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जैविक खेती सूचना पत्र
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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 लेखकें 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

इस अंक के साथ जैविक खेती सूचना पत्र अपने ७ वर्ष पूर्ण कर रहा है। इन ७ वर्षों की यात्रा में इस प्रकाशन का सूचना प्रवाह, तकनीकी ज्ञान विसर्जन तथा जैविक खेती तंत्र को आपस में जोडने में महत्वपूर्ण योगदान रहा है। इन सात वर्षों में जैविक खेती से संबंधित अनेक मिथक टूटे तथा एक नवीन सकारात्मक सोच उत्पन्न हुई। आज जैविक खेती को यद्यपि कम उत्पादनशील तो नहीं माना जाता परंतु इसकी राह में अभी अनेक बाधायें हैं जैसे उत्कृष्ट आदानों की उपलब्धता उनकी गुणवत्ता तथा प्रबंधन इत्यादि जिनसे अभी निजात पाना बाकी है। इन्हीं सब बातों के मद्देनजर इस अंक में वर्षा आधारित क्षेत्रों में जैविक खेती की उपयोगिता तथा उत्पादन क्षमता पर जानकारी प्रस्तुत है। कुछ होम्योपैथिक आदानों की पोषण प्रबंधन क्षमता व उनकी कृषि उत्पादन में उपादेयता पर भी एक वैज्ञानिक परीक्षण आधारित लेख प्रस्तुत है।

पिछले दो वर्षों में यद्यपि जैविक प्रमाणीकरण क्षेत्र की प्रगति आशानुरूप नहीं रही है फिर भी जैविक उत्पादों के बाजार की प्रगति निरंतर जारी है। बायोफाख इंडिया तथा इंडिया ऑरगेनिक २०१२ की अभूतपूर्व सफलता इसका प्रमाण है। अंर्तराष्ट्रीय परिप्रेक्ष्य में भी भारत के जैविक खेती उद्योग की महत्ता स्थापित हो रही है। वायोफाख जर्मनी २०१२ में भारत का कंट्री आफ द ईयर होना इसका प्रमाण है। इस अंक में इन्हीं सब उपलब्धियों व जानकारी का संकलन देश-विदेश की प्रमुख घटनाओं व अनुसंधान परिणामों के साथ प्रस्तुत हैं।

डा. ए. के. यादव
संपादक

Dear Readers

With this issue Organic Farming News Letter completes its seven year journey in the field of organic agriculture information, networking and technology dissemination. These seven years have also seen many myths breaking and a new thought development for organic sector. Organic management is although, now not seen as low yielder, but many constraints are yet to overcome and inputs availability, quality and their management scenario continues to pose problems. Keeping in view of the growing evidence for higher productivity, new management approaches and potential of new innovative inputs, the current issue highlights the production potential of the system in rainfed areas of the country. Potential of some homeopathic formulations in nutrient supplementation has also been discussed in this issue with multilocation trial results.

In terms of the total cultivable area under organic certification system, the growth during the last two years was not as expected, but the growth of market was excellent as is evident from the participants, visitors and trade volume witnessed at 3rd edition of BioFach India-Together with India Organic 2012. Internationally also the importance of India is being felt and same shall be visible in the BioFach Germany during February 2012, where India has been chosen as the country of the year. The current issue highlights all such developments along with regular update on national and international events and research findings.

Dr. A.K. Yadav
Editor

Organic System in Low Rainfall Areas for Climate Resilience and Returns

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Low rainfall areas or arid regions (rainfall below 500 mm/yr) of the country cover about 45 million ha area, mainly in Rajasthan (12 districts) and a small part in Haryana, Gujarat, Andhra Pradesh and Tamil Nadu. Low rainfall also has erratic distribution causing uncertainty and frequent drought. This condition gets further aggravated due to climate change effects. It has been reported that the impact of projected climate change by the end of 21st century is likely to be more pronounced in arid region than semi-arid or sub-humid region of India (Rao *et al* 2009).

Traditionally in such arid regions multi-component farming systems are being followed that includes annuals, perennials and animal component. These traditional organic systems are based on recycling of local resources and helps in mitigating the risk of rainfall uncertainty. Even under climatic uncertainties these systems have sustained since ages albeit with low productivity. Inefficient use of local resources was the main cause for low productivity.

In last few decades, although several attempts have been made to improve productivity of these traditional systems with the use of external inputs like fertilizers, pesticides, weedicides etc, but success was limited only to the good rainfall years, as these inputs performs well under assured water availability. But during below average rainfall years use of synthetic inputs was rather counterproductive. In view of high cost of chemical fertilizers and uncertain crop yield response Agrawal and Venkateshwrlu (1989) suggested to increase the use of organic manure for sustainable production. To mitigate the effect of climate uncertainty, balance nutrition through organic sources is the best viable option.

Evergreen revolution through organic

Stagnating yields, negative impact on environment, soil health and farmers' economy were some of the side effects of green revolution and provided fuel to search new and unexploited areas to ensure increased productivity through eco-friendly or evergreen farming. The low rainfall areas that were fairly untouched from green revolution due to shortage of water deserve specific attention on priority for the future self sustainable - self generating system (Sharma, 2001) with the following components:

1. **Efficient use of limited water:** Water is the scarcest resource of these regions. Use of synthetic fertilizers not only increase water demand of crop but also reduce water holding capacity of already light soils. At many places ground water combined with fertilizers is being used lavishly for production of rice, wheat, cotton and vegetables resulting into severe depletion of ground water and soil fertility. There are emerging possibilities of desertification in these areas. Contrary to chemical intensive farming, it has been found by experiments and experience that use of organic manure increases soil water holding capacity and crop water use efficiency, resulting in decrease in number of irrigation by 2-4 times in food crops. Water use can be further economized by growing low water demanding crops like spices & medicinal plants.

2. **Low fertilizer use - early conversion** : Low fertilizer consumption (48.3 kg/ha compared to national average of 135.2 kg/ha) offers excellent opportunity for early and easy conversion into organic farming. According to the priority areas of National organic farming policy this part of the country comes under the priority I and II.

3. **Diversified farming system** : Farming systems in the region are highly diversified in nature with crops, trees, animals and grasses. This system is scientifically more efficient in nutrient recycling and restoration of soil fertility. Availability of 10-30 trees/ha coupled with 2-5 animals per farm family is the backbone of this integrated farming system which not only minimizes pest incidence but also favours organic farming approach and controls desertification.

4. **Rich traditional wisdom** : Rich traditional wisdom in these areas for restoration of soil fertility and for pest control further strengthen and provide strong infrastructure for organic system (Sharma and Goyal 2000).

5. **Natural Availability of inputs** : Plants like neem, pongamia, calotropis etc are ideal sources of biopesticides and are abundantly available. Neem being available in various densities offers effective pest control in crops of low rainfall areas (Verma and Vir, 1997) under IPM mode. Minerals like rock phosphate, gypsum and lime are also available in large quantity for soil amelioration and nutrient mobilization. Higher dependence of such farming systems on animals is an added advantage for ensuring balanced nutrient supply.

6. **Employment opportunities** : High density as well as high growth of human resource remains underutilized throughout the year due to erratic rainfall and limited irrigation facilities. Migration of human resources during drought hampers development efforts of the state. Since organic farming is labour intensive and input production and availability is managed at local level, there is ample opportunity for employment and proper utilization of human resource.

7. **Soil improvement:** Soils are poor in water holding capacity and deficient in majority of essential nutrients. Addition of organic matter not only improves the water holding capacity but also ensures nutrient supply in a balanced manner.

8. **Mitigating effect of climate change**: Worldwide 90 million tons of mineral oil or natural gases are processed to get Nitrogenous fertilizers every year resulting into 250 million tons of CO_2 emission. On the contrary, organic farms return 575 to 700 kg/ ha CO_2 to the soil. Organic farming approaches, thus reduce CO_2 emission by eliminating synthetic fertilizers, and at the same time reduce atmospheric concentration of this gas by storing it in the soil, a win-win situation (Niggli, 2008). Soils with higher humus content are best equipped to address the adverse effects of climate change.

9. **High value monopoly crops** : These areas have four major export oriented crops namely Cluster bean (as guar gum), Sesame, Cumin and Psyllium (*isabgol*). Total export of these crops is around Rs 2000 crore ($400m) per year. In view of present trend and competitive market, enhancing export of mainly organic produce is a distinct opportunity.

Therefore there are ample opportunities in arid areas for promotion of organic farming.

Adequate availability of organic inputs

Availability of organic inputs in adequate quantities is always questioned and more so in the areas where biomass production is low. To assess the ground reality, a survey was conducted in four districts i.e. Jodhpur, Nagaur, Pali and Barmer during 2006-08. A questionnaire was developed to get primary information from selected blocks. Secondary

data was collected to get information at village and district level. Survey revealed that:

- Availability of biomass at farm level was influenced by several factors like rainfall, cropping pattern, size of holding, availability of labour etc. In general most of the farmers were found to be using raw cow dung, kept under sunlight for months. Manure obtained from this method was generally partly decomposed with low nutrient profile especially nitrogen. On an average 1.5-4.5 t/ha of such organic manure was available at farm level in the form of crop residues and animal dung.
- Availability was 1.5-2.0 folds higher at village level with farmers having cattle for dairy purpose. High availability of unproductive and old animals in many villages was also an opportunity for increased biomass availability for manuring purpose. Such cattle were found to be providing 4.6 to 11 kg of nitrogen per ha per year through urine (calculation based on total agriculture land divided by total number of animals in the village).
- Trees are integral part of farming systems of arid zone and contribute equivalent to 0.04t manure/tree. Trees growing in common land, protected areas, waste land etc also contribute to organic input availability.
- Availability was found to be further increased at district level, as intensive dairy farming is prevalent in peri-urban areas.
- Pooling of organic input availability from all the sources revealed that 4.5-5.0 tons of biomass is readily available for farming purpose.
- The availability of nutrient can be further increased by adopting following management practices-
    1. Crop rotation with leguminous crops like cluster bean, moth bean, moong bean etc.
    2. Avoiding heaping of dung under sun and use of improved methods of composting. In arid zone due to shortage of water and high temperature pit composting method has been found most suitable.
    3. Tree leaf litter, animal urine, bones of dead animals, non palatable weed biomass are some of the other rich and under utilized sources of nutrients.

