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 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.

प्रिय पाठको

इसमें कोई संदेह नहीं कि पिछले ६ वर्षों में जैविक खेती की अभूतपूर्व सफलता में जैविक किसानों, सामाजिक संस्थाओं तथा केन्द्र व राज्य सरकारों के प्रयासों ने महत्वपूर्ण योगदान दिया है। इस याात्रा में तकनीकी ज्ञान-सहयोग प्रमुखतया या तो किसानों द्वारा विकसित किया गया है या हमारी प्राचीन विधाओं पर आधारित है। इन विधाओं व प्रक्रियाओं की ग्राहयता तथा उपयोगिता के मद्देनजर यह आवश्यक हो जाता है कि इन विधाओं की विज्ञानपरक जॉच हो। इस अंक में इन विधाओं की जॉच तथा उनकी उपयोगिता पर एक महत्वपूर्ण लेख प्रस्तुत है। लेख में प्रस्तुत परिणाम न केवल उत्साहवर्धक हैं वरन् इन विधाओं की प्रभाविता व उपयोगिता सिद्ध करते हैं। मूँग की जैविक खेती में जैविक उपायों पर किये गये अनुसंधान वैज्ञानिक संस्थाओं की जैविक खेती में बढती रुचि को दर्शाता है।

भारतीय कृषि अनुसंधाान परिषद द्वारा आयोजित एक दिवसीय विचार गोष्ठी व हिमाचल प्रदेश कृषि विभाग द्वारा आयोजित जैविक मेला तथा जैविक खाद्य उत्सव पिछली तिमाही के प्रमुख आर्कषण रहे हैं जिन पर एक रिर्पोट प्रस्तुत है। भारतीय जैविक कृषि सोसायटी की स्थापना तथा अनेक राष्ट्रीय व अंर्तराष्ट्रीय सूचनायें भी इस अंक में समाहित की गई हैं। आशा है सभी जानकारियॉ पाठकों को रोमांचित करेंगी।

ए.के. यादव
संपादक

Dear Readers

There is no doubt that rapid growth of organic agriculture during last six years is a concerted efforts of farmers, civil society organizations and Central and State Governments, but in this journey the technological support has either come from practicing organic farmers or from knowledge pool of ITKs. Keeping in view of the wide acceptability and their potential these innovative approaches need validation from scientific point of view. Current issue presents an article on holistic view of studies taken up for validation of such ITKs. Results obtained are not only encouraging but also prove the efficacy of such innovations with practically no cash expenditure for farmers. An article on effect of various biological approaches in increasing the yield of mung bean indicates growing interest of scientific institutions in the organic agriculture

Interactive meet on organic farming organized by ICAR and a grand Organic Fair and Food Festival organised by Department of Agriculture, Government of Himachal Pradesh were important features of last quarter underlining the growing importance of the subject. Launching of Organic Agriculture Society of India along with other national and international news and report on some important events are other added features. I hope the readers will find the entire compilation interesting and exciting.

A.K. Yadav
Editor

Critical Review of Indigenous Technologies for Organic Farming in Horticultural Crops

*R. K. Pathak , R. A. Ram, (Mrs) N. Garg, R. Kishun,
S. R. Bhriguvanshi and S. Sharma
*Manas Gramin Vikas Sansthan, Thane, Maharashtra

Introduction

India had developed a vast and rich traditional agricultural knowledge since Vedic times and presently finding solutions to problems created by over use of agrochemicals. Present days' modern farming is not sustainable in consonance with economics, ecology, equity, energy and socio-cultural dimensions. Indiscriminate use of chemical fertilizers, weedicides and pesticides has resulted in various environmental and health hazards along with socio-economic problems. Though agricultural production has continued to increase, but productivity rate per unit area has started to decline. The entire agricultural community is trying to find out an alternative sustainable farming system, which is ecologically sound, economically affordable and socially acceptable. Sustainable agriculture is unifying concept, which considers ecological, environmental, philosophical, ethical and social impacts, balanced with cost effectiveness. The answer to the problem probably lies in returning to our own roots. Traditional agricultural practices, which are, based on natural and organic methods of farming offer several effective, feasible and cost effective solutions to most of the basic problems being faced in conventional farming system. There is also need to conserve our traditional seed, some of which have drought resistant properties and resistant to different pest and diseases.

Among the various alternatives attempted, organic agriculture is gaining acceptance throughout the world with annual growth of 20-25 per cent in most of the European countries, including U.S.A., Australia, Japan, China etc. in recent years. In India, sporadic attempts for organic production are being attempted in number of horticultural and few plantation crops like tea and coffee in certain pockets. In an attempt to evaluate the effectiveness of these systems research work was carried out with following objectives:

1 Quantum production equal or higher with, what is expected from optimum combination of agrochemicals.
2 Input generation at the farm
3 Continuous improvement in physico-chemical and biological properties of soil.
4 Par excellence produce quality with respect to nutrition, essential constituents, therapeutic value and storability.
5 Eco friendly and cost effective technology.

Research Achievements

The Institute declared one of its farms as organic during the year 2001 and physical, chemical and microbiological properties of soil were monitored. Initial soil sample was drawn before the application of Biodynamic package. Analysis of initial soil samples revealed that organic carbon, available P and K and population of mould and bacteria were 0.53 per cent, 8.66ppm, 140 ppm and $1.3x10^4$ and $3.7x10^6$ cfu g^{-1}, respectively. After five years of organic cultivation, significant improvement in physical, chemical and biological properties of the soil was noticed (Table 1).

Nutrient status of organic preparations

a) Compost

Four types of composts, i.e., Biodynamic compost, NADEP compost, vermicompost and microorganisms mediated compost (MMC) were prepared from locally available organic wastes with minimum use of cow dung. Nutrient status of these composts was significantly high compared to conventional FYM (Table. 2).

b) Liquid manures, *Amrit Pani* and *Panchgavya*

Liquid manures were prepared from leaves of leguminous trees, neem leaves, caster leaves and other medicinal plant parts. On an average, preparation of liquid manure takes 8 to 12 weeks. Liquid manures were also prepared with neem, *Pongamia* and *Calotropis* leaves and were found to have insecticidal and fungicidal properties. Brief descriptions of experiments done in fruit crops are discussed here. The status of nutrient contents in some of these liquid manures prepared with cow dung, cow urine, plant parts and Biodynamic sets has been summarized in Table. 3.

c) Fortification of compost with Biodynamic preparations

Fortification of compost and FYM was done by using Cow-pat-pit (CPP). CPP is known to enhance seed germination, promotes rooting in cutting and grafting, improves soil texture, provides resistance power to the plants against pests and diseases, replenishes and rectifies the trace elements deficiency. Besides, CPP can also be used in place of Biodynamic (502-507) sets for enhancing decomposition of Biodynamic composts and for fortification of FYM. The nutrients status of CPP fortified FYM and MM compost is summarized in Table 4.

Table 1 Effect of biodynamic practices on soil properties over 5 years period

S. No.	Constituents	Improvement after organic cultivation			
		Initial	II year	III year	IV year
1.	Organic carbon (%)	0.53	0.80	1.00	1.16
2.	P (ppm)	8.66	8.66	22.66	56.27
3.	K (ppm)	140.00	142.50	202.50	1062.25
4.	Yeast and mould (cfu g^{-1})	1.3x104	$5.8x10^4$	$8.5x10^4$	$8.5x10^4$
5.	Bacteria (cfu g^{-1})	$3.7x10^6$	$4.8x10^6$	$8.0x10^6$	$3.1x10^8$

Table 2. Nutrient status of different composts

Type of Compost	Nutrient level						
	N (%)	P (%)	K (%)	Zn (ppm)	Cu (ppm)	Mn (ppm)	Fe (%)
Biodynamic	1.68	0.17	1.23	96	45	357	3352
NADEP compost	0.98	0.35	1.00	162	56	430	230
Vermi compost	1.68	0.23	1.26	112	48	397	3323
M.M. compost	1.54	0.51	1.06	140	45	433	275
FYM	0.70	0.19	0.37	75	34	222	3134

Table 3. Nutrient status of liquid manures prepared from cow dung, urine, plant parts and Biodynamic preparations

Types of Liquid manures	Nutrient level						
	N (%)	P (%)	K (%)	Zn (ppm)	Cu (ppm)	Mn (ppm)	Fe (ppm)
Biodynamic Liquid based neem leaf manure	0.006	0.004	0.04	2.2	2.3	1.3	15.3
Biodynamic Liquid based Subabul manure	0.007	0.002	0.04	1.9	2.8	0.3	10.5
Biodynamic Liquid based Lantana manure	0.006	0.002	0.03	1.1	2.9	0.24	3.4
Glyricidia leaf manure	0.011	0.003	0.03	1.6	2.3	0.2	7.2
Panchgavya	0.007	0.01	0.06	2.9	2.4	1.7	25.8
Amrit Pani	0.008	0.016	0.06	7.9	4.0	18.8	213.2

Table 4. Nutrient status of FYM and composts

Type of compost	Nutrient level				
	N (%)	P (%)	K (%)	Zn (ppm)	Cu (ppm)
FYM (Unfortified)	0.70	0.19	1.37	75	34
FYM (Fortified with CPP)	1.02	0.38	0.32	0.05	0.009
MM compost (Fortified with CPP)	1.07	0.61	0.49	0.30	0.30

Analysis of microbial load of Biodynamic pesticides prepared with neem, caster, *Pongamia*, *Calotropis*, lantana and vermi wash, *Amrit Pani* and Biodynamic preparations 500-507

Microbial analysis of Biodynamic pesticides and preparations were done by serial dilution plate count method. Isolates from Biodynamic preparations (BD) and plant bio-pesticides prepared with Neem, Caster, *Pongamia*, *Calotropis*, Lantana, Vermi wash and *Amrit Pani* were subjected to further study. Isolated dominant cultures were purified and maintained on Nutrient Agar (for bacteria) and Potato Dextrose Agar slants (for fungi). Fourteen bacteria and 13 fungi were isolated from Biodynamic preparations 500-507 (Table.5). Sixteen bacteria and 17 fungi were isolated from plant part based bio-pesticide preparations (Table 5)

Crop production

A. Fruit Crops

Mango

Effect on yield and quality

The average yield of mango cv. Dashehari (tree^{-1}) was only 56.54 kg in conventional cultivation whereas it was 90, 35, 80 and 95 kg tree^{-1} in organically grown cvs Mallika, Amrapali, Langra and Dashehari, respectively (Table 6). Total soluble solid (TSS) was also found to be more (19.20-21.60^{0}B) in all the cultivars in comparison to conventionally produced mango (17.25^{0}B).

