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

पिछले पॉच वर्षों में जैविक खेती प्रक्रिया का अभूतपूर्व विकास हुआ है। एक अनजान विधा से शुरू होकर जैविक खेती धीरे–धीरे एक टिकाऊ वैकल्पिक खेती के रूप में स्थापित हो रही है। जैविक खेती किसानों के आंदोलन, गैर सरकारी संस्थाओं के प्रयास, विभिन्न राज्य एवं केन्द्र सरकार की योजनाओं तथा बाजार के दबाव का ही परिणाम है कि जैविक खेती आज भारतीय कृषि परिदृश्य का प्रमुख अंग है। वर्ष 2004 के बाद से जैविक प्रमाणीकरण अंतर्गत क्षेत्र का 20 गुना से अधिक विस्तार हुआ है। मार्च 2009 तक इसके 10 लाख हैक्टे. की सीमा पार कर जाने की संभावना है। जैविक कपास उत्पादन में 292% वृद्धि के साथ भारत अब विश्व में जैविक कपास का सबसे बड़ा उत्पादक देश है। वर्ष 2007–08 में लगभग 73,702 टन जैविक कपास का उत्पादन हुआ जो कि पूरे विश्व के जैविक कपास उत्पादन का 50% है।

राष्ट्रीय जैविक उत्पादन कार्यक्रम को एगमार्क कानून के तहत् कार्बनिक कृषि उत्पाद श्रेणीकरण और चिन्हांकन नियम, 2009 के रूप में अधिसूचित हो जाने से आयात तथा स्थानीय बाजार हेतु नियमन व प्रमाणीकरण प्रक्रिया सुलभ हो गई है। जैविक खेती सूचना पत्र के इस अंक में ऐसी सभी जानकारियों का समावेश है। जैविक खेती में प्रमुख अनुसंधान विषय तथा जैविक कपास खेती द्वारा छोटे जोत किसानों के जीवन स्तर में सुधार पर किये गये परीक्षणों का विवरण इस अंक की विशेषता है। कर्नाटक जैविक खेती मिशन की धूमधाम से शुरूआत ने पूरे विश्व का ध्यान खींचा है। आशा है पाठक इस अंक में प्रस्तुत विचार, अध्ययन तथा जानकारियॉ विचारोत्तेजक तथा उपयोगी पायेंगे।

Dear Readers

From the states of an unknown opportunity in the beginning of Xth plan to being talked about a viable alternative form of agriculture, organic agriculture has made credible performance in India during past 5 years. It is a combined effect of farmer's effort, NGOs work, Government intervention and market forces push to organic that Indian organic agriculture has reached a stage where it can swiftly move to occupy desired space in Indian agriculture.

The area under organic certification process has grown almost 20 fold since 2004 and is expected to cross 1 million ha mark by the end of March 2009. With 292% growth in organic cotton production, India emerged as the largest organic cotton grower in the world producing 73,702 MT or about half of world's organic cotton.

Notification of National Programme of Organic Production (NPOP) under Agriculture Produce (Grading and Marking) Act as "Agmark Organic Produce Grading and Marking Rules, 2009 has ensured the implementation of much needed regulatory framework for imports and domestic trade. The current issue of Organic Farming Newsletter highlights all such developments. Identifying priority areas of research and impact assessment of organic cotton farming on the livelihoods of small holders are special highlights. Launching of Karnataka Organic Farming Mission with much fanfare at Bangalore has attracted lot of attention world over. I hope readers will find the current issue thought provoking and highly informative.

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संपादक / Editor

Organic Package of Practices for Mustard and Soybean from Uttarakhand

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Under Technical Cooperation Project on Development of Technical Capacity Base for the Promotion of Organic Agriculture in India of the National Centre of Organic Farming (NCOF), Ministry of Agriculture, Government of India and Food and Agricultural Organization (FAO) of the United Nations.

Background

Under a Technical Cooperation Project (TCP) of DAC-NCOF and FAO on Development of Technical Capacity Base for the Promotion of Organic Agriculture in India an attempt was made to compile most authentic organic packages for 20 important crops. These packages are being published in a series in Organic Farming Newsletter since June 2007. So far organic packages defined for some important crops of Maharashtra, West Bengal, Tamil Nadu and Uttarakhand have already been published. Organic package for Mustard and soybean specific for Uttarakhand is presented here.