Model organic farm (MOF) at CAZRI

Considering the possibilities and to explore the potential through experimentation on organic production system for low rainfall areas, a 2.0 ha model organic farm was established during 2008, within the Central Research Farm CAZRI, Jodhpur with the partial financial support of the National Centre of Organic Farming, Ghaziabad. The farm was registered for certification and got the status of “Certified Organic Farm” in the year 2011. Following core facilities were created at the MOF to develop environment for research on organic system-

1. A trench cum mound was made around the farm for *in-situ* conservation of rainwater and to avoid drift of contamination through water from adjoining fields. *Cassia angustifola,* a medicinal shrub was planted on the mound for round the year availability of flower for predators and further filtration of contamination.
2. Two rainwater harvesting tanks of 5000 litres capacity (each) were constructed in the model organic farm. Cemented catchments area was made around each pond for maximum collection of rainwater. This catchment area was also utilized for drying and thrashing of crops during the lean period. The rain water so collected was used for raising low volume-high value crops like cumin, psyllium etc.
3. Manual weeding was done regularly and uprooted weed were spread in the same field as mulch that got decomposed in

due course and contributed 1.5-2.0 t/ha of organic matter

4. Biodiversity plantation was also done, that includes fruit trees namely *Ziziphus mauritiana, Phyllanthus emblica, Cordia mixa* and shrubs e.g. henna (*Lawsonia alba)* for shelter to predators, and *Adathoda vasica, Vitex nigundo, Aloe vera* and *Casia angustifolia* for botanical pesticides. Besides these, naturally grown, 32 plants of Khejri (*Prosopis cineraria,* a climax MPTS of the region*)* and 2 plants of neem (*Azadirachta indica)* were also protected. This plantation ensured adequate nectar supply and shelter to the beneficial insects. Neem plantation was done around the field for preparation of botanical pestcides.
5. The farm was registered with Rajasthan Organic Certification Agency (ROCA), Jaipur for organic certification and entire process as per the requirement of National Programme of Organic Production (NPOP) was followed to ensure organic integrity at all stages of cultivation and experimentation.
6. Six compost pits were made at one corner of the farm for making compost from the MOF generated crop waste.
7. Botanical pesticides were prepared with leaves of neem, calotropis, adhathoda etc and neem cake.
8. Pheromone traps were installed for trapping the pests like while grub, moth etc.
9. All the implements and produce of the MOF were kept in the store, inside the field boundary to avoid any contamination.
10. Display of useful information at various places was available in the field for the benefit of visitors.
11. The design of the farm was based on three principles of sustainability i.e. conservation of rain water, efficient use of field waste and proper field education (for the users).

Research outcome

A rotation of four crops including cluster bean and sesame in rainy season (kharif) and cumin and psyllium in winter (rabi) was selected for the study. On the basis of experiments conducted at MOF the findings are as follows:

Contribution of manures and legumes – Yields were found to be increasing, significantly with the increase in use of organic manures from 2.5 to 7.5 tons/ha in all the crops. Legume cultivation in kharif season, on an average contributed to 25-30% increase in yield in the subsequent crops of cumin and psyllium (Table 1).

Improvement in soil properties - Increase in soil moisture retention with the use of organic manure was observed (Fig 1) that helped in better growth and yield of crops. Similarly increase in soil organic carbon from 0.23% to 0.29% was recorded after three year application of compost @ 5.0t/ha.

Crop resilience to rainfall variability - Crop resilience to climatic variability was enhanced with the use of organic manure as is evident from the two year data. Since crop yield is the ultimate product of all the interactions, therefore only yield comparison is given here.

1. During 2009 because of low (208mm) as well as highly erratic rainfall (only 4 good rainy days and 2 long dry spell of 17 and 29 days), crop faced drought conditions. The severity was further increased by dry-hot winds during milking stage of crop in September. With this set of conditions while crops in the conventional plots were failed, but the crop grown with organic inputs coupled with timely interculture for moisture conservation could yielded up to 30-40% of the average yields. A yield of 196.3 kg/ha of sesame and 206.8 kg/ha of cluster bean was obtained in sampled plots (Table 2).

Table 1. Effect of rotation and level of manuring on the yield of rabi crops (irrigated with harvested rainwater under organic management (manuring was done to Kharif crops)

Crop sequence	Yield of crop(kg/ha)					
	Cumin			Psyllium		
	Manure application(t/ha)			Manure application(t/ha)		
	0.0	2.5	5.0	0.0	2.5	5.0
After sesame	229.4	374.3	459.8	424.7	578.8	672.9
After cluster bean	407.9	489.3	516.4	629.4	786.2	808.3

Fig. 1 Soil moisture status in sesame and cluster bean plots.

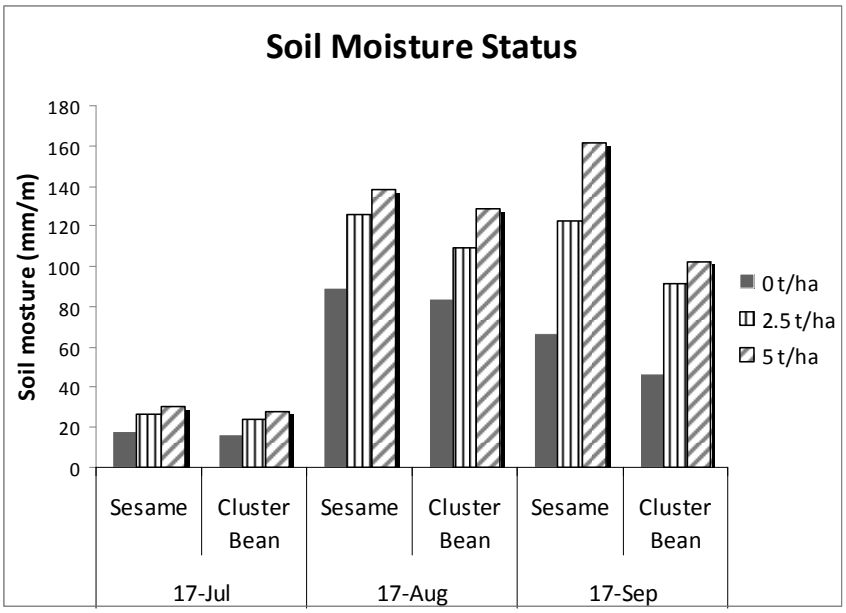

Table 2. Crop resilience to climatic variability (average rainfall at experimental site was 366mm/yr)

Year and rainfall	Crop yield (Kg/ha)			
	Sesame		Cluster bean	
	Organic	Conventional	Organic	Conventional
2009 (rainfall 208 mm)	196.3	0.0	206.8	0.0
2010 (rainfall 460mm)	886.6	523.9	630.2	308.6

2. In 2010, above normal rainfall (460 mm) during the cropping season was recorded. Under such situations organic plots due to organic matter incorporation maintained optimum aeration & moisture in soil, resulted in good crop growth while in the conventional plots crop growth was stunted, and produced poor yield (Table 2).

Pest Management : Pests were kept below economic threshold level with the integrated use of following eco-technologies:

- Soil application of neem seed powder @ 300 kg/ha
- Use of well prepared compost @ 5.0 t/ha
- *Trichoderma viride* application in soil and as seed treatment
- Use of healthy seed and also free from weed seeds
- Hand weeding and mulching

- Prophylactic spray of neem seed kernel extract solution (5.0%) at regular interval
- Use of pheromone traps according to the pest
- Regular visit of every part of the field to assess crop health conditions and timely spray was done at the initial stage of pest attack.

Observations in pest control - In organic farming every aspect/ effect cannot be quantified because of limitations in experimental designs. Therefore, some of the following results are based on visual yet continuous observations that were compared with the conventional farming plots-

1. Neem seed kernel extract (NSKE) spray either as prophylactic or at initial stage of pest attack was found very effective.
2. Neem seed powder was found to be effective in controlling soil pest like termite and white grub.
3. Aphids in cumin and psyllium were effectively controlled by lady bird beetle and some other predators.
4. Birds played a great role in controlling pest both at larval and adult stage.

Crop yield comparison - There are general apprehensions that organic system is poor yielder. However, findings at MOF, CAZRI shows that, at initial developmental stage of organic system there may be reduction in yield but after 2-3 years, once the system developed, the yield levels were comparable to the conventional (chemical input based) system. At third year yield of sesame 886.6 kg/ha, cluster bean 630.2 kg/ha, cumin 516.9 kg/ha and psyllium 808.4 kg/ha was recorded (Table 3). This was comparable to the average yield of conventional system. As mentioned earlier 2009 was a drought year therefore, data could not follow the trend however, organic performed much better then their conventional counterpart (Table 3).

Partitioning of sink : In a separate experiment on pearl millet (staple food of low rainfall areas) it was observed that, as the manure level increased, percentage of sink to grain increased from 15.7 to 19.8% while it decreased in case of stem and leaf (Table 4). This shows better partitioning of sink that increased grain yield, with the application of manure. It may be due to balanced nutrition through compost that used by plant for grain formation

Economics - Organic system took three year for development. Once the system developed most of the inputs e.g. seed, manure, bio-pesticides etc. were made with local resources, therefore major cost of cultivation became negligible and major expenditure was on the labor work for seeding, weeding, spraying, harvesting etc. Benefit : Cost ratio of 1.79, 3.06 and 2.74 was obtained with the application of manure @ 0.0 t/ha, 2.5 t/ha and 5.0 t/ha. However, highest profit of Rs. 27996.05/- per ha was obtained with the application of 5.0 t/ha manure. This shows that if there is limitation of manure, application of 2.5 t/ha manure is recommended. Although profitability will increase up to 5.0 t/ha manure application (if available).