2. **Guava**

In an experiment, maximum number of fruits and total fruit yield/tree was recorded with *Homa* + Biodynamic package of practice followed by 30kg vermicompost treated with *Azospirillum* and phosphorus solublizing bacteria treatments. Maximum fruit weight (310g/ fruit) was recorded with *Homa* + Biodynamic package of practice followed by *Homa* + *Panchgavya* (246.66g/fruit). While minimum fruit weight was were recorded with *Homa* treatment alone (190g/fruit). Improvement in fruit quality

due to application of different treatments was observed and maximum TSS (13.16^{0}Brix) was recorded with *Homa* treatment followed by 12.90 ^{0}Brix with *Homa* + *Rishi Krishi* treatment, but variations were not significant. Ascorbic acid content in fruits varied from 168.42 to 200.95 mg/100g fruits but again the variations among the treatments were not significant. Minimum acidity (0.133%) was recorded with *Homa* followed by 0.137 per cent with *Homa* + Biodynamic package of practice. Reducing sugars in freshly harvested fruits varied from 5.09 to 4.10 percent with highest of 5.09% with *Homa* while minimum of 4.10% was observed with *Homa* +Biodynamic package of practice (Table. 7 and 8).

Table 5: Microbial load of Biodynamic preparations

Biodynamic/organic preparations	Bacteria CFU/g sample	No. of dominant bacterial isolates	Fungi CFU/g sample	No. of dominant fungal isolates
BD - 500	1.2 x10^6	3	8.5 x 10^3	3
BD - 501	2.3 x 10^5	1	2.2 x 10^3	1
BD - 502	3.4 x 10^6	1	6.8 x 10^4	1
BD - 503	2.2 x 10^6	3	1.0 x 10^5	1
BD - 504	1.8 x 10^6	1	8.9 x 10^4	1
BD - 505	6.8 x 10^5	1	4.9 x 10^4	3
BD - 506	1.2 x 10^6	3	7.2 x 10^4	1
BD - 507	5.3 x 10^4	1	3.2 x 10^5	3
Neem leaves based bio-pesticides	6.6 x 10^5	1	8.5 x 10^4	1
Caster leaves based bio-pesticides	6.3 x 10^5	1	3.0 x 10^4	1
Pongamia leaves based bio-pesticides	8.7x 10^5	1	3.8 x 10^3	6
Calotropis	1.2 x 10^6	3	6.3 x 10^3	1
Lantana leaves based bio-pesticides	1.7 x 10^6	1	8.5 x 104	1
Vermi wash	7.0 x 10^5	3	1.6 x 10^3	3
Amrit Pani	2.1 x 10^5	3	9.6x 10^4	3
Cow pat pit	1.6 x 10^6	3	1.5 x 10^4	1

Table 6. Yield and fruit quality of conventionally produced and organically produced mango cultivars.

Cultivar	Yield (Kg tree^{-1})	Acidity (%)	TSS (^{0}B)
Conventional production Dashehari	56.54	0.20	17.25
Biodynamic production Mallika	90.00	0.16	19.20
Amrapali	35.00	0.11	21.60
Langra	80.00	0.18	19.20
Dashehari	95.00	0.16	21.50

Table 7. Effect of different treatments on yield and fruit quality attributes of guava cv. Allahabad Safeda

Treatment	Yield and other fruit parameters				
	Fruit number (tree^{-1})	Fruit yield (Kg tree^{-1})	Av. fruit length (cm)	Av. fruit wt. (g)	Av. fruit diameter (cm)
Homa Therapy alone	190	25.97	6.05	190.00	6.32
Homa Therapy + B D Compost @ 30 Kg/tree	215	29.20	6.88	206.66	7.37
Homa Therapy + Biodynamic package	264	34.81	6.68	310.00	6.59
Homa Therapy + *Rishi Krishi*	221	31.02	6.28	146.66	7.02
Homa Therapy + *Panchgavya*	202	28.39	6.32	246.66	6.29
Vermi compost (30 Kg/tree) + *Azospirillum* culture @ 250g/tree+ P S B @ 50 g/tree	224	33.19	6.07	224.00	7.23
FYM @ 30 Kg/tree	175	22.40	6.57	236.00	7.04
CD at 5 %	NS	NS	NS	53.68	NS

Table 8. Effect of different treatments on quality parameters of guava cv. Allahabad Safeda

Treatment	Quality parameters			
	T.S.S. (^{0}Brix)	Ascorbic acid (mg/100g fruit)	Acidity (%)	Reducing sugars (%)
Homa Therapy alone	13.16	200.95	0.133	5.09
Homa Therapy+ B D Compost @ 30 Kg/tree	12.50	195.87	0.137	4.32
Homa Therapy + Biodynamic package	12.90	175.06	0.150	4.10
Homa Therapy + *Rishi Krishi*	12.33	191.02	0.157	4.18
Homa Therapy + *Panchgavya*	11.83	168.42	0.190	4.11
Vermi compost (30 Kg/tree) + *Azospirillum* culture @ 250g/tree+ P S B @ 50 g/tree	12.33	185.27	0.193	4.14
FYM @ 30 Kg/tree	12.00	185.72	0.197	4.12
CD at 5 %	N S	N S	0.047	0.454

Microbial flora

Microbial population improved in soil after the application of different organic treatments (Table 9). Bacterial count was maximum ($8.1x10^6$ cfu g^{-1} soil) with application of BD 500 + FYM 10 kg, whereas it was observed minimum with FYM 20 kg + 250 g Azotobacter ($6.1x10^5$ cfu g^{-1} soil). Mould population was also affected by application of organic treatments and were found to be highest ($1.2x10^4$ cfu g^{-1}) with FYM 20 kg + 250 g *Azospirillum* and control treatments.

In another experiment, maximum yield (33.20kg $tree^{-1}$) was recorded with Biodynamic package of practices followed by 27.18 kg fruit $tree^{-1}$ with *Rishi Krishi*. While minimum (20.04 kg $tree^{-1}$) was recorded with application of 30kg FYM per tree. Maximum fruit weight (233.44g per fruit) was recorded with Biodynamic package of practice followed by 200.27g with 30kg vermi compost treated with *Azospirillum* and PSB, while minimum (120g) was recorded with 30kg FYM application. Significant variation in fruit length and diameter was recorded with different package except the application of 30 kg Biodynamic compost. Improvement in fruit quality with different treatments were observed and maximum TSS and ascorbic acid (12.66^0Brix and 231.38mg 100^{-1} fruit) were recorded with Biodynamic package of practice but variations among the treatments were non significant. Maximum acidity (0.19%) was recorded with 30kg FYM application while minimum (0.12%) with Biodynamic package of practice. Reducing sugars content in freshly harvested fruits varied from 4.70 -3.22 per cent being maximum with Biodynamic package of practice (4.70 %) with no significant difference and minimum (3.22 %) with application of 30kg FYM (Table.10 & 11).

3. **Papaya**

Yield and fruit quality

Experiment on effect of organic treatment (Table 12) revealed that the fruit yield of cv. Pusa Delicious was highest (56.00 kg $tree^{-1}$) with Biodynamic- 500 spray+10 kg FYM followed by CPP 500g + FYM 50 kg (49.00 kg $tree^{-1}$). Average fruit weight was recorded maximum (1.03 kg) with FYM 20 kg + 250 g *Azospirillum.* Average fruit length was more (21.5 cm) with FYM 20 kg + 250 g *Azospirillum* but TSS was highest at$b9.8^0$B with CPP 500 g + 50 kg FYM (Table 12).

Table 9. Microbial population of soil after one month of organic treatment application in guava

Organic treatment	Microbial population (cfu g^{-1} soil)	
	Bacteria	Yeast and mould
Vermi-compost 5kg	$2.3x10^6$	$6.3x10^3$
Vermi-wash (1:7)+10kg FYM	$2.7x10^6$	$1.1x10^4$
BD - 500 spray +10 kg FYM	$8.1x10^5$	$2.5x10^3$
CPP 500g + 5 kg FYM	$4.4x10^6$	$1.1x10^4$
FYM 20kg+250g *Azospirillum*	$3.7x10^6$	$1.2x10^4$
FYM 20kg+250g Azotobacter	$6.1x10^5$	$4.7x10^3$
FYM 10 kg+5kg Celrich	$5.1x10^6$	$9.3x10^3$
Control (350g N +200g P +350g K)	$4.4x10^6$	$1.2x10^4$

Table10. Effect of different treatments on yield and its attributes of guava cv. Allahabad Safeda

Treatment	Yield and other fruit parameters				
	Fruit number (tree^{-1})	Fruit yield (Kg tree^{-1})	Av. fruit length (cm)	Av. fruit wt. (g)	Av. fruit diameter (cm)
Control	200.66	22.89	4.08	145.50	3.88
B D Compost @ 30 Kg/tree	278.33	24.90	4.87	161.80	4.90
Biodynamic package	319	33.20	5.13	233.44	5.27
Rishi Krishi Package	261	27.18	4.75	173.18	4.47
Panchgavya Package	164.33	23.64	4.31	175.40	4.46
Vermi compost (30 Kg/tree) + *Azospirillum* culture @ 250g/tree+ P S B @ 50 g/tree	209.33	22.90	4.52	200.27	4.50
FYM @ 30 Kg/tree	221.66	20.04	3.85	120	4.26
CD at 5 %	77.76	7.20	0.40	31.77	0.66

Table 11. Effect of different treatments on quality parameters of guava cv. Allahabad Safeda

Treatment	Quality parameters			
	T.S.S. (^{0}Brix)	Ascorbic acid (mg/100g fruit)	Acidity (%)	Reducing sugars (%)
Control	12.06	197.03	0.13	4.30
B D Compost @ 30 Kg/tree	11.56	183.31	0.13	4.26
Biodynamic package	12.66	231.38	0.12	4.70
Rishi Krishi Package	12.48	201.69	0.13	3.84
Panchgavya Package	11.28	208.85	0.15	4.18
Vermi compost (30 Kg/tree) + *Azospirillum* culture @ 250g/tree+ P S B @ 50 g/tree	11.95	214.56	0.16	4.31
FYM @ 30 Kg/tree	11.28	190.10	0.19	3.22
CD at 5 %	N.S.	N.S.	0.03	N.S.

