fruits are important horticultural and breeding selection indices in Musa improvement programs. Three plantain hybrids ('30456-3', 'PITA 14' and '29525') and a landrace genotype, 'Agbagba', were evaluated for response to organic and inorganic fertilizers in a 4 x 3 factorial in a randomized complete block design (RCBD) in triplicate. Fruit parameters measured were fruit weight, edible proportion and pulp dry matter content; also, the concentrations of nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), iron (Fe) and zinc (Zn) in fruits were determined. These parameters were measured in two cropping cycles, the plant and ratoon crops, respectively. The hybrid, '29252' had the highest pulp N, K, Ca, Fe and Zn concentrations in the plant crop. In the ratoon crop, N and P were highest in '29525' and '30456-3', while the concentrations of the other nutrients did not differ among the genotypes. The landrace, 'Agbagba', produced the heaviest fruits, accumulated the highest pulp dry matter and fresh edible proportion in both crop cycles. Although in the plant crop, the fertilizer treatment did not affect most of the pulp nutrient concentrations, the P concentration decreased by 14.29 and 118.18%, respectively when inorganic fertilizer and poultry manure was applied. The N, K and Zn concentrations, respectively, increased by 6.45, 14.55 and 62.50% with inorganic fertilizer application, while all the nutrient concentrations were lowest when no fertilizer was applied. The fresh fruit weight, pulp dry matter content and fresh edible proportion were highest when poultry manure was applied. (Source - Ndukwe et al African Journal of Biotechnology 2012, Vol. 11(7), pp. 1651-1658)

National and International Events

BioFach, Germany 2012 with India as "Country of the year" 2012 – BioFach, the World's Biggest Organic Trade Fair was successfully organized during 15-18 February 2012 at Nurenberg, Germany. 2,420 exhibitors (70% from other countries) presented their products to 40,313 trade buyers and visitors from 130 countries (international share: 41%) during the 2012 edition of BioFach and Vivaness. This time the decision-makers were out in force at the world's leading exhibition. Every second visitor decisively influences the purchasing or procurement process in his company – an increase of 20 percentage points. Besides Germany (23,592), the top 5 countries for visitors included Austria (1,606), Italy (1,313), the Netherlands (1,218) and France (1,129). The assembled organic players at BioFach, the World Organic Trade Fair, and the parallel Vivaness, Trade Fair for Natural Personal Care and Wellness, used the occasion to announce more growth. The German market grew by 9% to 6.59 billion EUR in 2011, and international organic sales are just under 60 billion US dollars. Despite the financial crisis, BioFach's international patron, the International Federation of Organic Agriculture Movements (IFOAM), and its national supporting organization, Bund Ökologische Lebensmittelwirtschaft (BÖLW – German Federation of the Organic Food Industry), expect more market growth in the future. India was country of the year in this edition. The Indian market is one of the world's fastest growing sales markets for food. Organic agriculture is also flourishing since last 5 years. Total area under organic certification is growing at fast pace and as per the details released India possess more than 4.43 million ha (including wild harvest collection area). With 3.88 million tons of organic commodities India has emerged as the largest organic raw material supplier with practically everything in its basket. India pavilion was spread over more than 1000 sq mt with 40 exhibitors. ICCOA, a prominent organic farming promoter and distinguished learning centre in the country, put up its own stall for the first time under India pavilion.

International Congress and seminars being one of the best parts of Biofach, touched practically all important issues of growth and concern. Important seminar themes under the name forums were: (a) Fair Forum, (b) India as the Country of the Year 2012, (c) Sustainability Forum, (d) Textile forum, (e) Wine Forum and (f) Vivaness Forum. The congress program with its presentations, workshops, tastings and panel discussions was open for all visitors and exhibitors at BioFach and Vivaness.

International Conference – Let the Good Products Flow, Global Organic Market Access in 2012 and Beyond – GOMA International Conference was organized on the sidelines of BioFach Germany 2012 during 13-14th february 2012 at Nurenberg, Germany. For ten years, FAO, IFOAM and UNCTAD have worked in partnership to address and reduce barriers to trade of organic products resulting from the global proliferation of organic standards and technical regulations. At this high-level International Conference, the partners drew together a distinguished group of public and private sector leaders to examine the past, present and future of organic market access relative to systems of organic standards and conformity assessment. The conference looked at emerging issues, such as the potential for organic standards to promote the growth of organic agriculture vis-à-vis their potential to stifle growth. Developments and challenges for dominant and emerging exporting/importing economies and for still-developing countries were highlighted and discussed. Models of public-private and regional cooperation were considered as potential pathways for global solutions to the challenges. In addition to three eminent keynote speakers – Harsha V. Singh, Deputy Director-General WTO, Kathleen Merrigan, US Deputy Secretary of Agriculture, and Franz Fishler, former Agriculture Commissioner EU – participants were afforded an opportunity to discuss key issues with distinguished Government and private-sector speakers from Brazil,