राष्ट्रीय जैविक खेती केन्द्र तथा विश्व खाद्य संगठन के सहयोग से कुछ प्रमुख फसलों की जैविक उत्पादन प्रणाली तैयार की गई है। ये जैविक प्रणालियॉ जैविक खेती सूचना पत्र के पिछले 7 अंकों से क्रमबद्व रूप से प्रकाशित की जा रही हैं। इस अंक में उत्तराखण्ड राज्य से सरसों एवं सोयाबीन की फसल हेतु जैविक उत्पादन प्रणाली प्रस्तुत की जा रही है।

MUSTARD

Background

The rapeseed-mustard (*Brassica* spp) group of crops is the second most important oilseed after groundnut. The species belongs to the family Cruciferae and contributes nearly 25–30 percent of the total oilseed production in the country. The genus *Brassica* comprises 37 species, mainly annual or biennial herbs, and many of them are similar in appearance. Apart from their use as an oilseed, the plants are used as vegetable and also as fodder. Mustard seeds are also used as medicine for ailments like anemia, leprosy and throat and stomach-related diseases. In India, major mustard producing states are Rajasthan, Uttar Pradesh, Haryana, Madhya Pradesh and Gujarat.

सरसों–सरसों तिलहन की फसलों में काफी महत्वपूर्ण है तथा मूंगफली के पश्चात् दूसरी आर्थिक महत्व की तिलहन है। भारत में खाद्य तेल के उत्पादन का 25–30 प्रतिशत भाग सरसों से पूर्ण होता है। शाकीय पौधे वाली सरसों की लगभग 37 प्रजातियॉ पायी जाती हैं जो कि एक वर्षीय एवं द्वि–वर्षीय फसल के रूप में उगायी जाती है। सरसों के बीजों का उपयोग औषधि के रूप में भी किया जाता है। भारत में सरसों का उत्पादन प्रमुख रूप से राजस्थान, उत्तर प्रदेश, हरियाणा, मध्य प्रदेश एवं गुजरात में होता है। भारतवर्ष में सरसों का उत्पादन रबी की फसल के रूप में होता है जिसमें सितम्बर से अक्टूबर एवं फरवरी–मार्च के महीने उपयुक्त होते हैं। सामान्यतया 25–40 से.मी. तक वर्षा वाले प्रदेशों में इसका उत्पादन सुगम रूप से होता है।

Origin and distribution

Southern Europe is generally considered to be the place of origin of yellow mustard. White mustard is abundantly cultivated in countries such as Australia, China, Japan, Italy and England. Black mustard came to India from China. According to 1998-99 statistics, mustard was cultivated in India on 6.65 million hectares. Rajasthan accounts for the largest share (46.5 percent). Other major contributors to mustard production are Uttar Pradesh (fifteen percent) and Madhya Pradesh (nine percent). Smaller quantities of rapeseed and mustard are grown in the extreme north and northeastern states of the country.

Climate

Rapeseed and mustard are grown in tropical as well as temperate zones and require relatively cool temperatures for satisfactory growth. In India, they are grown as rabi crops, from September–October to February– March. These crops grow well in areas having 25–40 cm of rainfall. Though a warm climate is considered to be ideal for mustard cultivation, it is grown even at heights of 2,500 metres above sea level.

Cropping systems

Mustard is usually cultivated in the rabi season as a sole crop in rain-fed areas and in the fallows of the kharif season. It is also intercropped with chickpea or wheat. Mustard remains an important crop in different crop sequences in rain-fed and irrigated areas. In the lower mountain valleys, mustard is cultivated both as a single and mixed crop. In mixed cropping, it is generally sown with wheat as the main crop. At higher altitudes, where it is a kharif crop, it follows the same pattern of single and mixed cropping. In higher areas it is generally sown with potato. In July, when the potato leaves start falling, the spaces between the rows of potato crop are lightly tilled with a hand harrow. Mustard seeds are then sown and covered with soil with the help of a broom fashioned out of a bunch of shrubs. In the rabi season, mustard is cultivated in the fields of the kharif crops of mandua (ragi), gahat (kulath), kaala bhat (black soya) or mixed soybean crop. It is mostly grown after the leguminous crops and thus gets a good quantity of nitrogen for fast germination and growth. After the harvesting of mustard is complete, paddy is cultivated as the next crop in the kharif season. In case of kharif crops, mustard farming is followed by the rabi crops of potato, chaulai (amaranth), soybean, mandua (ragi), chili etc. After harvesting the mustard, the same fields are used for the cultivation of wheat.