Improvement in microbial population of soil

A. Papaya and guava orchards

Present study was conducted to ascertain the effect of organic manure supplementation on microbial population of papaya and guava orchard soils. Treatments, Biodynamic- 500, vermi-wash, vermi-compost and CPP were applied in papaya orchard, while in guava the treatments were vermi-compost, vermi-wash, Biodynamic 500, CPP, FYM 20 kg+200g *Azospirillum*, FYM 20 kg + 200g *Azotobacter*, FYM 10 kg+5 kg Celrich and NPK fertilizer (300g N+200g P + 350g K). Soil samples were collected from different treatments and microbial population were analyzed. Properly diluted soil samples were plated in triplicate on Nutrient Agar and Rose Bengal Chloramphenicol-Agar for enumeration of the population of bacteria

and fungi, respectively. Results revealed that the bacterial and mould population were highest (5.3 x 10^6 & 3.3 x 10^4 cfu g^{-1} soil) in CPP, while least (1.6 x 10^4 & 2.9 x 10^3 cfu g^{-1} soil) in control (Table 18) in case of papaya.

Bacterial and mould population were maximum (7.1 x 10^6 & 7.0 x 10^3 cfu g^{-1} soil) in guava orchards treated with FYM + Celrich (Table 13 & 14). Higher microbial counts are indicative of better soil health.

4. **Aonla**

Yield and fruit quality

Observations on organic/ Biodynamic treatments on yield and quality parameters revealed significant improvement in all the attributes (Table 15 and 16). Fruit weight and TSS were highest (55.0g & 9.40^{0}B) in cv. Krishna, while ascorbic acid was more (438.77 mg 100 g^{-1} fruit) in cv. Chakkiya. Fruit weight (35g), TSS (7.4^{0}B), acidity (2.21%) and ascorbic acid contents (377.54/100 g^{-1} fruit) were lower in conventional grown cv. NA 7.

B. Vegetable Crops

1. Cole crops

Cauliflower and cabbage were successfully grown with application of composts, Biodynamic preparations and Biodynamic liquid manures without use of any agro-chemicals and yield up to 42.58 t ha^{-1} with cauliflower and 56.16 t ha^{-1} with cabbage were obtained.

Table12. Effect of different organic/ Biodynamic treatments on yield attributes of papaya cv. Pusa Delicious

Organic treatment (plant^{-1})	Yield and other associated parameters				
	Yield (kg plant^{-1})	Weight (kg fruit^{-1})	Fruit length (cm)	Fruit cavity (cm)	TSS (^{0}B)
Vermi compost 5kg	47	0.86	11.70	9.00	9.20
Vermi-wash (1:7)+10kg FYM	44	0.75	12.00	8.50	8.00
BIODYNAMIC 500 spray +10kg FYM	56	0.88	12.00	10.00	9.00
CPP 500g + 5 kg FYM	49	0.83	14.00	17.50	9.80
FYM 20kg+250g *Azospirillum*	44	1.03	21.50	17.00	9.50
FYM 20kg+250g Azotobacter	29	0.75	13.00	8.50	9.00
FYM 10 kg+5kg Celrich	33	1.20	13.50	10.00	7.80
Control (350g N+200g P+350g K)	28	0.75	11.20	8.50	7.50

Table 13. Population of micro-organisms in organically managed papaya orchard soil

Organic treatment	Population of mirco-organism (cfu g^{-1} soil)	
	Bacteria	Mould
Biodynamic- 500	1.9 x 10^6	9.1 x 10^3
Vermi-wash	2.4 x 10^6	3.2 x 10^3
Vermi-compost	2.9 x 10^6	3.9 x 10^3
CPP	5.3 x 10^6	3.3 x 10^4
Control	1.6 x 10^4	2.9 x 10^3

Table14. Microbial population in organically managed guava orchard soil

Organic treatment	Population of mirco-organism (cfu g^{-1} soil)	
	Bacteria	Mould
Vermi-compost	1.9×10^5	1.9×10^3
Vermi-wash	3.7×10^4	3.0×10^2
Cow Horn Manure	6.6×10^6	5.4×10^3
Cow Pat Pit	5.7×10^6	3.8×10^3
FYM+*Azospirillum*	2.4×10^6	2.0×10^2
FYM+Azotobacter	1.3×10^6	5.5×10^2
FYM+Celrich	7.1×10^6	7.0×10^3
Control	5.9×10^5	4.4×10^3

Table 15. Yield and fruit quality of aonla cultivars (organic vs. conventional).

Variety	Av. weight of fruit (g)	TSS (%)	Acidity (%)	Ascorbic acid (mg/100g fruit)
Conventional (N. A. – 7)	35	7.40	2.21	377.54
Forest aonla	10	9.30	2.40	455.04
Produced with Biodynamic package of practice				
N.A. 10	45	9.20	2.14	408.16
N.A.-7	45	7.60	1.94	306.12
Chakayia	40	8.0	1.88	438.77
Krishna	55	9.40	2.21	418.36

Table 16. Nutritional quality of aonla fruits cv. NA-7 grown under Biodynamic/ organic cultivation system

Cultivation system	TSS (^{0}B)	Acidity (%)	Ascorbic acid (mg 100g $fruit^{-1}$)	Reducing sugars (%)	Total sugar (%)	Tannins (%)
Biodynamic	9.20	1.79	462.50	2.54	5.55	2.48
Conventional	8.80	2.26	312.50	2.23	4.45	2.17

2. Okra

Experiments were conducted to assess the influence of sowing date (as per Biodynamic calendar) on yield of okra cv. Pusa-4. Results obtained showed that, the highest yield (125.00 q ha^{-1}) was obtained when crop was sown during the time of moon opposite to Saturn and on full moon day (Table 17).

3. **Yield of vegetables in different organic farming systems**

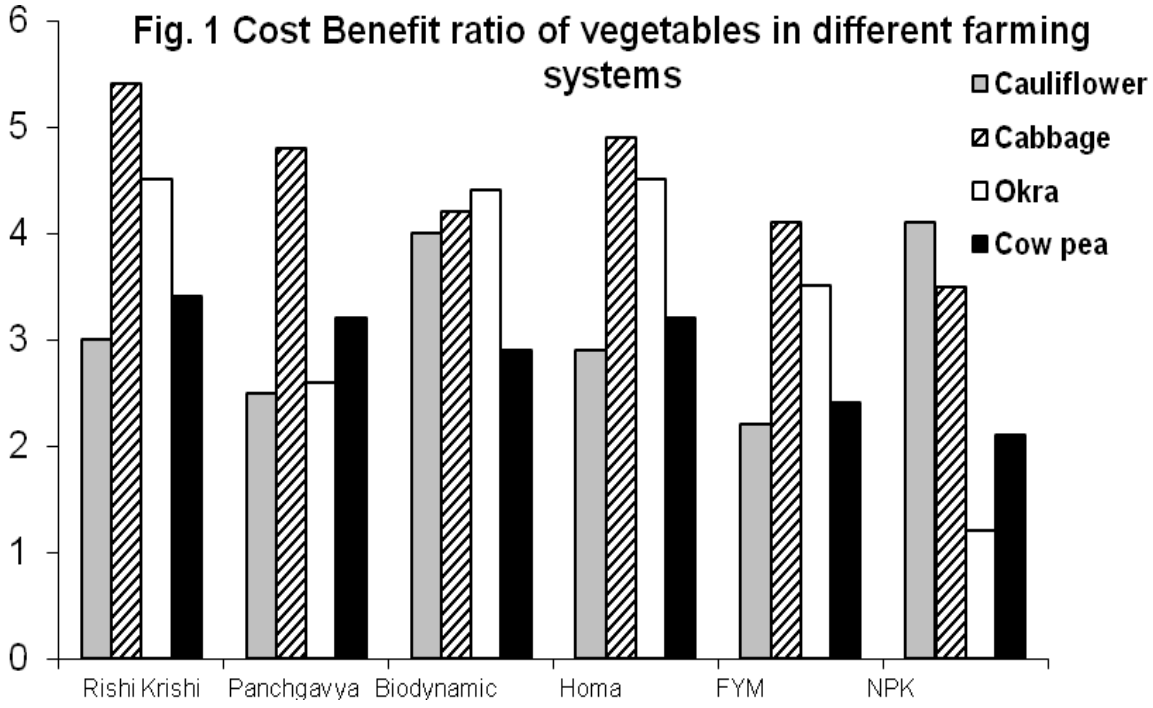
In another experiment cauliflower, cabbage, okra and cowpea were grown in different organic package of practice. Maximum yield (95.95 q $ha.^1$ - cauliflower, 178.73 q ha.1-cabbage and 89.27q $ha.^1$okra) was recorded with Biodynamic package of practice, while maximum yield of cowpea (69.71 q $ha.^1$) was recorded with *Panchgavya* package. Cost benefit ratio was recorded maximum (4.06) in cauliflower with Biodynamic, 5.36 and 4.38 in cabbage and okra respectively with *Rishi Krishi* and 3.41 in cow pea with *Homa* package (Table 18 and figure-1),

Table 17. Effect of Biodynamic calendar based date of sowing on yield of okra

Cultivation as per Biodynamic calendar	Area (M^{-2})	Yield (kg M^{-2})	Yield (q ha^{-1})
Fruit (descending)	25	31.25	125.00
Root (descending)	25	26.60	104.00
Flower (descending)	25	29.40	116.00
Leaf (descending)	25	22.50	88.00
(Moon opposite to Saturn)	25	31.25	125.00
Root days (descending)	25	30.00	120.00
Node (ascending)	25	26.35	105.40

Table 18. Yield of vegetables in different organic farming systems

Farming systems	Cauliflower (q ha^{-1})	Cabbage (q ha^{-1})	Okra (q ha^{-1})	Cowpea (q ha^{-1})
Rishi Krishi	71.38	114.95	88.39	64.81
Panchgavya	64.24	131.6	54.06	69.71
BIODYNAMIC package	95.95	178.73	89.27	60.86
Homa package	71.95	128.88	87.09	66.82
FYM	68.13	125.42	86.62	61.52
NPK	90.00	122.80	27.25	50.00
CD at 5%	NS	22.05	NS	NS



Note: Input generated at the farm without any purchase but their cost was included while computing CB ratio at market rate.