Table 3. Yield comparison of organic with conventional system

Year	Crop yield (kg/ha)							
	Sesame (rainfed)		Cluster bean (rainfed)		Cumin (irrigated with harvested rainwater)		Psyllium (irrigated with harvested rainwater)	
	ORG	CON	ORG	CON	ORG	CON	ORG	CON
Ist year (2008)	343.9	467.3	476.3	493.9	323.3	496.3	382.3	523.9
IInd year (2009)	196.3	0.0*	206.8	0.0*	423.9	496.3	485.7	510.7
IIIrd year (2010)	886.6	523.9	630.2	308.6	516.6	497.2	808.4	786.3

ORG= Organic ,CON= conventional, *Crop failed due to drought

Table 4: Partitioning of sink in pearl millet

Level of manure (t/ha)	Yield of plant part (g /m^2)				Total biological yield (g /m^2)
	Root	Stem	Leaf	Grain	
0.0	173.8 (25.1)	152.6 (22.0)	257.2 (37.2)	109.3 (15.7)	691.8
2.5	546.9 (27.7)	395.2 (20.7)	658.9 (34.2)	352.6 (18.0)	1951.6
5.0	692.8 (27.8)	429.6 (16.6)	908.4 (35.8)	501.3 (19.8)	2530.7

Figure in parenthesis is the percentage of total biological yield

Suggestions for promotion of organic farming in low rainfall areas

- Priority needs to be given to organic farming in ongoing programs like all rural development programs, watershed development programs, SGSY, RKVY, MNREGA, Food security mission and Horticulture mission etc.
- Popularization of organic farming for sustainability while keeping certification optional.
- Dissemination of organic farming in a holistic manner by all the technical and funding agencies
- Encouragement of decentralized input supply must be given priority for quality, savings in cost and efficient utilization of local resources.
- Adoption of improved methods of composting, as it is one of the major factor that improves nutrient availability
- Awareness and capacity building programs need to be intensified
- Provision of subsidy may be made for organic inputs to make organic produce more competitive.
- Promotion of high value crops e.g. spices, medicinal plants etc. that requires less water but fetches more prices
- Research is being done on various components of organic farming by ICAR/SAUs, yet more research is needed to integrate the efforts and assess their effects.

Conclusion

In water scarcity and light soils areas, organic approaches are most suitable for sustainable and profitable farming. Organic production in such areas not only boosts the economy of region but also sustain the productivity with natural resources. Some monopoly high value crops of this region like seed spices are having great international demand if produced organically. The need is to do research on development of easy & economic technologies, development of processing and marketing infrastructure and financial well as technical support for quality organic production.

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Assessment of some Homeopathic formulations on yield of wheat and rice in comparison with chemical fertilizers

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Introduction

Homeopathy is not only a human health care system but a whole science benefiting the entire life forms on the planet including the plants and crops. With the surge in demand for chemical residue free food and growing awareness for sustainability of the system various alternative models are being promoted. Homeopathic preparations specially formulated for use in soil and on plants, offer supplementary and complimentary solutions for growing nutrient and plant protection needs without affecting and degenerating the resources and environment.

Vishva Manav Seva Sansthan (VIMASES) a civil society organization based at Village Shantipuram, Fafamau District Allahabad, Uttar Pradesh has developed and introduced various novel Homeopathic formulations, which offer supplementary and complimentary solutions for obtaining sustainable yields. Homeo formulations are known to be reducing the requirement of chemical inputs significantly, with comparable or at par productivity with improved quality attributes. During the years 2009-10 and 2010-11 some of such Homeo formulations were subjected to multi-location trials by the Department of Agriculture, Uttar Pradesh at their different Regional Research cum Demonstration farms. Summary of such trails and experiments on wheat and rice crops are presented below:

Experimental details

Two Homeo formulations namely: Homeo Sanjivani and Homeo Amrit were subjected to field studies. Following homeopathic formulations were used against and/ or in combination with chemical fertilizers to assess their potential for chemical nutrient replacement.

Homeo Amrit – It is a specially formulated preparation of three homeopathic mother tinctures processed and cured with ginger and neem extract. Homeo amrit has been found to be replacing the requirements of chemical phosphorus and potash to a large extent.

Homeo Sanjivani – Homeo sanjivani is a specially formulated preparation of two homeopathic mother tincture processed and cured with ginger and neem extract. Homeo sanjivani has been found to be enhancing natural nitrogen cycle, leading to increased availability of nitrogen to the crop.

Experimental design

Experiments/ field trials were conducted at five State Research Experiment-cum-Demonstrational Farms of Department of Agriculture, Government of Uttar Pradesh during the years 2009-10 and 2010-11. Experimental design was randomized block design (RBD) with four replications, plot size was 5 x 3 mt (15 sq mt each) with row to row spacing 20 cm and plant to plant 10 cm.

Table 1. Treatment details

No.	Treatment details	
	Wheat	**Rice**
T1	Control (NPK kg/ha 120:60:40)	Control (NPK kg/ha 90:60:60)
T2	NPK kg/ha 150:60:40	NPK kg/ha 120:60:60
T3	150 kg N as urea (basal + 2 top dressing) + 2 lit Homeo Amrit mixed with 4 kg Jaggary and 4 Q FYM as basal dose, mixed with seed at the time of sowing.	120 kg N as urea (basal + 2 top dressing) + 2 lit Homeo Amrit mixed with 4 kg Jaggary and 4 Q FYM as basal dose. Seeds were also treated with 125 ml of Homeo Amrit for nursery
T4	2 lit Homeo Amrit mixed with 4 kg Jaggary and 4 Q FYM as basal dose, mixed with seed at the time of sowing and 500 ml Homeo Sanjivani + 4 kg Jaggary in 250-300 lit water as foliar spray after 22 and 60 days of sowing	2 lit Homeo Amrit mixed with 4 kg Jaggary and 4 Q FYM as basal dose. 500 ml Homeo Sanjivani + 4 kg Jaggary in 250-300 lit water as foliar spray after 22 and 60 days of sowing. Seeds were also treated with 125 ml of Homeo Amrit for nursery.
T5	2 lit Homeo Amrit mixed with 4 kg Jaggary and 4 Q FYM as basal dose , mixed with seed at the time of sowing and 500 ml Homeo Sanjivani + 4 kg Jaggary mixed with 4q FYM as top dressing in soil twice after 22 and 60 days of sowing	2 lit Homeo Amrit mixed with 4 kg Jaggary and 4 Q FYM as basal dose. 500 ml Homeo Sanjivani + 4 kg Jaggary mixed with 4q FYM as top dressing twice. Seeds were also treated with 125 ml of Homeo Amrit for nursery.

Results

Results obtained after two years of experimentation with two important food grain crop of the state are summarized below:

Effect of Homeo Amrit and Homeo sanjivani on yield of wheat

Effect of Homeo Amrit and Homeo sanjivani was tested on wheat crop in combination with different doses of chemical fertilizers as per the details given above at five district farms. Results obtained (average of two years) are summarized in Table 2.

Conclusion on Wheat

All the five trials conducted at different research farms of Government of Uttar Pradesh have clearly shown that Homeo formulations are effective in meeting the nutrient needs of wheat crop. In four out of five districts namely Itawa, Barelli, Jhansi and Meerut it was observed that combined application of Homeo Sanjivani and Homeo Amrit (T3 and T4) have yielded similar out put compared to control provided with NPK @ 120:60:40 kg/ha.

Table 2. Effect of Homeo preparations on yield of wheat

S. No.	Yield in Kg/ha (average of two years) in different districts				
	Itawah	Bareilli	Varanasi	Jhansi	Meerut
T 1	18.83	28.83	32.55	29.97	26.31
T 2	19.91	27.33	37.38	42.07	52.78
T 3	18.83	32.83	38.33	40.52	36.71
T 4	18.58	31.83	22.77	32.52	31.38
T 5	17.58	29.00	24.16	32.64	30.54
CD	4.62	2.97	32.55	0.178	NS

Application of only Homeo Amrit along with Urea N @ 150 kg/ha yielded at par with the treatment (T2) provided with 150 kg N, 60 Kg P_2O_5 and 40 Kg K_2O, indicating beyond any doubt that Homeo Amrit was able to replace the requirement of P and K.

At Varansi the treatments provided with Homeo Sanjivani and Homeo Amrit yielded significantly lesser than the control. In the absence of other details on rain, irrigation, cultural practices and soil condition it is difficult to explain the variation in results. But interestingly the treatment T3 where Homeo Amrit was used in conjunction with 150 kg N/ha yielded at par with T2, having NPK @ 150:60:40 kg/ha indicating that Homeo Amrit has been able to replace the need for application of P and K from chemical source.

Among T4 (2 lit Homeo Amrit mixed with 4 kg Jaggary and 4 Q FYM as basal dose + 500 ml Homeo Sanjivani + 4 kg Jaggary in 250-300 lit water as foliar/soil spray after 22 and 60 days of sowing) and T5 (2 lit Homeo Amrit mixed with 4 kg Jaggary and 4 Q FYM as basal dose + 500 ml Homeo Sanjivani + 4 kg Jaggary mixed with 4q FYM as top dressing twice after 22 and 60 days of sowing) where the two Homeo formulations were applied in two different ways, treatment T4 was proved to be superior over T5

Economics of Homeo formulation use

- Total cost of Homeo Amrit use - Rs. 2100/- per ha
- Total cost of Homeo Amrit and Homeo sanjivani - Rs. 3260/- per ha in T4 and T5

1. As the application of 150 kg N + Homeo Amrit was equivalent to 150:60:40 kg NPK, there was a net saving of 60 kg P and 40 kg K with no loss in productivity

2. Similarly as the application of Homeo Amrit + Homeo Sanjivani was comparable to 120:60:40 kg NPK, there was a net saving of 120 kg N, 60 kg P and 40 kg P in the form of chemical fertilizers

As is evident from the above table it is clear that by the application of Homeo Amrit there was not only the net saving of chemical fertilizers, but the cost on inputs was less by Rs. 504.20. If the component of subsidy is also added to the cost of chemical fertilizers there will be much more saving in cost. Another advantage of using Homeo formulation was that against non-renewable source the homeo preparations offer renewable resource with no import dependence.