Growing seasons

In Uttarakhand, mustard is cultivated during both the rabi and kharif (winter and monsoon seasons respectively). In the valleys, at altitudes below 6,500 feet, it is cultivated as a rabi crop whereas in places at higher altitudes, it is a kharif crop. Depending upon the location of the place vis-a-vis the sea level, the timings of sowing and harvesting of mustard vary.

Soil

Mustard can be grown in all kinds of soil but black soil is most suited. Required wetness of the soil for germination must be ensured before sowing the seed. Wetness is ascertained by feeling the soil with one's fingers.

Duration

In the mountain valleys (below 6,500 feet) sowing of the crop begins by the last week of October and is over by the second week of November. The crop takes approximately four months to grow and ripen. Harvesting begins in February. In the upper regions, due to possibility of snowfall in winter, mustard is cultivated in the kharif season only. In these areas, sowing begins in the second week of July and the crop is harvested after the second week of October.

Varieties

Traditional varieties

The local varieties of mustard traditionally grown are:

Yellow mustard (peeli sarson) – rada, toda

Black mustard (kaali sarson) – sarson, dain, jadi .

Black mustard is cultivated in larger areas as compared to yellow mustard. The yield of yellow mustard is relatively low but the extracted oil per unit weight is relatively high. To extract one kilogram of oil, 2.5 kg yellow mustard is required, whereas for the same quantity of oil, 3 kg seeds of black mustard would be needed.

मृदा एवं प्रजातियॉं

सामान्य सरसों का उत्पादन सभी प्रकार की मृदा में होता है किंतु इसके उत्पादन के लिए काली मिट्टी सर्वाधिक उपयुक्त होती है। इसके बीज के अंकुरण के लिए बीजाई के समय जमीन में उपयुक्त मात्रा में नमी होनी चाहिए। पहाड़ी क्षेत्रों में इसकी बीजाई अक्टूबर के अंतिम सप्ताह से शुरू होती है तथा नवम्बर के दूसरे सप्ताह तक चलती है।

फसल परिपक्वन लगभग चार महीनों में होता है तथा कटाई फरवरी के माह में होती है। जिन क्षेत्रों में बर्फबारी होती है उनमें सरसों की फसल खरीफ की ऋतु में ली जाती है। इन क्षेत्रों में जुलाई के दूसरे सप्ताह में बीजाई तथा अक्टूबर के दूसरे सप्ताह में कटाई की जाती है।

सरसों की पारंपरिक प्रजातियों में काली एवं पीली सरसों जबकि नई प्रजातियों में लक्ष्मी, नरेन्द्र राय, पूसा जय किसान, अग्नि, जगन्नाथ, पूसा बहार, पूसा बारानी एवं अन्य प्रजातियॉं प्रमुख हैं।

New varieties

A large number of high yielding varieties have now replaced the traditional varieties and with them an increase in productivity of at least 15–20 percent has been noted. The main improvements seen in the new varieties of mustard are:

- Higher seed and oil content, low erucic acid and glucosinolates.
- Resistance to biotic and abiotic stresses.
- More varieties for different cropping systems and non-traditional areas.