Crop protection
Mango
Insect pest
Evaluation of Biodynamic liquid pesticides against mango mealy bug (*Drosicha mangiferae*)
Neem and *Pongamia* based Biodynamic preparations (50%), neem cake powder (5%), commercial formulations of neem such as (Nimbecidine (0.2 %), Neemexcel (0.2 %) and Nereistoxin (0.05%) were evaluated under laboratory conditions against first instar nymphs of mealy bug and initially (up to 5 days) exhibited a slow action. Later on (within 7 - 14 days) mortality was more and it ranged from 82 to 100 per cent. Biodynamic preparations showed better results as mortality ranged from 76.67 to 100 per cent on 7th day.

Gummosis and dieback
Gummosis is one of the major diseases of mango. Results revealed that the pasting with cow dung is very effective in controlling gummosis in mango inoculated artificially with *Lasiodiplodia theobromae* and in rejuvenated mango orchards. Attempts were also made to determine the mode of action of cow dung. An actinomycete was isolated from fresh cow dung, which showed antipathogenic potential against *Colletotrichum gloeosporioides* (anthracnose pathogen) and *Lasiodiplodia theobromae* (gummosis, stem end rot & die back pathogen) of mango. Mode of antipathogenic activity was studied under the microscope and it was found that actinomycete (filamentous bacteria), identified as *Streptosporangium pseudovulgare* attacks the mycelial (pathogen) cell wall, and enters the host. Inside the host it utilizes the host cytoplasm for its multiplication and finally the host cell degrades completely. In *in-vitro* experiment on mango and guava (artificially inoculated) also, actinomycete was found to be effective against *C. gloeosporioides* and *L. theobromae*.

Pasting with cow-dung alone showed better response as compared to copper oxychloride. It checked the microbial infections and gummosis effectively and showed promising response in controlling the mango bark splitting which is responsible for die back in mango. Thus fresh cow dung can be used for eco-friendly and economic management of number of serious diseases in rejuvenated mango trees. Now it is an established technology in rejuvenation of old mango orchard. Biodynamic liquid manures have also been found effective in curing several plant diseases.

Clustering disorder
A typical phenomenon in mango, i.e., setting of fruits at the tip of the floral panicles in “cluster” has been observed since long in mango belt of Malihabad, Lucknow and the adjoining areas of Uttar Pradesh. The phenomenon is locally called as *jhumka* (clustering). Setting of fruit in cluster occurs in a number of mango varieties with varying degree of intensity and in Dashehari about 80 per cent of the trees were found to be affected. An estimated loss of crop due to clustering disorder during the year 1993 was in the range of 60 to 80 per cent. Disorder can be seen where pesticides are used indiscriminately but its occurrence was not noticed at CISH farm, which is being managed organically since last 4 years.

Pollinator population in organically managed orchard (where chemical pesticides have not been used for the last five years) as well as species composition was much higher compared to other places. Here sting less bees were the predominant species (53.33%) followed by flies (30%). Sting less bees comprised of Melipona/Trigona spp., and accounted for 53.33% of the pollinators, flies consisted mainly of Sarcophaga sp., Lucilia sp., Syrphus spp., and 7 spp., of unidentified flies which accounted for 30% of pollinator population. Coccinellid beetles (4 species) accounted for 8% of the pollinators. Percentage relative abundance of Apis bees (true honey bees) comprising mainly of *Apis florea* and A. indica was 4.33%. Other bees such as A. mellifera and A. dorsata visits were rare even though A. mellifera colonies were kept in the orchard. The

average pollinator number per panicle was 11 and the average fruit set was 8 fruits per panicle in the organic farm during 2004-05. In other years too, the pollinator numbers as well as fruit set was better than the other two places (7.00 and 6.00 pollinators per panicle and 6.50 and 6.00 fruit set respectively during 2003-04 and 2005-06). The maximum number of pollinator on a panicle was 20 and the maximum number of fruits on a panicle was 22.

At farmer's fields where orchardists regularly used synthetic pyrethroids in addition to other chemical pesticides, insect pollinator's numbers were very low. Here pollinator species composition too was much less. The species comprised of stingless bees, Melipona/Trigona spp., (76.66%) and flies (21.66%) were predominant. In such orchards average pollinator population was very low 0.50-0.80 and the fruit set at 0.60-1.60 per panicle. In farmers' orchards no forest land is left and they resort to severe and indiscriminate applications of insecticides (mostly pyrethroids) and often during flowering period, as a result the pollinator population as a whole have gone down significantly.

At conventional farm of the institute where recommended pesticides are regularly applied pollinator population as a whole was low and average pollinator population was 2.5 (range 1.50-4.00) with average fruit set at 2.50 (range2.00-3.00) per panicle.

The most probable reason of low pollinator population was regular and long duration of spraying schedule of insecticides and adverse weather condition due to climate change.

Validation of technology at farmer's fields

Thirty seven farmers of Azamgarh district of U.P. adopted organic farming for medicinal crops and earned profit from Rs.3, 45, 00.00 - Rs.4,36,000 ha^{-1} and in Lucknow districts of U.P. 31 farmers adopted organic farming for vegetables crops and earned profit from Rs.20,000.00 to Rs.36,000.00 ha^{-1} over and above conventional cultivation.

Impact

- Farmers are engaged in production of inputs at their farm. Therefore cost of cultivation is reduced as compared to spraying of pesticides/fungicides to control pest and diseases.
- Looking the profit per unit area other farmers who were not trained in the programme are willing to join the practice.
- Because of better taste and flavour, produce were sold at premium price in the markets.
- At Azamagarh, all the produces are being purchased by organic India at higher rates for export as fields are also organically certified as per National Standards.

Organic production of seeds and planting materials

Seed, seedlings and plantings materials are crucial, critical and essential input in agriculture production system. In conventional farming system the diseases are generally controlled by seed treatment, but it is not an option in organic agriculture. Current practice in organic agriculture is to analyse/monitor the seed and plants by health testing techniques and discard the infected lot. With implementation of National Programme on Organic Production (NPOP), organic farmers need to use seed and planting materials produced organically. Keeping these views in mind, a new method for organic propagation by use of poly and net houses to improve the efficiency and extension in propagation period in a year has been standardized.

Softwood grafting in poly bags has been standardized for propagation of mango, guava, aonla and bael. Rooting media was prepared by mixing equal volume of garden soil, vermi/Biodynamic compost and sand. It was fortified with CPP and solarized thoroughly by covering with white polythene sheet. Biodynamic liquid manure and organic pesticides were sprayed for the control of pests and plant

vigour promotion. Biodynamic multiplication of horticultural planting materials has been standardized.

Comparison of pollinator's activities at organic, conventional and farmer's conventional fields:

Comparative assessment of pollinators was made on pollinator populations in mango in different environments viz., organic farm of the institute, conventional experimental orchard of the institute and farmers' orchards in the area. Assessment of insect pollinator populations at different locations and environments revealed that the pollinator populations were adequate at organic farm of the institute.

Revenue generation

At conventional farm converted to organic in the year 2001, maximum revenue was recorded (1.80 lacs) in the year 2005. However revenue was recorded less in 2001was due to conversion factor (Table.19). Less revenue during conversion cannot be compared with revival of soil health and reduction of soil, air and water pollution.

Package of practice for organic production of fruit, vegetables and medicinal crops

Fruit crops

1) Nutrient management

- Growing of legumes for green manuring or as inter/cover crops as per requirement and as per calendar.
- Application of organic manures (10-20kg/tree) through NADEP, Vermi or Biodynamic Compost (Biodynamic) in descending Moon period
- Mulching after application of 100g CPP, spraying of cow horn manure (Biodynamic -500)/ *Panchgavya*/Amrit Pani/ release of earthworms in presence of proper moisture as per calendar.
- Need based foliar spraying of Biodynamic liquid manures/vermi wash/cow pat pit (CPP) in ascending Moon phase.
- Application of *Homa* biosol and spraying of *Agnihotra* ash rich water.
- Regular performance of *Agnihotra* at Sun set and Sun rise

Pest management

- Spraying of Agnihotra ash/Biodynamic pesticides prepared from cow urine, neem, *Pongamia* (*Pongamia pinnata*), Lantana, Calotropis, castor, *Thevtia nerrifolia*, Vitex sp. leaves as per experience.
- Regular performance of *Agnihotra* at sun set and sun rise
- Nettle leaves extract sprays to control hard pests like mango hopper, mites etc.

Table.19 Revenue generation (other than planting material sale) at organic farms

Year	Fruit crops (Rs.)	Intercrops produce (Rs.)	Total (Rs.)
Conventional management (cost of agrochemical is not included)			
1997-98	32959.00	48150.00	81,109.00
1998-99	22846.00	42586.00	65,432.00
1999 -00	13569.00	25692.00	39,261.00
Organic management (input generation at the farm)			
2000-01	18004.00	29217.00	47,221.00
2001-02	14788.00	100251.00	1,15,039.50
2002- 03	61570.00	33715.00	95,285.00
2003-04	69499.00	56826.50	1,26,275.00
2004-05	99643.50	81286.5	1,80,930.00
2005-06	51196.00	95689.00	1,46,885.00

Disease management

- Biodynamic tree paste/cow dung

paste for the control of gummosis and dieback.
- Two sprays of cow horn silica (Biodynamic -501) at germination, flowering and fruit development stage on Moon opposite to Saturn phase.
- Spraying of horsetail (*Equisetum arvensis*)/ casuarina leaves extract for the control of fungal diseases in ascending Moon period.