Effect of Homeo Amrit and Homeo sanjivani on yield of paddy

Effect of Homeo Amrit and Homeo sanjivani was also tested on paddy crop in combination with different doses of chemical fertilizers as per the details given above, at six district farms. Results obtained (average of two years) are summarized in Table 4.

Table 3. Economics of homeo input use vis-à-vis chemical fertilizers in wheat

Treatment	Inputs used	Total cost
T 1	Control (NPK kg/ha 120:60:40)	Rs. 3936.20
T 2	NPK kg/ha 150:60:40	Rs . 4269.20
T 3	150 kg N + Homeo Amrit	Rs. 3765.00
T 4	Homeo Amrit + Homeo Sanjivani (basal + spray)	Rs. 3260.00
T 5	Homeo Amrit + Homeo Sanjivani (basal + TD)	Rs. 3260.00

Table 4. Effect of Homeo preparations on yield of paddy

S. No.	Yield in Kg/ha (average of two years) in different districts					
	Varanasi	Hardoi	Itawah	Mathura	Azamgarh	Meerut
T0*	-	3.99	22.91	-	-	-
T 1	24.66	-	22.39	24.50	33.30	22.50
T 2	28.66	20.13	23.95	39.62	33.96	45.00
T 3	32.33	19.65	22.39	36.69	35.63	40.00
T 4	23.22	18.31	23.12	33.63	38.29	30.00
T 5	15.99	17.31	22.91	35.43	38.62	26.50

T0 = Absolute control, No inputs.

Conclusion on Paddy

All the six trials conducted at different research farms of Government of Uttar Pradesh on important food grain crop Paddy have clearly shown that Homeo formulations are effective in meeting the nutrient needs of paddy crop to a great extent. Significantly higher yields under Homeo treatments (T4 and T5) over absolute control in Hardoi District, indicates that these Homeo formulations are significant nutrient mobilizers for paddy crop. In four districts namely Itawa, Mathura, Azamgarh and Meerut it was observed that combined application of Homeo Sanjivani and Homeo Amrit (T3 and T4) have yielded higher or similar out put compared to control provided with NPK @ 90:60:60 kg/ha.

In Varanasi and Hardoi districts the yield under Homeo treatments (T4 and T5) was slightly lower compared to T1. But T3 was at par with T2 indicating that Homeo Amrit was successfully able to replace the need of P and K nutrients.

Among T4 (2 lit Homeo Amrit mixed with 4 kg Jaggary and 4 Q FYM as basal dose + 500 ml Homeo Sanjivani + 4 kg Jaggary in 250-300 lit water as foliar/soil spray after 22 and 60 days of sowing) and T5 (2 lit Homeo Amrit mixed with 4 kg Jaggary and 4 Q FYM as basal dose + 500 ml Homeo Sanjivani + 4 kg Jaggary mixed with 4q FYM as top dressing twice after 22 and 60 days of sowing) where the two Homeo formulations were applied in two different ways, treatment T4 was proved to be superior over T5

Economics of Homeo formulation use in paddy

- Total cost of Homeo Amrit use - Rs 2190/- per ha
- Total cost of Homeo Amrit and Homeo sanjivani – Rs. 3350/- per ha in T4 and T5

1. As the application of 150 kg N + Homeo Amrit was equivalent to 150:60:40 kg NPK, there was a net saving of 60 kg P and 40 kg K with no loss in productivity

2. Similarly as the application of Homeo Amrit + Homeo Sanjivani was comparable to 120:60:40 kg NPK, there was a net saving of 120 kg N, 60 kg P and 40 kg P in the form of chemical fertilizers

Table 5. Economics of homeo input use vis-à-vis chemical fertilizers on paddy

Treatment	Inputs used	Total cost
T 1	Control (NPK kg/ha 120:60:40)	Rs. 3936.20
T 2	NPK kg/ha 150:60:40	Rs . 4269.20
T 3	150 kg N + Homeo Amrit	Rs. 3855.00
T 4	Homeo Amrit + Homeo Sanjivani (basal + spray)	Rs. 3350.00
T 5	Homeo Amrit + Homeo Sanjivani (basal + TD)	Rs. 3350.00

As is evident from the above table it s clear that by the application of Homeo Amrit there was not only the net saving of chemical fertilizers, but the cost on inputs was less by Rs. 414.20. If the component of subsidy is also added to the cost of chemical fertilizers there will be much more saving in cost. Another advantage of using Homeo formulation was that against non-renewable source the homeo preparations offer renewable resource with no import dependence.

Effect of Zinc sulphate and Homeopathic preparation (Homeo sudha and Homeo moksha) on yield of paddy and wheat –
Homeo Sudha and Homeo moksha are two homepathic formulations which have been found to be effective in control of various insect pests of wheat, paddy, arhar, moong urad and other crops. Homeo sudha has also been found to meet the micronutrient requirement, especially of Zinc. To assess the impact of Homeo sudha as replacement input for zinc sulphate, trails were also conducted on various State Regional Research cum-Demonstrational Farms in 7 districts on two most important food grain crops, wheat and Paddy.

In all these trials while the dose of NPK was kept constant at 120:60:60 in case of paddy and 150:60:40 in case of wheat. Zinc sulphate, Homeo sudha and Homeo moksha were used as test products. Results presented below are average of two years in different districts.

All the trial under study in Paddy and wheat clearly indicated that mere addition of zinc sulphate at 20kg/ha, significantly increased the productivity of both the food grain crops. Homeo sudha was also found to be an effective replacement of zinc sulphate in both the crops. Application of 500 ml Homeo sudha in all the trials under study yielded significantly higher yields compared to their only NPK control (T1). On comparison with NPK+Zinc sulphate (T2), treatments provided with Homeo sudha yielded at par or higher productivity in five out of seven districts (namely Benaras, Barabanki, Jhansi, Mathura and Azamgarh). Homeo sudha treatment (T3) was found to be slightly poor in yield compared to zinc sulphate treatment (T2) at Meerut and Hardoi Districts. But in these two cases also the productivity by Homeo sudha was significantly higher than only NPK control.

Similarly in wheat the NPK+Homeo sudha application (T3) also yielded at par or higher productivity compared to NPK+Zinc sulphate treatment (T2) in 5 out of six districts (namely Benaras, Barabanki, Jhansi, Mathura and Meerut). At District Azamgarh the yield in Homeo sudha treatment was slightly lower then zinc sulphate treatment but significantly higher than only NPK control.

Table 6. Effect of zinc sulphate, Homeo sudha and Homeo moksha on yield of Paddy at constant NPK applications (120:60:60)

S. No	Treatment	Benaras	Barabanki	Jhansi	Mathura	Meerut
1.	Control (only NPK)	29.44	28.40	11.52	32.40	23.80
2.	NPK + 20 kg $ZnSO_4$	30.44	44.50	38.74	33.82	38.08
3.	NPK + 500 ml Homeo sudha	30.33	45.80	38.41	33.15	33.22
4.	NPK + 25 kg $ZnSO_4$ + 500 ml Homeo moksha	30.88	47.20	38.74	35.07	42.84
5.	NPK + 5 kg $ZnSO_4$ + 20 kg urea as spray	36.22	49.30	38.91	36.22	47.60

Table 6 contd.

S. No	Treatment	Hardoi	Azamgarh	Average
1.	Control (only NPK)	4.33	19.66	21.36
2.	NPK + 20 kg $ZnSO_4$	22.47	35.45	34.79
3.	NPK + 500 ml Homeo sudha	20.65	35.73	33.90
4.	NPK + 25 kg $ZnSO_4$ + 500 ml Homeo moksha	20.98	36.28	36.00
5.	NPK + 5 kg $ZnSO_4$ + 20 kg urea as spray	21.31	38.78	37.49

Table 7 Effect of zinc sulphate, Homeo sudha nd Homeo moksha on yield of wheat at constant NPK applications (150:60:40)

S. No	Treatment	Azamgarh	Banaras	Barabanki	Average
1.	Control (only NPK)	13.12	29.88	12.45	18.48
2.	NPK + 20 kg $ZnSO_4$	31.45	29.77	41.5	34.24
3.	NPK + 500 ml Homeo sudha	26.00	30.05	41.65	32.56
4.	NPK + 20 kg ZnSO4 + 500 ml Homeo moksha	26.25	29.71	43.00	32.98
5.	NPK + 5 kg ZnSO4 + 16 kg urea as spray	26.90	30.33	43.45	33.56

Table 7 contd.

S. No	Treatment	Jhansi	Mathura	Meerut	Average
1.	Control (only NPK)	29.75	46.46	57.35	44.52
2.	NPK + 20 kg $ZnSO_4$	41.85	48.67	51.80	47.44
3.	NPK + 500 ml Homeo sudha	42.50	50.28	53.65	48.81
4.	NPK + 25 kg ZnSO4 + 500 ml Homeo moksha	42.62	51.6	62.9	52.37
5.	NPK + 5 kg ZnSO4 + 20 kg urea as spray	43.15	53.33	29.6	42.02

All these results have clearly established that Homeopathic preparation known as Homeo sudha is not only an effective insect pest controller, but also assist in zinc mobilization and replace the requirement of zinc application.