The following varieties of mustard are recommended for different regions and climates:

Mustard: GM1, GM2, Laxmi, Narendra Rai, Pusa Jaikisan, Agni, Jagannath, Pusa Bahar, Pusa Barani, Samjukta, Sarma, TM2, TM 4
Brown Sarson: KBS 3, KOS 1
Yellow Sarson: Pusa Gold, NDYS 921, Rajendra Sarson 1, Subinoy, YS93
Toria: Jawahar Toria 1, Panchali, RAUT 917, RH 68, TLC 1, TS 29.
Taramira: RTM 314, TMC 1
Gobhi Sarson: GLS 2 PGSH 51, Sheetal

Seed Selection

Seed selection follows the traditional pattern of using indigenous seeds. During the standing crop period, some plants are identified for seed in the field itself. The seed plants are selected from fields with higher yield. Once the plants are identified, the selected crop is separately cut, carried in bundles and arranged in the form of heaps that makes threshing easier. Threshing is done after 10–12 days by feet or by bullocks. Winnowing with the help of a winnowing fan (supa) follows threshing. After winnowing and cleaning, the seed is dried in the sun for 4–6 days in the valleys or 6–8 days in the high mountains. Care is taken during drying to ensure that some moisture (8–10 percent) is left in the seed. This is confirmed by crushing the seed with the teeth. If it produces a mild sound, it is considered fit for storage. Traditionally, seed is stored in small vessels like the tumdi and the kulna. As per popular belief, Tuesdays, Thursdays and Saturdays are auspicious days for storing seed and Mondays, Wednesdays and Fridays for removing it. While selecting seed, the cultivator usually chooses seed produced at a relatively higher altitude as seed from higher altitudes germinates faster at lower altitudes. Early germination has twin advantages as the crop can compete effectively with the weeds and the early ripening of the crop protects it from birds and pests

Seed rate

Seed is sown @ 4–5 kg/acre in the case of single cropping and 2–3 kg/acre in mixed cropping. In general, seed rate between 4–5 kg/ha is considered optimum. Ideal spacing is 45 cm row-to-row and 15 cm plant to plant. Closer spacing of 30 x 15 mm is also adopted in some areas.

Recommendations

Seed treatment with Trichoderma can help in controlling root rot and Fusarium wilt diseases that affect the mustard crop. Before sowing, seed of mustard can also be treated overnight with jeevamrut. This increases the pest and disease resistance capacity of the crop.

बीज चयन, बीज दर एवं बीजाई

पारंपरिक प्रजातियों के बीज का चयन करें। बीज चयन हेतु ऐसे खेत का चुनाव करें जिसमें उपज ज्यादा मात्रा में हो। ऐसे खेत से पौधों को निकाल कर बीज संग्रहीत करें। पूर्व मान्यता के अनुसार बीज भंडारण के लिए मंगलवार, गुरूवार एवं शनिवार जबकि बीज निकासी के लिये सोमवार, बुधवार एवं शुक्रवार को शुभ मानने की धारणा है।

बीजाई हेतु 4–5 कि.ग्रा./एकड़ की दर से एकल फसल एवं 2–3 कि.ग्रा./एकड़ की दर से मिश्रित फसल हेतु बीज प्रयोग करें। बीजाई से पूर्व बीजों को ट्राइकोडर्मा से उपचारित करें।

Cultivation

Mustard has small seed size and therefore, for good germination and stand, a fine tilth is required. In rain-fed areas, harrowing has to be done after every effective shower of rain. For the rabi crop, the first tilling of the field, after the harvesting of the kharif crop (generally mixed), is done with the traditional indigenous plough. The levelling of the field and crushing of the hard soil pieces with a hammer-like instrument follows the first tilling. Then the field is cleared of stones, wood, and leftovers of the preceding crop with the help of a hand harrow (kudal). The pata is applied to level the field, which is then left for 7–10 days and then tilled again. In the period between the two tillings, dung manure is applied to the field. Sowing begins in early October (Navratri). In the case of mixed cropping with wheat, after the sowing of the wheat, the mustard seeds are spread over the field in adequate proportions. This is done to ensure that the mustard seeds do not go deep into the soil and have their growth impeded. The soil is then levelled with the kudal before applying the pata to it. For the kharif crop, in the high mountain regions, the field preparations begin from the first week of July when the soil is tilled. The field is then left as it is for 10–12 days during which time the weeds, exposed to sun, air and water, decompose. After that, the field is tilled a second time and the seed is sown. For the rabi crop in Uttarakhand, the manure of green leaves is also used in the first fortnight of December. To make green manure, green leaves from local trees such as banj (*Quercus incana*), buransh (*Rhododendron* sp.), pati (*Artemisia* spp), poplar (*Populas* spp) etc, are collected from the forest and stored near the house. These leaves are used as bedding for the bullocks, cows and other domesticated animals. Subsequently this is used as manure in the fields. Owing to some properties in these leaves, this manure is also useful to control pests. In fields on the mountain slopes tilling is done upwardly which creates little impediments along the slopes and protects the soil and manure from erosion, so that the fertility of the soil is retained.