Package of practices for *Jaivik* production for vegetables and medicinal crops

Nutrient management
- Green manuring with sunhemp/Sesbania.
- Soil preparation and application of (5-10 tonnes) compost through NADEP, Vermi or Biodynamic Compost (Biodynamic) in descending Moon period
- Spraying of cow horn manure (Biodynamic-500) / *Panchgavya*/ *Amrit Pani* before sowing/ transplanting in the evening of descending period of Moon.
- Sowing 48 hours before the full Moon or on exact constellation based on the part of the crop is to be harvested.
- Soaking of seeds/seedlings in cow pat pit solution (1:7 ratio stirred for 30 minutes)/*Panchgavya*/*Amrit Pani* prior to transplanting.
- Regular performance of *Agnihotra* at Sun set and Sun rise
- Transplanting of seedlings during descending Moon period or on exact constellation based on the part of the crop is to be harvested.
- Incorporation of *Panchgavya*/*Amrit Pani* with irrigation water. Application of *Homa* biosol and spraying of *Agnihotra* ash rich water.
- Two sprays of cow horn silica (Biodynamic-501) at germination/ after establishment of seedling, flowering and fruit development stage preferably on Moon opposite to Saturn phase.
- Two sprays of Biodynamic liquid manures prepared from cow dung, cow urine, leguminous leaves or vermi-wash for the better growth and fruiting. Intercultural operation/mulching for weed management and proper root development in soil.
- Harvesting and storage as per constellation.

Pest management
- Spraying of *Agnihotra* ash /Amrit Pani/*Panchgavya*/ Biodynamic liquid pesticides prepared from cow urine, neem, *Pongamia* (*Pongamia* pinnata), Calotropis, lantana, Datura sp., castor, Thevtia nerrifolia, Vitex sp. leaves.
- Spraying of nettle leaves extract to control hard pests like mites.
- Application of *Homa* biosol and spraying of *Agnihotra* ash rich water.

Disease management:
- Two sprays of cow horn silica (Biodynamic-501) at two leaf stage and fruit development stage especially on Moon opposite to Saturn day.
- Need baseed spraying of horsetail (*Equisetum arvensis*)/casuarina extract for control of fungal diseases.
- Spraying of fresh cowdung/ Biodynamic liquid manures prepared from cow urine, neem and *Pongamia* (*Pongamia pinnata*) for the control of bacterial diseases.
- Application of *Homa* biosol and spraying of *Agnihotra* ash rich water.

Biological Approaches to Enhance Growth, Yield and Nutrient Uptake by Mung Bean (*Vigna radiata* L.) Under Organic Farming System

Janardan Yadav
Department of Soil Science and Agricultural Chemistry,
Institute of Agricultural Sciences,
Banaras Hindu University, Varanasi-221005

Mungbean [*Vigna radiata* (L.) Wilczek] is grown in about 3.3 million hectares in India with a total annual production of 1.37 million tonnes. Among the states, Orissa ranks first in the area and production. Punjab is the leading state in productivity with 834 kg ha^{-1} vis-à-vis the national average of 417 kg ha^{-1}. The seed of mung bean contains 23-24% protein, 60% carbohydrate, 1.5% fat besides 381 g Ca, 42.5 mg phosphorus and 12.4 mg iron per 100 gm. Seed inoculation with plant growth promoting microbes like *Rhizobium* (Sharma and Khurana, 1997; Sharma *et al*, 2007). and phosphate solubilizing bacteria / fungi (Chatterjee and Bhattacharjee, 2002) is cost effective, eco-friendly and have potential for supplying nutrients capable to reduce application of chemical fertilizers by 25-50% in mung bean. The effectiveness of PGPR is very much concern to the soil and environmental conditions. However, little work has been done on combined inoculation of *Rhizobium, Azotobacte*r and phosphate solubilizing bacteria (*Psuedomonas)* with fungal inoculants like*, Aspergillus* and *Trichoderma* specially under organic farming system. Hence, the present research work was carried out to find effective combination of PGPR and PGPF for organic farming of mung bean in Indo-gangatic plains of Uttar Pradesh

Field experiments with 10 treatment combinations of PGPR and PGPF (T_0 – Control,T_1- *Rhizobium*, T_2- *Rhizobium* + *Azotobacter*, T_3- *Rhizobium* + *Pseudomonas*, T_4- *Rhizobium* + *Pseudomonas* + *Azotobacter*, T_5- *Rhizobium*+ *Azotobacter* + *Trichoderma*, T_6- *Rhizobium* +*Pseudomonas* + *Trichoderma*, T_7- *Rhizobium* + *Pseudomonas* + *Aspergillus*, T_8- *Rhizobium* + *Pseudomonas* + *Aspergillus* + *Azotobacter*, T_9- *Rhizobium* +*Pseudomonas* + *Aspergillus* + *Azotobacter* + *Trichoderma*) were carried out in triplicates during *kharif* season for two consecutive seasons of 2007 and 2008 on mung bean (*Vigna radiata* L.) var. MOP-15 at basal dressing of 12 tonnes FYM ha^{-1} at Banaras Hindu University, Varanasi. The Physico-chemical properties of the initial soil of experimental field was sandy clay loam in texture with 40.83 % water holding capacity and neutral in reaction (pH 7. 25). The content of O.C. was 4.95 g kg^{-1} and available N 213 $kgha^{-1}$, P_2O_5 27 $kgha^{-1}$ and K_2O 255 kg ha^{-1}.

Healthy and counted mung bean seeds (18 g $plot^{-1}$ (@ 18 kg ha^{-1}) for each plot (4 x 2.5 m) were separately inoculated as per treatments in plastic bags with 5 ml of 7 days old broth cultures grown in specific media of respective inoculants (mixed in 1:1 ratio for combined treatments) along with 1ml of 15% (w/v) sticker solution containing gum acacia to ensure microbial population in the range of 10^7 to 10^8 cfu per seed. After drying for one hour in shade, uninoculated seeds were sown first followed by inoculated seeds in rows by 30x10 cm spacing during 1st fortnight of July in both years.

Nodulation and plant growth attribute at flowering stage (Table 1) were influenced by alone treatment of *Rhizobium* (T_1) as well as in co-inoculation with *Azotobacter* (T_2) and *Pseudomonas* (T_3). The values of nodules number and their dry weight due to above co-inoculants (T_2 and T_3) were in the range of 12.3 - 14.1 and 55.0 - 67.0 mg plant^{-1} in 2007 and 15.5 - 23.4 and 15.4 -21.1 mg plant^{-1} in 2008, respectively. Similarly, the values of per plant dry weight of root and shoot were in the range of 0.07 – 0.08 g and 1.41 – 1.44 g in 2007 and 0.06 – 0.09 g and 1.3 – 1.7 g in 2008, respectively. These treatments also manifested significantly higher N and P uptake by shoot as compared to single application of *Rhizobium* inoculation (T_1) and control (T_0). However, *Rhizobium* + *Pseudomonas* (T_3) treatment proved beneficial in obtaining higher nodulation and root and shoot dry weight and finally the grain and straw yield in both the years as compared to control, T_1 and T_2 treatments. Treatments triple inoculants like *Rhizobium* + *Pseudomonas* + *Azatobacter* (T_4), *Rhizobium* + *Azatobacter* + *Trichoderma* (T_5), *Rhizobium* + *Pseudomonas* + *Trichoderma* (T_6), *Rhizobium* + *Pseudomonas* + *Aspergillus* (T_7) manifested significantly superior number of nodules plant^{-1}, dry weight of nodules, dry weight of root and shoot, N and P uptake in both years over T_0, and T_1 but not better than T_3.

The tetra and penta inoculants treatment combinations viz. *Rhizobium* +*Pseudomonas* + *Aspergillus* + *Azatobacter* (T_8) and *Rhizobium* + *Pseudomonas* + *Aspergillus* + *Azatobacter* + *Trichoderma* (T_9) were found comparable and superior in all respect. However, T_9 brought about significantly maximum plant^{-1} number of nodules (21.9 and 25.6), dry weight of nodules (83.5 and 55.5 mg), dry weight of root (0.11 and 0.12 g) and shoot dry weight (1.08 and 1.08g) at flowering stage and yield of grain (7.48 and 8.40 qha^{-1}) and straw (29.89 and 42.3 qha^{-1}) in respective years of 2007 and 2008. Similarly, data pertaining to uptake of N and P by grain, straw and the total uptake (Table 2) clearly indicate superiority of this treatment (T_9) by which grain yield increased significantly over most of the other PGPR combinations in both years of the experimentation.

Table 1 : Effect of *Rhizobium* and PGPR combinations on nodulation, plant growth at flowering and yield attributes at harvesting stage in field conditions during *kharif* 2007 and 2008

Tr.	Nodulation Plant^{-1}				Dry wt. (g) plant^{-1}		Yield (qha^{-1})			
	2007		2008		2007	2008	2007		2008	
	No.	Dry wt. (mg)	No.	Dry wt. (mg)	Shoot	Shoot	Grain	Straw	Grain	Straw
T_0	9.1	43.0	13.5	10.5	1.2	1.2	3.56	14.24	4.7	20.5
T_1	12.1	53.0	17.5	15.3	1.3	1.3	5.29	21.15	5.3	27.7
T_2	12.3	55.0	15.5	15.4	1.4	1.3	5.34	21.37	5.3	22.5
T_3	14.1	67.0	23.4	21.1	1.4	1.7	5.50	22.02	7.8	43.4
T_4	17.3	71.3	13.6	16.5	1.6	1.4	6.36	25.23	6.3	27.6
T_5	16.0	67.0	19.5	18.9	1.5	1.6	6.31	25.45	6.9	31.3
T_6	18.4	75.0	18.0	18.2	1.8	1.7	7.06	28.23	8.1	33.8
T_7	17.9	73.0	19.3	17.9	1.6	1.5	6.58	26.32	6.5	28.8
T_8	18.7	76.6	21.6	20.3	1.8	1.8	7.08	28.30	8.2	44.5
T_9	21.9	83.5	25.6	55.5	1.9	1.9	7.48	29.89	8.4	42.3
SEm±	1.8	5.6	0.51	1.14	0.07	0.24	0.32	1.27	0.54	0.82
CD at 5%	3.8	11.8	1.07	2.39	0.14	0.50	0.67	2.66	1.12	1.73

According to the performance of inoculants in terms of different parameter of crop the following combinations of PGPR along with *Rhizobium* were found highly effective and useful for further application in legumes particularly in mungbean.