Epilogue

Independent evaluation of Homeopathic formulations at State Government farms in 5-6 district in two most important food grain crops have clearly indicated the usefulness of these products. Homeo Amrit application offers an excellent opportunity for phosphate and potash replacement. In all the experiments on two important food grain crops, application of Homeo Amrit has replaced the need for P and K and yielded at par with the treatments provided with 60 kg of P_2O_5 and 40 kg of K_2O in wheat and 60 kg of P_2O_5 and 60 kg of K_2O in Paddy. Although, the mechanism of action of these inputs on their role in P and K mobilization is not known, it is expected that these inputs have some how stimulated the microbiological and/ or other natural processes in such a way that required quantity of P and K was available to crop plants for absorption from the available soil pool. Further experimentation on long term use of such inputs in same soils is needed to be assessed on their effect on soil nutrient pool in long run. In other treatment where Homeo Amrit was used in conjunction with Homeo Sanjivani, it was observed that these two inputs produced comparable or at par yields compared to plots provided with 120 kg N, 60 kg P_2O_5 and 40 kg K_20 in case of Wheat and 90 kg N, 60 kg P_2O_5 and 40 kg K_20 in case of Paddy. Here again how the Homeo Sanjivani has facilitated the availability of nitrogen is not known, but seems to have facilitated by stimulating the biological nitrogen fixation potential. In this regard also long term experimentations are needed to ensure sustained impact of these inputs and their effect on soil nutrient pool in long term.

Replacement of Zinc sulphate with the application of Homeo sudha is an interesting observation. It seems that the said homeopathic formulation have triggered some biological activity, which resulted into availability of increased metallic ions in the soil facilitating the availability of free zinc for the plant from the soil pool. Effect of similar other formulations in control of insect pests and diseases are also worth assessment. Vishwa Manav Seva Sansthan invites the scientists and research institutions to come forward and undertake extensive trials, not only to assess their potential as yield enhancer but also to establish the science behind their mode of action.

With lot of experiments conducted on farmers' fields the author is convinced that such Homeopathic formulations can play an important role in mitigating the nutrient availability stress on the nation and can offer some respite to the mounting subsidy burden on the exchequer. Depending upon the soil, availability of organic manure and crop Homeo Amrit and Homeo sanjivani can offer chemical nutrient holidays without any loss of yield. These formulations have proved to be highly effective in conjunction with chemical fertilizers also and thus provide a scope that, where it is not possible to fully replace the chemicals with these formulations they play effective and potential supplementary and complimentary role. Role of other Homeopathic formulations in micronutrient availability and in control of insect pest and disease management also provide a window for growing residue free food with renewable and non-toxic alternatives. Extensive trials are also needed on these aspects for convincing results and ascertain mode of action.

Vishwa Manav Seva Sansthan is producing these inputs with limited facilities; if some industry can come forward then such formulations can be produced in bulk quantities at much cheaper prices. Options are also available where such concentrates are prepared in industry in small volumes, which can be further formulated at farmers end with botanical portion, offering further scope of price reduction. Collective efforts, continued research and commitment for environment friendly technologies by technologists, scientists and development agencies are the need of the hour.

Wheat Production by Innovative Technology

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Natural Phenomenon: Investigations and experience on truth of natural plant life surrounding us revealed that 1) soil is living, 2) health of cattle influences biodiversity as well as recycling of biomass and 3) quality of water. It is "soul" content of alternate farming. Options available are, to preserve and enrich soil ecology and terrestrial environment. Strategies, to address these three fundamental pillars of alternate-organic farming are crucial and provide solutions to many problems? Essentially, to adopt such innovative approaches farmers and stakeholders would prefer case study scientifically investigated and verified under farmers farm situation.

Wheat: In the present agricultural scenario with increase in cost of fertilizers and other inputs, change in crop production strategy becomes inevitable to restrict cost of production. Case study roadmap for an alternative management system is presented here for monocot-wheat which requires essentially chemical sources for nitrogen nutrition under conventional approach for higher productivity. How to reduce cost of production and to maintain productivity is the major challenge? Alternate model of farming is suggested here for which steps in order of conventional farming format are as under:-

No Burning: Burning of residue is loss of precious biomass resource; therefore all out efforts must be made to prohibit this practice. Land can be prepared by tractor or bullock driven implements. Mix biomass into soil, it can be done even by using rotavator. In pre-sowing tilling incorporate adequate quantity of enriched organic manure.

Wheat Varieties: Varieties recommended for the area be selected for farming. Seed can be treated with 1 kg of cow dung slurry mixed with 1 kg cow dung cake ash and 0.2 kg *Trichoderma viride*. This is sufficient for treatment of 50 kg seed. Dry the seeds in shade.

Sowing: Sowing to be done as per local practices. To boost the growth of wheat seedlings in the initial growing period, a mixture of fortified compost and biofertilizers such as Azotobacter, Azospirillum and PSB are used and placed below seeds through drilling. Use of biotech protein hydrolysate granules @ 15 kg per 0.4 ha can supplement nitrogen requirement to a large extent.

Germination: After germination (6-8 days) broadcast berseem (*Trifolium alexandrium*) 2 kg and/ or *Meliotus*-clover seed 0.5 kg mixed with 10 kg dry cow dung manure. To activate phosphorus solubilization add 0.5 kg PSB culture as well as 0.5 kg *Aspergillus awamori* culture for decomposition of biomass.

Protein hydrolysate: After 20 to 23 days of sowing, in place of first top dressing by urea, sprinkle by broom (jhadu) a slurry formulated by the author. This slurry can be prepared on-farm by the farmers by mixing cow dung 25 kg + 2 kg jaggery (gur) + 2-3 Kg of oil cake or crushed small sized soybean seed + 5 litre cow urine + 5-10 gm bakers yeast cake for fermentation (available with bakeries or even *jalebi* broth can be used). Add 150 litre of water and keep it for fermentation for 3-5 days. Dilute with additional quantity of water and use in one acre by soil surface application before

irrigation. Apply another dose of this formulation after a gap of 30 days period.

This on-farm protein hydrolysate formulation can meet 60-70 percent requirement of nitrogen and other plant nutrients. Protein hydrolysate also detoxicates soil and promotes multiplication of beneficial mcroflora. Due to its plant growth promotion potential it also enhances plant growth and also acts as protectant from the damage by insect and diseases. This one single formulation has many advantages.

Irrigations: Usual irrigations can be given. Legumes -berseem- melilotus germinate slowly between rows of wheat which is a fast growing crop. These fodder legumes relatively smaller in size are slow in growth. Crops also have liking for company, like us, and in intimate company, they whisper and share nutrients mutually. Legumes provide cover on the soil which does not permit growth of unwanted plants. Tall growing unwanted plants can be uprooted and used as green mulch. Green cover on the soil enhances living activities below ground.

Atmospheric nitrogen fixation: Experimental evidences over years have convincingly established that atmospheric nitrogen fixed in legumes is made available to wheat, in all probability through mycorrhizal hyphae and in return legume plants also get nutrients form monocot wheat. Growth of wheat was found to be lush green in such experimental fields with adequate mycorrhizal associations is a positive sign for availability of nitrogen.

Innovative technique: This innovative technique appears to be simple but it is based on existing natural phenomenon. It is useful in saving chemical sources of nitrogen to the extent of 75-80 percent at a nominal cost of berseem seed.

Harvesting: Wheat matures earlier than berseem therefore there is no problem in harvesting wheat manually or by machines.

Production: Wheat production under such management is as high as is obtained with full use of chemicals right in the first year or even it is superior by 20-25 percent. It belied general perception that alternative methods - organic farming reduces production. Microbes which make soil vibrant with living activities work tirelessly to ensure timely availability of nutrients and also ensure soil biological activity, leading to sustained soil health.

Revenue from berseem seed: Left out berseem after harvest of wheat if provided with irrigation, produces around one quintal seed form 0.4 ha. Value of this berseem seed is around Rs. 5000/-

Wheat stubbles: Remains of wheat stubbles start decomposition on irrigation and residues of berseem act as a green manure crop, which play major role in reviving soil health and their congenial living condition.

Production of wheat and cost benefit ratio: Wheat yield-levels depend on varieties. *Triticum aestivum*-sharbati-amber is a high value quality variety with high acceptability among masses. Average yield of about 30-50 quintals per ha is possible at much lesser cost under central India conditions. Cost benefit ratio in this practice is around 1:3

Demonstrations: It is proposed that the technique be demonstrated in technology parks like ICAR's, SAU's, KVKs, NGO's corporate farms etc. Incidentally farmers deserve support from the public institutions and all social organizations, believing in green technology should come forward to promote it.

Conclusion: The technique has been finalized with meticulous care since 1984 with the backup of neo technology which offers enlightenment to all stakeholders. Living soil supported by microbial activities results into better mobilization of nutrients. This is a beginning to decode secret of natural phenomenon. The details of the present status are given in the book of the author "Alternate Farming and Environment Care"

India Organic News

Economic Viability of Organic Farming: An Empirical Experience of Wheat Cultivation in Punjab - The present study has assessed the economic viability of organic wheat cultivation in Punjab by collecting primary data from 85 organic growers and 75 inorganic growers spread over 30 villages in the districts of Patiala and Faridkot for the period 2008–09. The area under organic farming has been found about 27 per cent of the total operational area in *rabi* season for the sample organic growers. The major share of organic area has been found under wheat crop, which accounted for 15 per cent of the total operational area of sample organic growers. The total variable cost on per acre basis for the cultivation of organic wheat has been found less as compared to inorganic wheat. The net returns over variable cost of organic and inorganic wheat have been observed as Rs 21895/acre and Rs 16700/acre for organic growers. The lower crop yield in organic wheat (6.7q/acre) was well compensated by the higher price it fetched in the market. A wider varietal distribution has been observed for organic than inorganic wheat cultivation. The regression analysis has revealed that with one per cent increase in expenditure on farmyard manure + jeevamrit, biodynamic and machine labour, the organic wheat productivity would increase by 0.114 per cent, 0.703 per cent and 0.556 per cent, respectively, showing significant impact on value productivity. The study has observed that though organic wheat cultivation has been found more profitable for the growers in the study area, the significant reduction in its productivity level poses a serious challenge in term of food security for the nation (Source – Singh and Grover 2011 Agricultural Economics Research Review Year : 2011, 24 : 275-281)