Weeds

Weeds likely to be found in mustard fields are: bathua (*Chenopodium album*); genhusa (*Phalaris minor*); doob (*Cynodon dactylon*); tipatia (*Oxalis latifolia*); sanwa (*Echinochloa colonum*); malkoni (*Setaria glauca*), etc. Weeds likely to appear in the kharif season are kondo, doob, tipatia and motha (*Cyperus rotundus*). In general, weeding (nirai) is done 45–50 days after sowing. Generally weeding is done by hand but if the weeds are in excess, a danyala (a comb like wooden or iron instrument) is used for weeding. The harrowing of the kharif crop is done after 25–30 days, when the mustard plants have grown

4–5 inches. Weeding is done in September, just before the budding. Harrowing is done with a hand harrow (a small sharp edged semi curved tool).

Managing Soil Fertility

In general, a mustard crop depletes the soil to the extent of 33 kg N, 42 kg K, 17 kg S, 42 kg Ca and 9 kg Mg per tonne of produce. In organic production, efforts are made to meet these requirements through organic inputs. In the rice-mustard sequence, incorporation of *Sesbania* green manure is useful to reduce nitrogen requirement of the succeeding mustard crop to the extent of 30–40 kg/ha. Seed treatment with *Azospirillum* can enhance the yield of mustard to the extent of 10-15 percent. Use of FYM as a nutrient for the crop is common in all the regions of Uttarakhand. Farmers incorporate 10 tonnes/ha or 4–5 tonnes/ha of vermi/BD compost. In the Bhabhar region of Uttarakhand, prior to the cultivation of mustard, the field is kept fallow for some time. In some areas sun hemp or Sesbania are grown in the fields at the commencement of the rains, then the field is tilled after 40–50 days and the vegetation is ploughed back. This not only enhances the supply of nitrogen, phosphorus and other organic nutrients in the field but also increases the quantity of microorganisms in the soil, which improve the health of the soil and increase productivity.

Water Requirements

Mustard is cultivated in both arid and irrigated lands. It does not require much irrigation. The kharif crop does not need any irrigation whereas the rabi crop needs irrigation once, in the first fortnight of December. In the plains, two irrigations are recommended, the first at rosette stage (20–30 days) and the second at the siliqua formation stage (50–60 days). Furrow, flood and now, sprinkler irrigation is becoming very common.

Water conservation techniques

In hilly regions, formerly khals (earthen pond-like structures) were constructed for rain water storage. The water stored in these structures would gradually seep into the soil, enabling it to retain wetness for a long time. Thus, mustard farming in the mountainous region was not completely dependent on rain. But these structures are now rare.

Recommendations

In case of scarce irrigation resources, mulching of the field should be done to retain the moisture. Mulching is also helpful to control weeds.

मृदा उर्वरा एवं जल प्रबंधन

- फसल के साथ ढ़ेंचा लगायें।
- एजोस्प्रिलम जैव उर्वरक का प्रयोग करें।
- 10–15 टन/है. की दर से FYM या 4–5 टन/है. की दर से वर्मी या B.D. कम्पोस्ट का उपयोग करें।
- खरीफ की फसल में सिंचाई की आवश्यकता नहीं होती है जबकि रबी की फसल में दो बार सिंचाई करें।

Problem Insects and Diseases

Mustard aphid (*Lipaphis erysimi*)

The mustard aphid is called mahu in the local language. It damages the crop at vegetative/flowering and pod formation stages. It is 2–3 mm long, green in colour. It starts infesting the crop in December and by February the number of insects has multiplied manifold. This pest causes maximum harm to the crop in February–March. The mustard aphid takes away the nutrients of the plant from the latter's delicate parts, e.g., leaves and stems – and obstructs its growth.

Parts of the infested plant start drying, leading to the eventual death of the plant. The leaves become black and thus photosynthesis is obstructed. Eventually the leaves become yellow, mutilated and fall.