1. *Rhizobium* + *Azotobacter* + PSB (*Pseudomonas fluorescens* + *Aspergillus niger* + *Trichoderma harzianum*
2. *Rhizobium* + PSB + *Aspergillus niger*.
3. *Rhizobium* + PSB + *Trichoderma harzianum*.

Table 2 : Effect of *Rhizobium* and PGPR combinations on uptake of N and P by mungbean at harvesting stage in field conditions during *kharif* 2007 and 2008

Tr.	Uptake (kg ha^{-1}) during 2007						Uptake (kgha^{-1}) during 2008					
	By Grain		By straw		Total		By Grain		By straw		Total	
	N	P	N	P	N	P	N	P	N	P	N	P
T_0	8.9	2.8	8.3	2.9	15.0	5.7	10.4	2.5	13.4	3.9	23.9	6.4
T_1	15.0	2.8	16.7	3.7	25.8	6.5	14.4	3.2	18.5	5.7	33.0	9.0
T_2	16.9	3.2	17.2	4.2	28.2	7.4	13.4	2.9	15.0	4.4	28.4	7.4
T_3	17.2	3.2	17.4	5.3	28.9	8.5	26.3	5.0	35.8	12.1	62.1	17.2
T_4	17.7	4.2	18.1	5.5	29.8	9.7	19.4	4.1	20.2	6.2	39.7	10.3
T_5	18.4	4.0	17.8	5.5	27.5	9.4	20.2	4.5	24.9	7.6	45.1	12.1
T_6	20.5	4.6	21.3	6.2	31.8	10.9	24.4	5.3	26.3	9.1	50.7	14.5
T_7	18.6	4.5	18.5	5.7	28.7	10.2	18.0	4.1	22.4	6.5	40.5	10.7
T_8	20.4	4.7	22.6	6.7	33.9	11.4	27.7	6.3	38	12.7	65.7	19.0
T_9	24.0	4.7	24.6	9.1	36.6	13.8	28.7	6.3	36.1	14.2	65.5	20.5
SEm±	1.2	0.2	1.1	0.3	5.1	0.4	1.57	0.40	0.77	0.30	1.59	0.45
CD at 5%	2.5	0.5	2.2	0.6	10.8	0.7	3.29	0.84	1.62	0.63	3.35	0.94

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Organic Agriculture Society of India

To overcome the challenges of changing environment and ill effects of modern agriculture, organic farming is likely to play a pivotal role in near future. Organic practices are being followed by organic farmers and various NGOs in different parts of the country without any scientific back up. The CSKHPKV, Palampur has taken a lead in establishing the Department of Organic Agriculture for scientific validation and developing suitable organic practices for sustainable organic farming. In order to bring the scattered knowledge and experience in the country under one platform the '**Organic Agricultural Society of India**' is being launched on 2nd July 2010 at Himachal Pradesh Krishi Vishvavidyala, Palampur. The launching of the society will fulfill a long felt requirement of a scientific forum for development of 21st century organic agriculture.

India Organic News

Status of organic farming in India, Productivity vs Profitability

Background - There has been a lot of debate in recent years about the feasibility of organic farming under Indian conditions. The most often debated questions related to organic farming include its production potential, economic feasibility and the possible environmental benefits like improved soil quality and health. To ascertain the production potential, economic feasibility and likely benefits of organic farming in terms of improved soil fertility/quality, a survey was undertaken with an objective to compare the productivity, economics and soil quality of certified organic farms in comparison to the conventional farms.

Methodology - The survey was conducted during 2008–09 in Maharashtra, Karnataka, Tamil Nadu (including Puducherry), Kerala and Uttarakhand involving 50 certified organic farms and 50 comparable conventional farms. The list of organic farms was obtained from the accredited organic certification agencies in India. These selected organic farms are from Pune district of Maharashtra, Belgaum and Hubli districts of Karnataka, Coimbatore and Erode districts of Tamil Nadu, Auroville in Puducherry, Ernakulum, Iddukki and Wayanad districts of Kerala, and Dehradun and Haridwar districts of Uttarkhand. Replicated soil samples (from the top 0–15 cm depth) were collected from each certified organic farm and from nearby conventional farms having similar soils. A total of 300 soil samples were collected for the analysis. The analysis included soil physical (bulk density), chemical (pH, EC, organic carbon), biological (dehydrogenase, alkaline phosphatase, microbial biomass carbon) parameters and macro (N, P and K) and micronutrient (Zn, Cu, Fe, Mn) status of soil by adopting standard analytical methods.

Salient findings - On an average, the mean land holdings of each certified organic farm was 12.7 hectares. The average age of these certified organic farms was 6 years (ranges from 3 to 20 years). The average number of cattle possessed by each organic farm was around 11–12. Different manures used for supplying plant nutrients in organic farms include farm yard manure (FYM), vermicompost, Narayan Devraj Pandey (NADEP) compost, green manures, biofertilizers, neem cake, fish meal, biogas slurry, bone meal, press mud, biodynamic preparations, Jeeva amrit, Panchagavya, effective microorganisms (EM), minerals like gypsum, rockphosphate, etc. Different plant protection materials used in organic farming include neem oil, fermented butter milk, Jeevamrit, Panchgavya, cow urine, plant extracts like *Aloe vera*, datura, pongamia, cassia, garlic, ginger, chilly and bio-agents like *Trichoderma*, *Pseudomonas*, *Verticillium*, HNPV and Bt spray. On an average, the productivity of crops in organic farming is lower by 9.2% compared to conventional farming. There was a reduction in the average cost of cultivation in organic farming by 11.7% compared to conventional farming. However, due to the availability of premium price (20–40%) for organic produce in most cases, the average net profit was 22.0% higher in organic compared to the conventional farming. Yields relative to comparable conventional systems are directly related to the intensity of farming of the prevailing conventional systems. This is not only the case for comparison between regions, but also between crops within a region, and for individual crops over time. In areas of intensive farming system, shifting to organic agriculture decreases yield; the range depends on the intensity of external input use before conversion. In the so-called green revolution areas (irrigated lands), conversion to organic agriculture usually leads to almost identical yields. In traditional rainfed agriculture (with low external inputs), organic agriculture has shown the potential to increase yields. The replacement of external inputs by farm-

derived organic resources normally leads to a reduction in variable input costs under organic management. Expenditure on fertilizers and sprays is substantially lower than in conventional systems in almost all the cases. In a few cases, higher input costs due to the purchase of compost and other organic manure have been reported. Studies have shown that the common organic agricultural combination of lower input costs and favourable price premiums can offset reduced yields and make organic farms equally and often more profitable than conventional farms. Farms that did not include organic price premiums have given mixed results on profitability. The economics of organic cotton cultivation over a period of six years indicated that there is a reduction in cost of cultivation and increased gross and net returns compared to conventional cotton cultivation in India. The bulk density of soil is less in organic farms which indicates better soil aggregation and soil physical conditions. Improvement in soil organic matter decreased the bulk density by dilution of the denser fraction of the soil. There was a slight increase in soil pH and electrical conductivity in organic farms compared to conventional farms. On an average there was 29.7% increase in organic carbon of soil in organic farms (1.22%) compared to the conventional farms (0.94%) which is a good indicator of soil quality as it works as a sink for all nutrients and known for improving all soil physical and biological properties of soil. Regular organic additions (manures and root biomass) have the largest effect in soil organic matter. Dehydrogenase, alkaline phosphatase and microbial biomass carbon were higher in organic soils by 52.3%, 28.4% and 34.4% respectively compared to the conventional farms. This clearly indicates higher microbial activity in organically amended soils which is essential for nutrient transformations and increased availability of these nutrients to the plants. Increased nutrient availability in organic manure treatment could also be due to increased dehydrogenase and phosphatase activity. In general, increase in microbial biomass carbon in organic manure amended soils was due to increased availability of substrate-C that stimulates microbial growth, but a direct effect from microorganisms added through the compost is also possible. In organically managed soils, both macronutrients (N, P and K) and micronutrients (Zn, Cu, Fe, Mn) were available in larger quantities compared to the conventional soils. It is well documented that there is a significant positive correlation between organic matter and micronutrient cation availability.
(Source – Ramesh et al 2010, Current Science, Vol 98(9) : 1190-1194).

Economics and Efficiency of Organic Farming vis-à-vis Conventional Farming in India – A study report by Indian Institute of Management (IIMA), Ahmedabad - The study was conducted in four states namely; Gujarat, Maharashtra, Punjab and U.P states. From each state; a random sample of fifteen organic and fifteen inorganic farmers were interviewed regarding their cost of cultivation in major crops grown by them. The data for both input and output quantities and their unit prices were collected from sample farmers. The study pertains to the cropping year 2009-10 and the crops identified for study across different states were sugarcane paddy, wheat and cotton. The crop economics results showed a mixed response. In general, organic farming is a production system which has low productivity levels, needs more labor, require low energy inputs and has a changing net income levels along with selling prices. Overall, crop economics results concluded that the unit cost of production is lower in organic farming in case of Cotton (both Gujarat and Punjab) and Sugarcane (both in U.P and Maharashtra) crops whereas the same is lower in conventional farming for Paddy and Wheat (both in Punjab and U.P) crops. The DEA efficiency analysis conducted on different crops indicated that the efficiency levels are lower in organic farming when compared to conventional farming, relative to their production frontiers. There was only one exception in case of cotton in Punjab where the reverse trend was observed. The results conclude that there is ample scope for increasing the efficiency under organic farms. Exposure to more trainings as well as increase in technical guidance would enhance the productivity

and efficiency of organic farms in India. The role of the Government is critical in motivating the farmers towards organic farming in the country. Some of the major suggestions for expansion of organic farming are: creation of separate 'green channels' for marketing of organic foods; announcement of premium prices for organic staple food crops; creation of demand by more awareness programs; input/conversion subsidies for encouraging organic growers; more R & D investments on organic farming and finally cheap and quick certification process etc.
(Full study paper can be archived from http://www.iimahd.ernet.in/publications/data/2010-04-03Charyulu.pdf**)**

Organic farming gives Indian farmers greater financial security - A Greenpeace report released 15th June 2010 says the monetary benefits of organic cotton farming are much greater than using the Genetically Engineered variety that makes farmers more vulnerable to financial collapse due to high debts and increased costs of cultivation. The report titled "Picking Cotton – The choice between organic and genetically-engineered cotton for farmers in South India" shows that in the year 2009-10 farmers cultivating cotton through organic practices earned 200% more net income than farmers who grew Genetically Engineered cotton [Bt cotton]. The Greenpeace report is a comparative analysis of two methods of agriculture among cotton farmers in Andhra Pradesh. It not only shows the economic benefit of ecological farming (in this case organic) but also that Genetically Engineered (GE) cotton, despite using many toxic pesticides, still has greater crop loss to pests. "Our study illustrates how farmers growing GE cotton face high debts and high costs of cultivation, becoming more vulnerable to financial collapses", said Dr Reyes Tirado, Scientist, Greenpeace International, who authored the report.