Impact of intercropping of medicinal and aromatic plants with organic farming approach on resource use efficiency in arecanut (*Areca catechu* L.) plantation in India - The present investigation was conducted at Vittal, Karnataka, India during 2004–2007 to study the feasibility of intercropping of medicinal and aromatic plants (MAPs) in arecanut plantation. The results revealed that MAPs can be successfully grown as intercrops in arecanut plantation with increased productivity and net income per unit area. Kernel equivalent yield of MAPs varied between 272 kg ha^{-1} in case of *Piper longum* to 1218 kg ha^{-1} in *Cymbopogon flexuosus*. Pooled data indicated that *Asparagus racemosus* produced fresh root yield of 10,666 kg ha^{-1} of arecanut plantation and contributed to maximum kernel equivalent yield of 1524 kg ha^{-1} among all medicinal and aromatic plants. Intercropping of MAPs in arecanut was found economical. The net return per rupee investment was highest in *C. flexuosus* (4.25) followed by *Bacopa monnieri* (3.64), *Ocimum basilicum* (3.46) and *Artemisia pallens* (3.12). The total system productivity of arecanut + MAPs intercropping system varied from 2990 to 4144 kg ha^{-1}. Arecanut + *O. basilicum* intercropping system registered significantly higher production efficiency 8.2 kg ha^{-1} day^{-1} than other systems. Intercropping of MAPs had more positive effect on soil pH in arecanut based cropping system. The soil pH was 5.6 in 2004 and it was 0.3–0.9 units higher in 2007. Soil organic carbon (SOC) content varied significantly due to intercropping of MAPs at the end of experiment. The SOC content increased in *Aloe vera*, *A. pallens*, *P. longum* and *B. monnieri*, while it depleted in grasses and rhizomatic MAPs. Based on demand and marketing opportunities for MAPs, farmers are advised to grow aromatic plants in large areas on a community basis to meet huge industrial demand and variety of medicinal crops in small areas to meet the requirement of traditional systems of medicine. (Source – Sujatha et al 2011, Industrial Crops and Products Volume 33 (1) : 78-83)

Organic Farming History and Techniques - Organic farming involves holistic production systems that avoid the use of synthetic fertilizers, pesticides and

genetically modified organisms, thereby minimizing their deleterious effect on environment. Agriculture area under organic farming ranges from 0.03% in India to 11.3% in Austria. Organic farming is beneficial for natural resources and the environment. Organic farming is a system that favours maximum use of organic materials and microbial fertilizers to improve soil health and to increase yield. Organic farming has a long history but show a recent and rapid rise. This article explains the development stages, techniques and status of organic farming worldwide. The sections are: the development and essential characteristics of organic farming; the basic concepts behind organic farming; historical background; developmental era of organic farming; methods of organic farming; relevance of organic farming in the Indian context; comparative account between organic farming and conventional farming; importance of organic farming in environmentally friendly approaches; working with natural cycles; relevance of organic crop production in food security; yield potential and trends of organic farming; rural economic linkage its scope and limitations; and legislation procedures adopted by various countries. Organisations and financial aspects of organic farming are also briefly discussed (Source – Behera et al 2011, Agroecology and Strategies for Climate Change, Sustainable Agriculture Reviews, Volume 8, 287-328)

Higher yield, profit and soil quality from organic farming of elephant foot yam - Alternative agricultural systems, like organic farming, that are less chemical intensive, less exploitative and environment friendly are gaining popularity. Elephant foot yam (*Amorphophallus paeoniifolius* (Dennst.) Nicolson) is an important starchy tuberous vegetable with high nutritive and medicinal values. Since information on the organic farming of tuberous vegetables is scanty, field experiments were conducted in this crop at the Central Tuber Crops Research Institute, India, over a 5-year period. The impact of organic, conventional, traditional and biofertilizer production systems on growth, yield, quality, soil physico-chemical properties and economics were evaluated in elephant foot yam. The results show that organic farming favoured canopy growth, corm biomass and lowered collar rot disease. Dry matter and starch contents of organic corms were significantly higher than those of conventional corms by 7% and 13%, respectively. Organic corms had 12% higher crude protein and 21% significantly lower oxalate contents. The content of K, Ca and Mg in corms was slightly higher, by 3–7% under organic farming. After 5 years of farming, the organic plots showed significantly higher pH, by 0.77 unit, and higher organic C by 19%. The exchangeable Mg, available Cu, Mn and Fe contents were also significantly higher. Organic management lowered the bulk density by 2.3%, improved the water-holding capacity by 28.4% and the porosity of soil by 16.5%. In short, organic farming proved superior and produced 20% higher yield (57.097 t ha^{-1}) over conventional practice (47.609 t ha^{-1}). The net profit was 28% higher and an additional income of Indian Rs. 47,716 ha^{-1} was obtained. Thus organic farming was found to be an eco-friendly management strategy in elephant foot yam for sustainable yield of quality tubers and higher profit besides maintaining soil health. Technologies for organic production involving farmyard manure incubated with bio-inoculants, green manuring, neem cake, biofertilizers and ash were also standardized (Source - Girija Suja et al, 2011 Agronomy for Sustainable Development)

Effect of aqueous extract of *Sargassum johnstonii* Setchell & Gardner on growth, yield and quality of *Lycopersicon esculentum* Mill - Experiments were conducted on tomato to study the potential of brown alga *Sargassum johnstonii* (a sea weed) as a biofertilizer. Seaweed extract was applied as a foliar spray, soil drench, and soil drench + foliar spray to assess its effect on plant growth, yield, and concentration of lycopene and vitamin C. The main objective of the study was to enhance the biochemical constituents with neutraceutical and antioxidant values in tomato fruit. Different concentrations (0.1%, 0.4%, 0.8%, 2%, 6%, 8%, and 10%; v/v) of

seaweed extract were used and growth was observed over a period of 7 months. A total of 14 sprays/drenches were applied at 15-day intervals during the entire vegetative and reproductive phase. A statistically significant increase in vegetative growth (plant height, shoot length, root length, and number of branches), reproductive parameters (flower number, fruit number, and fresh weight), and biochemical constituents (photosynthetic pigments, proteins, total soluble sugars, reducing sugars, starch, phenols, lycopene, and vitamin C) was recorded following all three methods of treatment at higher concentrations of seaweed extract. The study also reports auxin- and cytokinin-like activity, and the presence of macro- (Ca, Mg, Na, and K) and micronutrients (Fe, Cu, Zn, and Mn), in seaweed extract of *S. johnstonii*, which makes it a potential biofertilizer. (Source Reeta Kumari et al 2011, Journal of Applied Phycology, 23 (3) : 623-633)

Organic Agriculture : A Way Forward to Achieve Gender Equality in India - Among several benefits of organic agriculture, emphasis on gender equality is one important aspect which makes it unique as it is believed, that it empowers women. To understand gender dynamics in organic farming, 111 men and 69 women registered organic farmers were studied using a semi-structured interview schedule and on-farm observations in the context of livestock production activities during 2006-07 in the state of Uttarakhand. Land and livestock ownership was mostly with men, whereas income was jointly managed by both men and women followed by women members alone in most of the households. Animal husbandry activities were performed by both men and women, followed by women members of the family, whereas, decision making in animal husbandry activities though reflected plurality, the final decisions in most of the cases rested with men only. This study was not designed to compare the gender dimensions in conventional/ traditional farms against organic farms, yet it was observed that women's formal involvement was being encouraged through appropriate policy interventions in the state of Uttarakhand. (Source - Subrahmanyeswari, B. and Chander 2011 Journal of Organic Systems, 6(3), 2011)

Status of Organic Farming and Research Experiences in Rice - India has tremendous potential to become a major exporter of organic rice in the international market. Considering the importance of organic farming and to generate comprehensive scientific research data, field experiments were conducted for five years (2004-05 to 2009-10) covering ten crop seasons on a deep black clayey vertisol (Typic pellustert) at the Directorate of Rice Research farm, to compare organic and conventional farming systems with fine quality rice varieties. During the first two years, kharif grain yields in plots with inorganic fertilizers were superior to those with organics by 15-20%. However, during later years, grain yield improved in organic plots to parity with those with inorganic. During rabi, plots with inorganic were superior in grain yield to those with organics for the first four years but both the systems were on par during the fifth year. Most of the grain quality parameters were not influenced though moderate improvement in nutritional quality (protein, phosphorus and potassium contents) was recorded with organic, especially in brown rice and polishing reduced the quality improvement. In general, there was no significant difference in the insect pest incidence between the systems in most of the years with an exception in a few years where decreased pest incidence and increased parasitism was observed with organic compared to inorganic. Organic system significantly improved the soil quality and the sustainability index of the soil was maximum with organics (1.63) compared to inorganic (1.33) after four years of study. Benefit cost ratio was less with organic (by 26%) compared to inorganic in the first year which improved with organics over inorganic (by 22%) at the end of fourth year. (Source - K. Surekha, Journal of Rice Research Vol.3 No. 1)