Canada, China, Great Britain, France, India, Malaysia, The Netherlands, Sri Lanka, Thailand, Uganda and United States. Representatives of inter-Governmental and international organizations such as The European Commission, FAO, International Federation of Organic Agriculture Movements, International Trade Commission, International Organic Accreditation Service, Pacific Islands Community and UNCTAD also contributed to the presentations and discussions. (www.ifoam.org)

4th International conference on the organic development in Central/Eastern European and Central Asian countries in Izmir, Turkey - 4th International conference on the organic development in Central/Eastern European and Central Asian countries will be held during 13-15th April 2012 at Izmir Turkey. The event is the 4th of a series of conferences focussing on the organic sector development in Central/Eastern, Central Asian and neighbouring countries. The conference is meant as a place to network, to meet new partners and trade contacts in a region not easy to access. It presents an excellent opportunity to learn about recent developments, to promote companies activities and to increase recognition. It is an ideal meeting point for all important stakeholders active in the organic sector in the targeted region. It offers the opportunity to learn from each other by reaching out to the leading personalities of the organic sector internationally and in the region. In the countries of Central and Eastern Europe, Central Asia and the Caucasus agriculture plays an important role. Most of the inhabitants live in rural areas. Huge farms contrast with small scale subsistence farming. Some of the best soils worldwide are located in the region, but also areas of heavily degraded agricultural land. The countries have to cope with effects of intensive use of agrochemicals, soil salinity, and desertification and water scarcity. This year's conference will focus on organic farming and how to maintain and improve its integrity**.** As Turkey is one of the leading organic cotton and textile producers, sustainable textiles will be included in the conference. Organic products can be trusted. The inspection and certification regime is the best the food industry at large has ever experienced. But scandals and fraud cases weaken the integrity of organic. Some issues which may later result in fraudulent actions have their beginning in the failure of successfully implementing organic principles in farming or at any other point of the food chain. Experiences and challenges in organic quality assurance along the product chain will be discussed from the point of view of producers, processors and certifiers. This year the conference will be held in parallel to the organic trade fair Ecology Izmir, providing participants the chance for B2B meetings as well as for traders to join the conference.

6th European Organic Congress, 17 – 18 April 2012 at Copenhagen, Denmark - Over the year 2012, far reaching decisions will be made to shape European food systems for the future: European Parliament and Council of Ministers will discuss the Common Agricultural Policy 2014-2020, based upon proposals made by the Commission in October 2011. Challenges to our future food supply such as climate change, increasing scarcity of natural resources and socio-economic shifts in rural areas demand progressive change in policies and farm practice. Organic farming as a knowledge based, innovative system approach to sustainability and quality food production with EU wide certification in place offers opportunities to meeting a broad range of these challenges and the economic strengthening of High Nature Value farms can ensure the enhancement of biodiversity and contribute to the viability of rural societies; both farm systems should be in the focus of the new policies. The 6th European Organic Congress "Smart change - towards a sustainable CAP" addresses the policy change needed to come to a greener, smarter, fairer CAP for the future, improve the availability of sustainably produced food for consumers and to ensure the credibility of certification for sustainable farm systems. For more information log on to - congress@ifoam-eu.org.

The 2nd IFOAM Animal Husbandry Conference, September 12-14, 2012 Hamburg, Germany -Building on the first IFOAM conference in the US in 2006, farmers and scientists will once again have the opportunity to exchange information and build new partnerships at the 2nd IFOAM International Organic Animal Husbandry Conference. Although organic livestock production has made significant advances over the last few decades, navigating complex regulatory frameworks and dealing with other challenges facing the sector, organic livestock systems will benefit from an exchange at the international level. This conference will concentrate on health and food safety in organic livestock production systems, marketing trends, innovation in organic livestock production systems and livestock breeding strategies. Key figures from around the world will present the diversity of organic livestock systems, including opportunities and challenges on the horizon. Topics will relate to a wide range of livestock species: cattle, poultry, pigs, small ruminants, fish, bees, rabbits, horses and others. The conference will be held in Hamburg, at the Bio-Center of the University of Hamburg: Biozentrum Klein Flottbek, Ohnhorststr. 18,D-22609 Hamburg, Germany.