Indian organic food market shows huge potential - In a latest research report "Organic Food Market in India 2010," Report Buyer, an independent online store for global business information, stated that the Indian organic food industry has huge potential, thanks to growing export market, organized retail enhancing distribution network, Government initiatives and increasing health consciousness among consumers. Organic farming is an old concept in India in terms of the extensive farming carried out in the country. The organic food market is worth $129.3 million and shows huge potential for growth in future. The increasing export market coupled with Government's support has driven the market. Further, the report also identified key challenges to the industry. According to the researchers, high prices of organic food, lack of integrated supply chain and difficulties for farmers, certification barriers are the key challenges in the country. The 24-page report begins with an introduction to the organic food products highlighting their benefits over the similar conventional food. The report provides a detailed overview of the status of organic farming in India and the status of certification process of organic food products in India. The market overview section compares the global and domestic organic food market. The report also provides an overview of the competitive landscape including brief profiles of key domestic producers and promoters of organic food products. (Source – www. greenpeace.in)

Organic Farming Source Book

The Fourth Edition of the Organic Farming Source Book by Claude Alvares, Pp 462 (2009) is a fully revised, updated version of much sought after compendium in the field of organic agriculture and has been published after a gap of nearly 10 years. The Sourcebook is the most comprehensive bank of information on every aspect of organic farming in India and includes a directory (and detailed stories) of the country's organic farmers and green stores. The new edition has separate chapters on organic seeds, indigenous cattle and genetic engineering. Indispensable for those keenly interested in all aspects of organic farming.

Global Organic

Organic Agriculture-Official journal of The International Society of Organic Agriculture Research, Editor-in-Chief: Elizabeth Stockdale ISSN: 1879-4238 (print version) ISSN: 1879-4246 (electronic version) Journal no. 13165 Springer Netherlands - The journal "Organic Agriculture" offers a mixture of original refereed research papers which bring some of the most exciting developments in sustainable agriculture and food systems often with an inter- or trans-disciplinary perspective. The journal also includes invited critical reviews on topical issues, and overviews of the status of organic agriculture in particular regions / countries. The journal covers the principles and practice of organic agriculture and food systems taking a broad view of the subject area and is also encouraging papers which provide a critique or challenge to current standards or practices. To address the challenges of developing sustainable food and farming systems, the journal seeks contributions which probe the technical and socio-economic constraints to productivity, market and system development, policy and governance. High quality research work in organic farming systems is often under-represented in the published literature and the journal particularly welcomes contributions which cannot be easily linked to a single disciplinary interest. For more details see the full Aims and Scope of the journal. *Organic Agriculture* is the official journal of the International Society of Organic Agriculture Research (ISOFAR). ISOFAR was launched in 2009 and seeks to promote, encourage and support research in all areas of Organic Farming by facilitating global co-operation in research, methodological development, education and knowledge exchange. *Organic Agriculture* is published quarterly (March, June, September and December). *Organic Agriculture* is available through Springer Developing Countries Initiative such as AGORA and HINARI.

Global Organic Market Access (GOMA)-a project of FAO,IFOAM and UNCTAD - Organic agriculture and trade afford the world a high level of agro-ecosystem services, and present social and economic opportunities for people, especially those in need of food security and ways out of poverty. Among the foremost challenges for the further development of organic agriculture is that trade pathways have become entangled with multiple organic standards and technical regulations. The labyrinth of requirements in both government and private sectors constitutes an obstacle to trade which constrains organic market development and denies market access to many, including hundreds-of-thousands of small producers in developing countries. The Global Organic Market Access (GOMA) project seeks to simplify the process for trade flow of organic products among various regulatory and/or private organic guarantee systems. GOMA focuses on harmonization and equivalence of organic standards and certification performance requirements as mechanisms for clearing trade pathways. It provides two practical tools for this purpose. The tools were developed by the International Task Force on Harmonization and Equivalence in Organic Agriculture (ITF), comprised of representatives from governments, intergovernmental organizations and private sector representatives, which subjected them to international consultation. The Guide for Assessing Equivalence of Standards and Technical Regulations (EquiTool) and the International Requirements for Organic Certification Bodies (IROCB) can be used by any government or private sector organic label scheme as practical tools for recognizing other organic standards and certification performance requirements as equivalent to their own. Project activities include: (a) outreach to share knowledge about the tools and possibilities for cooperation; (b) pilot projects to test the tools in various environments; (c) technical assistance to governments and private sector stakeholders to implement the tools

and related recommendations; (d) facilitation of new regional initiatives for cooperation on harmonized organic standard development and multi-lateral equivalence; (e) analysis of the organic trade system and evaluation of the trade-facilitating tools. GOMA is overseen by a steering committee comprised of representatives from FAO, IFOAM and UNCTAD. The project is funded by the Norwegian Agency for Development Cooperation (Norad). The Global Organic Market Access Project is an extension of the work of the International Task Force on Harmonization and Equivalence in Organic Agriculture (ITF). For more information, visit the ITF website: www.itf-organic.org

EU eyes increased role for organic farming - With the EU's future farm policy expected to have an increased focus on protecting biodiversity, promoting sustainable farming and achieving CO_2 reduction goals, organic farming may be worth a closer look, EU officials said. "There is a growing interest in organic farming, particularly in the context of talks on ecosystem services," said Ladislav Miko, Director at the European Commission's environment directorate, addressing a seminar on the role of organic farming in combating climate change on 20 April. His comments come as the EU is preparing a major overhaul of the Common Agricultural Policy (CAP) for the post-2013 era, in a bid to tap into the increasingly recognised potential of agriculture to mitigate climate change and deliver various other environmental benefits, such as improved soil and water quality. A Commission staff working document accompanying the 2004 EU action plan on organic farming underlines that its main benefits include the protection of soil, nature, biodiversity and habitats. Restricted use of pesticides also improves water quality, it notes. According to the EU executive, only 4% of EU farmland is currently used by organic farming. However, in some countries organic farming covers up to 15-20%. Anna Barnett from the Commission's environment directorate stressed that the focus should be on reducing pollution from the 96% of farm land currently used for conventional farming. She noted that 50% of France's drinking water, for example, needs to be cleaned of pesticides before it is fit to drink. (Source – EurActive.com April 2010)

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

National and International Events

One-Day Consultation Meeting on Organic Farming in India – A one day consultation meeting was organized by the ICAR at NASC, New Delhi on 23rd April, 2010 to understand the emerging scenario of organic farming in India and abroad and to determine strategies for its promotion. Dr. A.K. Singh, DDG (NRM) welcomed the delegates and highlighted the importance of organic farming in conservation of natural resources, lowering of production cost and minimization of risk in dry land farming. Dr. S. Ayyappan, Secretary, DARE and DG, ICAR in his inaugural remarks urged upon the participants for developing the road map to spearhead the organic movement in the country. He also emphasized upon specific agenda for research, extension and human resource development in the field. The presentations by lead speakers and general discussion in the sessions entailed organic farming as a system of crop production using on-farm and low cost biological approaches targeted at reduction in cost of cultivation, enhancement of soil health, conservation and utilization of natural resources and production of safe and healthy food free from chemical residues.

The recommendations emerging out of the day long deliberations were as follows:-

1. Low cost bio-intensive Organic Farming System should be promoted to ensure food, nutritional and economic security for small and marginal farmers in ecologically fragile areas (rainfed, hilly/mountainous and tribal regions).
2. While organic farming could be practiced for any crops/cropping systems, preference may be given to crops like basmati rice, sugarcane, oilseeds, pulses, cotton, spices, tea, coffee, cashew, fruits and vegetables.
3. Certification may not be required for the organic produce if it is accepted by the consumers as such under the brand name. It may be warranted for the domestic and international markets demanding so and offering a premium price for the organic produce. While APEDA is facilitating the export of organic produce to the international markets under its regulatory mechanism, the National Centre on Organic Farming as an Apex Body under Department of Agriculture and Cooperation, GOI should develop its own easily affordable Internal Control System for certification involving State Govt. Agencies, ICAR, SAUs, KVKs, NGOs and Agri-clinics etc.
4. The organic standards on the system of growing organic crops, permissible organic inputs, storage and processing etc. need to be formulated and notified for the domestic markets.
5. The organic laboratories for testing of soil, water, organic inputs and organic produce should be set up to ensure the quality of the produce.
6. NARS comprising ICAR & State Agricultural universities should evolve scientifically validated organic farming practices after harmonizing the existing knowledge pool (ITKs) with farmers.
7. Providing a scientific basis for improvement in quality of organic produce in terms of taste, color, complexion, fragrance and keeping quality etc.
8. Best experiences on organic farming from farmers and organizations need to be identified and documented and used as input for research and extension.
9. Organically responsive seed and planting material should be evolved.
10. India having competitive advantage in availability of diverse climates and crops and low production costs, should emerge as bigger beneficiary of global organic boom.
11. Best experiences on organic farming from farmers and organizations need to be identified and documented and used as input for research and extension.
12. Inclusion of organic farming in curriculum at graduate level, launching degree programmes and diploma and certification courses in organic farming.