Global Organic

Nitrogen Contribution of Legume/Cereal Mixed Cover Crops and Organic Fertilizers to an Organic Broccoli Crop - Legume/cereal mixed winter cover crops are commonly used by organic growers on the central coast of California, but they are unable to provide sufficient nitrogen (N) for a high N-demanding vegetable crop such as broccoli and supplemental fertilizer application may be necessary. The goals of this project were to evaluate the contribution of N from a mixed legume/cereal cover crop (CC) and feather meal and blood meal as organic fertilizers (OF) to an organic broccoli crop and to evaluate economic benefits of CC and OF to the subsequent organic broccoli crop. Trials were conducted at two sites (A and B) with different management histories. Cover crops were grown over the winter and incorporated into the soil in the spring and subsequently broccoli [*Brassica oleracea* L. (Italica group)] was grown in 2006 at both sites and in 2007 at B only. Cover crop and no CC treatments were grown with supplemental organic fertilizers at four fertility levels (0, 84, 168, and 252 kg N/ha of OF) with four replicates. Generally broccoli head yields at A (14.9 to 26.3 mt ha^{-1}) were higher than at B (0.7 to 17.4 mt ha^{-1} in 2006 and 5.5 to 17.9 mt ha^{-1} in 2007). Yield and above ground biomass N were significantly increased by OF at rates up to 168 kg N/ha at A and to 252 kg N/ha at B and by CC in 2006 at both sites but not in 2007 at B. Although N content of the CC was similarly low at site A (2006) and at B (2007), immobilization of soil mineral N occurred only at B. This suggests that the addition of a low N content CC was offset by high N mineralization from the soil at A with a long organic management history (greater than 33 years). Supplemental fertilizer applications may be necessary to achieve optimal yields, but the amount needed can be reduced by cover cropping in fields with a long history of cover crop-based organic management (A) or when cover crop N content is sufficiently high to prevent immobilization (B, 2006). Soil NO_3-N patterns suggest a pre-side dress nitrate test may also be useful for N management in organic broccoli. Use of cover crops increased net return above harvest and fertility costs when the yield reduction by N immobilization did not take place. However, the net return increase by the use of cover crops tended to diminish as the rate of OF application increased (Source Muramoto et al Horticulture Science, 2011, 46 (8) : 1154-1162)

Diversity and Activity of Free-Living Nitrogen-Fixing Bacteria and Total Bacteria in Organic and Conventionally Managed Soils - Agricultural soils are heterogeneous environments in which conditions affecting microbial growth and diversity fluctuate widely in space and time. In this study, the molecular ecology of the total bacterial and free-living nitrogen-fixing communities in soils from the Nafferton Factorial Systems Comparison (NFSC) study in northeast England were examined. The field experiment was factorial in design, with organic versus conventional crop rotation, crop protection, and fertility management factors. Soils were sampled on three dates (March, June, and September) in 2007. Total RNA was extracted from all soil samples and reverse transcribed. Denaturing gradient gel electrophoresis (DGGE) and quantitative PCR (qPCR) were used to analyze *nifH* and 16S rRNA genes in order to study free-living diazotrophs and the total bacterial community, respectively. Crop rotation was shown to have a significant effect on total bacterial diversity (and that of free-living N fixers) ($P \leq 0.001$). On all three dates, *nifH* activity was higher in the conventional crop rotation. In contrast, qPCR analysis of free-living N fixers indicated significantly higher levels of activity in conventionally fertilized plots in June ($P = 0.0324$) and in plots with organic crop protection in September ($P = 0.0143$). To our knowledge, the effects of organic and conventional farming systems on free-living diazotrophs have never been studied. An

increased understanding of the impacts of management practices on free-living N fixers could allow modifications in soil management practices to optimize the activity of these organisms. (Source – Caroline et al Appl. Environ. Microbiol.February 2011, 77 : 3911-919)

The need to breed crop varieties suitable for organic farming, using wheat, tomato and broccoli as examples: A review - It is estimated that more than 95% of organic production is based on crop varieties that were bred for the conventional high-input sector. Recent studies have shown that such varieties lack important traits required under organic and low-input production conditions. This is primarily due to selection in conventional breeding programmes being carried out in the background of high inorganic fertilizer and crop protection inputs. Also, some of the traits (e.g., semi-dwarf genes) that were introduced to address problems like lodging in cereals in high-input systems were shown to have negative side-effects (reduced resistance to diseases such as Septoria, lower protein content and poorer nutrient-use efficiency) on the performance of varieties under organic and low-input agronomic conditions. This review paper, using wheat, tomato and broccoli as examples, describes (1) the main traits required under low-input conditions, (2) current breeding programmes for organic, low-input agriculture, (3) currently available breeding and/or selection approaches, and (4) the benefits and potential negative side-effects of different breeding methodologies and their relative acceptability under organic farming principles (Source - Lammerts van Bueren et al 2011 Wageningen Journal of Life Sciences, 58, (3-4) :193-205)

Quality of Organic vs. Conventional Food and Effects on Health - Results of the studies analysed in this report indicate certain advantages in nutritional quality of organic food compared with conventional. It can be stated that organic plant products contain generally more phenolic compounds and vitamin C. However, the level of carotenoids is often higher in conventional plant products. Studies show higher content of dry matter, total sugars and mineral components, but due to the limited number and variable results of the studies it is difficult to make general conclusions. An elevated content of bioactive substances, desirable from health point of view, in organic raw materials allows the conclusion that such food can contribute to better health. There are several studies which confirm this thesis, based on analyses performed on animals. In the case of cereals, it can be concluded that organic grains contain less but a higher quality of protein than conventional grains. The superiority of organic food is more probable if the producing and processing are in accordance with regulations. There is a common understanding that all fertilizers and pesticides are forbidden in producing organic products. The fact is that in organic food production it is necessary to keep the soil fertile and to feed the plants as well, only by the use of natural fertilizers. There are biopesticides allowed to use for plant protection in organic agriculture. They are environmentally friendly, they do not leave harmful residues in plants and their long-term use can be as effective as chemical pesticides. It is important for farmers to be informed about novel methods and products allowed in organic agriculture to reduce food producing and processing costs. Organic milk, in comparison with conventional milk, has a higher content of CLA and omega-3 acid, a better ratio of omega-6 : omega-3 acids, high levels of vitamins (vitamin E) and antioxidants, acting as an important part of human health prophylaxis. Due to the ban of the high supplementation of mineral fertilizers, organic milk may have the deficiency of specific micro- and macronutrients. Also, it has been assessed with lower points in sensory evaluation by consumers compared with conventional milk. Meat from organic production is characterised as with higher intramuscular fat content, favourable profile of fatty acids – higher content of omega-3 and lower content of saturated fatty acids. Organic eggs tend to have a higher amount of carotenoids in their yolk due to the birds having outdoor access and consuming fresh grass. The presence of pesticide residues in

conventional food is the main difference between organic and conventional food. Many monitoring and studies have demonstrated that due to use of synthetic pesticides, conventional food may contain pesticide residues, even of several substances together and over the permitted level (over MRL). Even small amounts of chemical residues may be hazardous to human health and how the multiple compounds might interact is not clear. Pesticide intake with food has been linked to cause many disturbances, malformations and diseases (including cancers) in humans. There are evidences that conversion into organic food decreases the level of pesticide residues significantly in human breast milk and children urine. It is well proven that the content of nitrates is lower in organic crops compared with conventional. Excessive intake of nitrates is dangerous to human health – it may cause methemoglobinaemia in small babies and cancers in adults. The content of mycotoxins is an important indicator of food quality. They can contaminate both organic and conventional food, and their concentration in crops depends not only on the production system (organic vs. conventional), but also on the field production and storage conditions. In conventional food processing several hundreds of different synthetic additives are permitted for use, while in organic food processing only around 40 natural substances are allowed. Several artificial additives used in conventional food processing have been linked to many adverse health outcomes (including obesity, allergies, headaches, cancers etc.); however, their hazardousness is not yet sufficiently proven to ban them. It is difficult to draw precise conclusions regarding the impact of organic food on animal and human health status. Few studies have been conducted so far and there is a need to undertake research of a higher and more specific level. However, initial conclusions can be drawn. Studies on animals conducted so far confirm a positive impact of organic crops on parameters such as immune status, fertility rates and the survival rate of young. Food preference studies performed on animals have confirmed their preference for organically produced food. Based on human studies conducted so far, it is possible to build a hypothesis that organic food can have a beneficial impact on human health. It is proved that regular consumption of organic milk and milk products by mothers decreases the frequency of skin allergy in the breast-fed infants and small babies. Other experiments investigating the health impact of organic foods on humans have brought contradictory results. The data is still insufficient to formulate clear conclusions. Health condition depends essentially on food and its quality. Therefore, organic methods in farming and processing can significantly improve the quality of agricultural products compared with conventional methods, which are based on the intensification and use of chemicals. Planning a healthy diet or development of healthy/functional food must consider the use of organic raw materials because they contain more bioactive substances that are important for strengthening the human immune system and metabolism. Consuming organic food may also prevent health problems caused by poor nutrition or low-quality of food (occurrence of chemical residues and artificial additives) (Source – A report by Darja Mat et, al. Estonian University of Life Sciences, 2011, Full report available at http://orgprints.org/19504/1/Report_2011_(1).pdf)

National and International Events

BioFach India Together with India Organic 2011, Bangalore, India, 10-12 November 2011 - *BioFach India together with India Organic* is organized jointly by Nürnberg Messe, Germany; with International Competence Centre for Organic Agriculture (ICCOA), in India every year since 2009, with the objectives of developing markets for Organic produce from India. This remains the biggest platform, an annual event in the South Asian Region where organic stakeholders meet and interact. The event gives a linkage to the businesses and the farmer groups, enabling access to markets- both domestic as well as international. This year *BioFach India together with India Organic* was held in Bangalore at Palace Grounds during 10-12 November, with the Deptt of Agriculture, Govt of Karnataka as the co-organizer.

The twin event of Trade Fair-cum-International Seminar was inaugurated by Shri D V Sadananda Gowda, Hon'ble Chief Minister of Karnataka and was attended by Shri S A Ravindranath, Min for Horticulture, Govt of Karnataka, Shri Umesh Vishwanath, Minister for Agriculture, Govt of Karnataka and Shri B N Bachhe Gowda, Minister for Sericulture, Govt of Karnataka. Shri Satyanand Jha Batul, Minister for Agriculture, Govt of Jharkhand, Dr. Chumben Murry, Minister for Agriculture, Govt of Nagaland, Shri P L Subba, MLA, Sikkim and Shri Ramu Damu, Advisor, Govt of Sikkim were some of the names in the list of VIP's visiting the event. Presence of other Govt organizations like National Horticulture Board, SIMFED, NERAMAC, Central Institute of Horticulture, APEDA, NCOF, NABARD, Coffee Board, Tea Board, Spices Board provided strategic importance for the development of the sector. State Governments, which participated in the event included Jharkhand, Andhra Pradesh, Maharashtra, Meghalaya, Chattisgarh and Uttarakhand.