Second African Organic Conference – The second African conference with a theme "Mainstreaming organic agriculture in the African Development Agenda" will takes place from May 2 to 4 2012 at Lusaka, Zambia. The overall objective of the conference is to report and further promote mainstreaming of organic agriculture in African Government policies, in African intergovernmental organizations as well as among development partners. In this regard, the conference will provide evidence-based information on the benefits of organic agriculture and its contributions to the challenges and needs in Africa. It will

1. Present successful small-scale organic agriculture projects and case studies in organic production including biodiversity and seed production, livestock, climate mitigation, demonstrating impacts on food security ;
2. Present successful organic agriculture projects and case studies in marketing and trade of organic products, including how organic guarantee systems can be shaped to be supportive of local, regional and external trade;
3. Highlight successful initiatives and case studies in public policy, research and sector development.

Based on this it will propose ways ahead for organic agriculture to reach its full potential and contribute substantially to the African Agriculture and development agenda. For more information log on to www.africanorganicconference.com.

Snapshots from First International Conference on Organic Food Quality and Health Research, 18-19 May 2011 - More than 150 researchers from 30 countries presented 100 oral and poster contributions in the field of organic food quality and health research, in the presence of representatives of national and international agencies, control bodies and industries attended the First International Conference on Organic Food Quality and Health Research. The Conference was focused on the State of the Art in Research on Organic Food Quality and Health in the areas of: (a) Quality and safety of organic plant and animal products, (b) Organic food authenticity, (c) Impact of organic food on animals and humans and (d) Health concepts.

BioFach China 2012 - The sixth edition BioFach China, shall be organized during 24-26 May 2012 at Shanghai. The fifth edition witnessed a 27% increase in visitors. 14,613 (2010: 11,526) international organic product sector players travelled from 33 countries to what was so far the most successful edition of the only trade fair for certified organic products in China. Shanghai is China's fastest growing metropolis with the highest purchasing power, which is linked to global markets by convenient transportation links and is the international meeting point of sellers and buyers from all over the world.

Book Reviews

Organic Production and Food Quality: A Down to Earth Analysis, By Robert Blair John Wiley & Sons, 20-Dec-2011 - Business & Economics - 296 pages - The internet is rife with biased and unsubstantiated claims from the organic industry, and the treatment of issues such as food safety and quality by the media ("if it bleeds, it leads") tends to have a negative impact on consumer perceptions about conventional food. Until recently, more and more consumers in many countries were opting to buy organic food over conventional food, resulting in a radical shift in food retailing. This was due to concerns over chemical residues, food poisoning resulting in recalls, food scares such as "mad-cow" disease, issues like gene-modified (GM foods), antibiotics, hormones, cloning and concerns over the way plants and animals are being grown commercially as food sources. As a result there has been an expansion of the organic industry and the supply of organic foods at farmers' markets, supermarkets and specialty stores. "Effects of Organic Production on Food Quality" is the first comprehensive book on how organic production methods influence the safety and quality of foods, based on an unbiased assessment of the latest scientific findings. The title is a 'must-have' for everyone working within the food industry. Comprehensive explanation of organic production methods and effects on the safety and quality of foods, authoritative, unbiased and up-to-date examination of relevant global scientific research and answers the questions of whether organic food is more nutritious and/or more healthy.

Sustainable agriculture and food security in an era of oil scarcity: lessons from Cuba BY Julia Wright 2009Earthscan, 2009 - Technology & Engineering - 261 pages - When other nations are forced to rethink their agricultural and food security strategies in light of the post-peak oil debate, they only have one living example to draw from: that of Cuba in the 1990s. Based on the first and - up till now - only systematic and empirical study to come out of Cuba on this topic, this book examines how the nation successfully headed off its own food crisis after the dissolution of the Soviet Bloc in the early 1990s. The author identifies the policies and practices required for such an achievement under conditions of petroleum-scarcity and in doing so, challenges the mainstream globalized and privatized food systems and food security strategies being driven through in both industrialized and more vulnerable developing regions. In rural regions, where the author had unique access, industrialized high-input and integrated agriculture is aspired to for the majority of domestic production, despite the ongoing fluctuations in availability of agrochemicals and fuel. By identifying the challenges faced by Cuban institutions and individuals in de-industrializing their food and farming systems, this book provides crucial learning material for the current fledgling attempts at developing energy descent plans and at mainstreaming more organic food systems in industrialized nations. It also informs international policy on sustainable agriculture and food security for less-industrialized countries.

Organic Crop Breeding by Edith Lammerts van Bueren, Publ. John Wiley & Sons, 2012 - Technology & Engineering Series- 312 pages - *Organic Crop Breeding* provides readers with a thorough review of the latest efforts by crop breeders and geneticists to develop improved varieties for organic production. The book opens with chapters looking at breeding efforts that focus on specific valuable traits such as quality, pest and disease resistance as well as the impacts improved breeding efforts can have on organic production. The second part of the book is a series of crop specific case studies that look at breeding efforts currently underway from around the world in crops ranging from carrots to corn. *Organic Crop Breeding* includes chapters from leading researchers in the field and is carefully edited by two pioneers in the field. (AKY)