Organic Fair and Food Festival at Shimla, Himachal Pradesh, 10-12 June, 2010 - Department of Agriculture, Government of Himachal Pradesh in collaboration with HPTDC, Agriculture Finance Corporation Ltd. and International Competence Centre of Organic Agriculture, Bangalore organised a 3-day organic fair and food festival during 10-12, June 2010. Domestic organic stakeholders, pioneering organic companies, State and Central Government pavilions as well as organic producers [Self help groups, Farmers organisation, NGOs, Cooperatives and others] were invited to showcase their products.

"Organic Fair and Food Festival'' provided excellent opportunity to farmers to visit and see new interventions / innovations in various fields of organic agriculture and to interact with farmers' groups, scientists, industrialists and entrepreneurs. The highlights of the fair were Exhibition, Workshops, Screening of the movies, Food court and Food restaurant. This was for the first time that such a festival for promotion of organic farming was organised in the State.

Prof. Prem kumar Dhumal, Hon'ble Chief minister, Himachal Pradesh inaugurated the event and said that now it is high time to bring together all stakeholders to give more focus on organic farming. He said Organic farming is an age old practice which our ancestors were doing. Our traditional agro system suffered a great setback, especially due to the indiscriminate use of inorganic fertilizers and pesticides. Now, there is an urgent need to take holistic view of problems and concerns posed, to curb its negative impact. Organic agriculture is the only solution for sustainable agriculture and an answer to our problem of chemical contamination of food, polluted water resources, degraded land and wide range of effects owing to unsustainable agriculture practiced in the recent past. Emphasis be given to use naturally available organic manures, biological pest management. He also informed that organic farming is very much on the priority of the Govt. of Himachal Pradesh. He announced that organic food will also be served in hotels of HPTDC. Secretary Agriculture to the Govt of HP Sh. Ram Subhag Singh and Dr. J.C. Rana, Director Agriculture, HP also spoke on the occasion and underlined the importance of organic farming approach and presented an overview of the present scenario in the State, Dr. A K Yadav, Director National Centre of Organic Farming and Dr. Tej Partap, Vice Chancellor, CSK HPKV, Palampur gave key note address. The book entitled "Javik Krishi Prabandhan" was also released by Agriculture University Palampur at this occasion. About 10,000 farmers, officers, tourists and many other eminent personalities visited the fair.

On the second day of the festival, interactive workshop for farmers on Organic Production Technologies was organised in which experts namely Dr. A.K. Yadav, Director National Centre of Organic farming, Dr. Tej Partap, Vice Chancellor, CSK HPKV, Palampur and Additional Director of Agriculture, HP interacted with about 300 farmers. They not only spoke on organic agriculture, but also replied to farmers questions on various aspects of organic farming.

On third day of the festival, interactive workshop for farmers on Organic Certification took place in which experts interacted with about 500 farmers. The workshop provided a forum to share ideas and experiences in this field where leading experts presented their views and discussed concept of organic agriculture. The valedictory session was chaired by Sh. Ram Subhag Singh, Secretary, Govt. of Himachal Pradesh. Other dignitaries present on the occasion were: Dr. A. K. Yadav, Director National Centre of Organic Farming, Dr. J.C. Rana Director of Agriculture, HP, and Manoj Kumar Menon, Executive Director, ICCOA. Appreciating the festival, the participants said that they were exposed to such a festival for the first time and the exposure in this fair shall be quite helpful in expanding organic agriculture in a big way. The farmers groups also sold their organic products during the fair. At present, 19000 farmers have been registered under organic

agriculture and are at various stages of certification and 10,605 hectare area has been covered. 20 hatcheries and 28 commercial organic manure production units have been set up. 3.40 lac vermicompost units have been set up. Government is providing assistance for certification. The State Govt. appreciated the guidance and financial assistance being providing by NCOF for promotion of Organic Agriculture. (A Report by Dr. J.C. Rana, Director, Agriculture, Govt of HP)

European Organic Congress in Madrid - The future of agricultural policies regarding their potential to contribute to tackle on urgent challenges such as climate change, loss of biodiversity and the economic crisis amongst EU decision makers and the organic sector will be in the focus of the 3rd European Organic Congress in Madrid on June 7, 2010. Rares-Lucian Niculescu, Vice-Chair of the Committee for Agriculture and Rural Development in the European Parliament, will provide an outlook on the role of the European Parliament in the CAP post-2013 process. Juana Labrador Moreno, President SEAE, and Christopher Stopes, President IFOAM EU Group, will present the organic approach to face future challenges. The practitioner's perspective will be presented by Ronald van Marlen, Director of Ariza. Moreover, the chance to exchange views between leading organic associations and operators will be given in the round table "EU meets Spanish organic sector". The scientific point of view will be represented by Prof. Nic Lampkin, Director Organic Research Centre Elm Farm, Andreas Gattinger, FibL and Manuel Luis González de Molina, University PO Seville. Arnd Spahn, EFFAT, will bring in the aspect of worker's rights and Andras Krolopp, IUCN, will present the demands of organisations cooperating for biodiversity in the Countdown 2010 campaign. (Source: IFOAM EU Group)

3rd International conference on the Organic Sector development in Central/Eastern European and Central Asian countries scheduled during September 17-18, 2010 at Astana, Kazakhstan - The 3rd International conference will focus on organic farming and the benefits it provides to the region of Central/Eastern European and Central Asian countries, and its interactions with rural development, nature conservation, ecotourism and biodiversity. The conference 2010 moves into a field in which organic is emerging as a solution. It will present practical and scientific knowledge and discuss interrelations between agro-ecosystems, biodiversity, food security and rural development in order to pave the ground for developing the organic sector further and to inspire decision makers, farmers and specialists with innovative ideas and solutions for sustainable agriculture. Conference objectives include (a) Presenting practical and scientific knowledge (b) Exchange of experiences among stakeholders (c) Broadening participants' understanding of interrelations of organic agriculture and nature conservation, biodiversity, rural development and eco-tourism and (d) Promoting the importance of intact agro-ecosystems. Outcomes are expected to be (a) Furthering organic production and development of the organic sector (b) Contribution to sustainable development in the region (c) Enhancing livelihoods of farmers and rural communities and (d) Spreading knowledge about organic agricultural practices. Programme topics include: (a) How can organic agriculture and nature conservation goals complement each other? (b) How can biodiversity be used sustainably within organic systems? (c) What does organic farming contribute to rural development? and (d) What means ecotourism and how does organic agriculture support it? The conference will be held in English and Russian language with simultaneous translation. National and international speakers, public and private, are invited to present their perspectives and experiences during the two days conference with plenary and parallel sessions. For further details contact Susanne Krause Phone: +49 89 820759 05 Email: s.krause@organic-services.com.

BioFach China 2010 - International representatives from the organic sector meet again at BioFach China in the International Exhibition Centre INTEX

Shanghai from 27–29 May 2010. NürnbergMesse China has already successfully established the international trade fair for organic food and natural products in Shanghai, which now takes place for the fourth time. BioFach China 2009 attracted an encouraging 238 exhibitors and some 10,400 trade visitors. This year's event also promises a variety of inspiring organic products, conference events and opportunities for networking. For further information visit www.ifoam.org or contact Miriam Hempel Nürnberg Global Fairs Messezentrum 90471 Nürnberg Germany Tel +49 (0) 9 11. 86 06-86 92 biofach@ngfmail.com

First International Conference on Organic Food Quality and Health Research - First International Conference on Organic Food Quality and Health Research is scheduled for 18 -20 May, 2011 at Prague Czech Republic. The Conference will focus 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) Impact of processing on organic quality and safety, (c) Standardization of novel methods, (d) Organic food authenticity, (e) Impact of organic food on animals, (f) Impact of organic food on humans and (g) Health concepts. For further details visit www.fqh2011.org.

4th European Organic Congress (Regulations), June 21-22, 2010 Rome, Italy - The 4th European Organic Congress invites the European organic sector to Rome to evaluate and discuss the European legislative framework for organic farming. The congress sets out to evaluate the first year of the new organic Regulation, assessing the current situation, and providing a platform for an outlook on further elements to be added to the regulation. With the new EU Regulations for organic food and farming now in place for more than a year and a half, the IFOAM EU Group invites the organic sector to the Italian capital to evaluate the performance of the regulatory framework – what are the bottlenecks and challenges, which areas need work now and which will need attention in the future. The Congress is arranged by the IFOAM EU Group in conjunction with IAMB (The Mediterranean Agronomic Institute of Bari) in the frame of the "InterBio" project which is financed by the Italian Ministry of Agricultural, Food and Forestry Policies. The venue is set in the heart of Rome, direct opposite the Rome opera house and within walking distance from the Spanish Steps, Fontana Trevi and the Vatican. (For further details log on www.ifoam.org)

Nature Health Fair 2010 Ljubljana, Slovenia - This year's 41st Nature-Health Fair will take place from 7 till 10 October 2010 with the slogan: Well coming tomorrow! The Nature-Health Fair is based on long-term trends of rising environmental awareness and the importance of a healthy lifestyle. The whole project, consisting of an exhibition and a professional part, aims at showing the nature's diversity and integrity that now a days affects the everyday of our whole society - of individuals and companies alike. The event is composed of several thematic sets that show visitors several ways of healthy life and harmony with the nature, as well as enabling exhibitors to prepare a target presentation for their most potential customers: (a) Nutrition (b) Wellness and exercise (c) Eco-Home (d) Environment. The event has an added value in the form of a professional part that is related to the above-mentioned sets and features a presentation on practical experiences of acknowledged professionals.

17th Organic World Congress and IFOAM General Assembly - The 17th Organic World Congress will be held in Namyangju City, Gyeonggi Province, South Korea from September 28th to October 1st, 2011. The IFOAM General Assembly will also be held on the sidelines of this congress during October 3rd to October 5th, 2011.