Presence of 171 exhibitors including participation from 4 Countries and 12 Indian States and 7,529 visitors including trade buyers from Germany and France was indication of runaway success of the event. The whole diversity of the international organic community was shown in the heart of the IT metropolis and garden city of Bangalore on the three lively and colorful days of the exhibition, which was characterized by business talks and professional and intercultural exchange. The three day event also witnessed 32 Buyer Seller meetings. The range and quantity of products offered for selling by the companies as well as by farmer groups were very large. The exhibitors from the Indian subcontinent provided organic delicacies like spices, tea and coffee and diverse varieties of corn and rice as well as raw materials for cosmetics.

The International seminar was attended by 190 delegates wherein 33 speakers deliberated on wide spectrum of topics covering policy, research, Textiles, wellness and other emerging opportunities. Also, part of the event was two special sessions on 'India as the country of year at BioFach Nurnberg 2012' and 'Retailer Panel discussion'. In all, 8 sessions with 33 slots were covered in three days.

National Conference on Organic Meat, Poultry & Fish Value Chain Management- The conference was scheduled for 12-13 November, 2011 at the Convention Centre, Alumni Association-UAS, Bangalore, Veterinary College Campus, Hebbal, Bengaluru. The organizers of this event were Forum of Former Vice Chancellors of Karnataka State Universities, Alumni Association, UAS Banaglore, Karnataka Veterinari and Fisheries Sciences University, University of Agriculture Sciences, Dharwad, National Institute Animal Nutrition and Physiology, Association for Promotion of Organic Farming, Karnataka Organic Livestock Initiatives and M/s Blue Bay

Organic Farms and Foods (P) Ltd. Bengaluru. The conference was unique event wherein policy issues relating to Organic Meat, Poultry & Fish Value Chain Management were deliberated for the benefit of all the stakeholders. Highlights of the event included promoting organic awareness in Meat, Poultry and Fish, Exhibition showcasing producers, livestock entrepreneurs, companies, progressive farmers, retail chains, cold chain operators, feed companies, certification agencies, packers, machinery manufactures and financial institutions. For details please contact Dr. B.L. Chindananda, Organizing Secretary, Deptt. Of Animal Sciences, College of Agriculture, GKVK Campus, UAS, Bangaluru-560065. E-mail: chinda@koli.in, chindauas@gmail.com

BioFach and Vivaness, 15–18 February 2012 Nürnberg Germany - BioFach, the World Organic Trade Fair, distinguished by its vigour, internationality and innovative power is scheduled for 15-18 February 2012 at Nuremberg Messe, Nuremberg Germany. Together with Vivaness, the Trade Fair for Natural Personal Care and Wellness, it attracts some 2,500 exhibitors – two-thirds of them from abroad – and around 43,000 trade visitors from over 80 countries in the world to Nürnberg every year in February. Under the patronage of IFOAM (International Federation of Organic Agriculture Movements) and with BÖLW (German Federation of the Organic Food Industry) as national supporting organization, BioFach guarantees the constantly high quality of the products on display through strict admission criteria. The BioFach 2012 is very special for India as India has been chosen as the country of the year. "We have now been part of the BioFach family in Nürnberg for more than ten years and present our Indian products to the international market. So we are now really delighted that we can play an even more active part as Country of the Year in 2012", says Asit Tripathy, Chairman APEDA. The some 50 exhibitors and many visitors from India support this decision. "The Indian market is one of the world's fastest growing sales markets for food. According to estimates, sales in the organic sector are currently some 150 million US dollars for exports and about 30 million US dollars in the domestic market. The government is pursuing ambitious goals and plans to continue expanding organic agriculture: the growing area is to increase to 2 million hectares by 2012. This corresponds to 1.5% of the total agricultural land. The aim is also to raise the worldwide market share to 2.5% (2009: 0.2%).

Global Organic Market Access in 2012 and Beyond, 13-14 February 2012, Nuremberg Messe, Nuremberg, Germany - Recognizing that multiple organic standards, certification requirements and other regulations were major obstacles to organic trade, FAO, IFOAM and UNCTAD organized a Conference in February 2002 on International Harmonization and Equivalence in organic agriculture. In line with the needs identified during this conference and the readiness of participants to learn from each others' organic guarantee systems and seek convergence, the three partners sought and developed solutions by organizing and leading the International Task Force on Harmonization and Equivalence in Organic Agriculture (ITF). Results include two practical tools, an established networking among standard setters, regulators, and certification bodies and a common understanding of organic guarantee systems. Ten years later, this partnership continues to facilitate harmonization, equivalence and other forms of cooperation to enhance organic agriculture development worldwide. Working under the project title, Global Organic Market Access (GOMA) the partners announce a follow-up Conference in February 2012. This international Conference will assemble, on a global scale, key government and private sector actors to review the progress made in the last decade on organic guarantee systems, including outcomes of the ITF and GOMA, as well as envision strategies for the next ten years of public-private cooperation that are crucial for the continued growth of organic agriculture and markets. In addition to four eminent keynote speakers, participants are afforded

an opportunity to discuss key issues with distinguished government and private-sector speakers from Bhutan, Brazil, Canada, Costa Rica, China, Great Britain, France, India, the Netherlands, Sri Lanka and United States. Representatives of intergovernmental and international organizations such as The European Commission, International Federation of Organic Agriculture Movements, International Trade Commission, International Organic Accreditation Service and Pacific Islands Community will also contribute to the presentations and discussions.

The 2nd IFOAM Animal Husbandry Conference September 12-14, 2012, scheduled at Bio-Center of the University of Hamburg, 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. 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.

Himachal Pradesh Government Adopts Organic Farming Promotion Policy

Giving recognition and encouragement to the organic sector, recently The Government of Himachal Pradesh approved the draft policy for promotion of organic agriculture; which includes the recognition of the relevance of organic sector to over all development of agriculture in the state and thereby linking organic sector with the agriculture development objectives of Himachal Pradesh. Founding pillars of the policy document includes: (a) Creating enabling environment for organic farming in the state, through developing appropriate policies, plans, and support services for activities, such as, organic production of lead cash crops- fruits and vegetables of the state, increasing yields in low-input areas, conserving biodiversity and natural resources on the farm, increasing income and reducing cost of cultivation and increase supply of safe food to local / national/ international markets. (b) Develop favourable policies and plans to strengthen crop-livestock linkages of the farming sector and make Himachal an organic compost rich state. (c) Undertake steps to make Himachal Forests, grazing lands, pastures recognised as organic, certified/ uncertified, so as to facilitate organic grazing areas, organic fodder supply for livestock and organic non timber forest products. (d) Create investment environment for organic agribusiness and organic villages / valleys based on organic agro tourism, so as to develop these key sectors for self employment and value added on farm & off farm activities in rural development sector

Book Reviews

Organic Crop Breeding, *By* Edith Lammerts van Bueren,2011, *Publ.* John Wiley & Sons, 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* provides valuable insight for crop breeders, geneticist, crop science professionals, researchers, and advanced students in this quickly emerging field.

Science and Technology of Organic Farming, Allen V. Barker, 2011, CRC Press, London, ISBN 978-1-4398-1612-7 pp 224 -This is a practical handbook for anyone interested on organic farming. Science and Technology of Organic Farming is a concise, readily applicable textbook for learning the scientific basis for organic farming and the technology required to achieve adequate yields through plant nutrition and protection. It provides the tools necessary to dispel hampering myths about organic farming so students and farmers regardless of their experience can strengthen their own growing practices. Addressing relevant issues and concepts along with practical applications, chapters cover soil fertility and plant nutrition; individual plant requirement,; liming; farm manure; green manures and composts; mulching and tillage; and weed, insect and disease control, as well as companion planting and storage. The text also includes more than 50 illustrations and glossary with common technical and scientific terms used in conventional and organic agriculture. This valuable reference is ideal for farmers, agricultural advisers, and soil and plant scientist in both academia and industry.

Recycling Organic Wastes for Soil Health and Productivity, Eds. A.B. Singh, K. Sammi Reddy, M.C. Sharma, A. Subba Rao, 2011 Agrotech Publishing Academy, Udaipur ISBN (13)978-81-8321-213-7 pp 344-Integrated nutrient management (INM) has been recognized as the economically viable and environmentally benign technology to enhance soil productivity through the balance use of mineral fertilisers combined with organic sources of plant nutrients. One of the major constraints of INM is the quality of organic manures available with the farmers. Keeping view above facts, IISS Bhopal organized a winter school on “Efficient Farm Waste Utilization for Sustainable Agriculture and Ensuring Soil and Produce Quality” during 1-21 December, 2009. The invited papers from the faculty have been reviewed and brought out in the form of book. The book contains very useful information on various on-farm and off-farm organic wastes being used for soil fertility management in INM and organic farming, nutrient enriched compost preparation, use of vermicomposting techniques for bio-degradation of organic wastes, conservation agriculture, and the effect of organic wastes on crop and soil quality, and soil carbon dynamics. The contains 20 chapters including Utilization of cotton crop industry wastes for sustainable crop production; Recycling crop residues for improved nutrient use efficiency; Efficient methods of organic wastes recycling for sustainable agriculture; Recycling of press mud and spent wash in agriculture; Soil carbon dynamics; Recycling of waste and its quality assessment; Soil organic matter; Molecular techniques to export microbial diversity; Impact of industrial and city waste on soil quality; Organics as important components in integrated nutrient management for enhancing log-term productivity and nutrient use efficiencies; etc