Management

- Early sowing is practised so that before the menace of the pest peaks, the crop is already ripe for harvesting.
- To control the pest in its initial stages, ash is sprinkled in the field @ 25–30 kg per nali .
- If the field is irrigated within 45 days of sowing, it also helps in controlling the pest.

Recommendations

- A mixture of garlic (250 gm), tobacco (400 gm), and shikakai (200 gm) is crushed, soaked in water and kept for a day. The following day, it is to be mixed in 100–200 litres of water and sprayed per acre of the crop.
- Two foliar sprays of BD 501 at the stage of flowering and fruiting can protect the crop from this pest. One gram of this preparation should be mixed with 13.5 litres of water at sunrise, when the lunar position is northwards and opposite to Saturn, and sprayed in the morning. This quantity is sufficient for one acre of land.
- Use of light traps from the flowering period onwards is also effective.

कीट एवं रोग नियंत्रण

माहू

- बीजाई निर्धारित समय पर करें।
- 25–30 कि.ग्रा./नाली की दर से राख छिड़कें।
- बीजाई से 45 दिन के अन्दर सिंचाई करने से कीट प्रकोप से बचा जा सकता है।
- 250 ग्रम लहसुन, 400 ग्राम तंबाकू, 200 ग्राम शिकाकाई को पीसकर पानी मिला लें, इसे एक दिन के लिये छोंड़ दें। अब इसमें 100–200 लीटर पानी मिलाकर एक एकड़ क्षेत्र में स्प्रे करें।
- B.D. 501 का छिड़काव करें।
- प्रकाश जाल का प्रयोग करें।

Painted bug (*Bagrada hilaris*)

This bug is known locally as jhanga keet . It is black in colour with yellow and red spots. Its shining pink larva is very small. It attacks the plant in the initial stages of its growth. The eggs of this pest are transformed into pupae in 3–7 days. This bug affects the leaves, flowers and other soft organs of the plant which dry up leaving the plant destroyed.

Management

- The infected plant is removed from the field.
- Ash @ 4–5 quintals/acre is sprinkled on the field.

Recommendations

- The crop should be threshed immediately after harvesting so that the effect of the pest on the ripe crop can be checked.
- Extract of tipati (*Roylea cinerea*) leaves may be sprayed on the standing crop.
- If jeevamrut is sprinkled at the initial stage, the plant develops better resistance to the pest.

झांगा कीट

- कटाई के तुरंत बाद बीज निकाल लें।
- तिपाती की पत्तियों के रस का छिड़काव फसल पर करें।

Mustard sawfly (*Athalia proxima*)

This insect is known as sarson ki illi or sarson ki makkhi in the local language. In its initial stage it is green and gray with no hair on it. On maturing, its colour becomes dark and five stripes appear on its back. The pest survives on the plant from germination till the crop is harvested. The pest causes maximum harm at the larva stage. It generally makes holes in the leaves, thereby weakening the plant's growth. The pest generally attacks the plant in the mornings and evenings. Most of the infested plants get destroyed.

Management

The bugs are removed from the leaves and killed.

Recommendations
- Spray ten percent NIBOLI (neem seed) solution on the crop to reduce the damage.
- Light traps control the population of these flies.
- Liquid pest control agents should be sprayed on the land.

सरसों की ईली
- पत्तियों से कीटों को हटाकर नष्ट कर दें।

सफेद चित्ती
- 100 ग्राम लहसुन, 30 ग्राम खादी साबुन को आधे लीटर पानी में मिला लें। इसमें 5 लीटर पानी मिलाकर फसल पर छिड़काव करें।
- वर्मीवाश एवं पानी को 1:13.5 के अनुपात में मिलाकर छिड़काव करें।
- 10 ग्राम/कि.ग्रा. बीज की दर से ट्राइकोडर्मा से उपचार करें।

Alternaria blight (*Alternaria brassicae*)
Round brown spots appear on the infested parts and gradually spread over the whole plant. The infested plants fade and fall.

Management
- Before sowing, the field is subjected to 2–3 deep tillings.
- The crop cycle is adhered to.
- Before sowing, the seeds are treated with cow urine.

Recommendations
- Ten gm of *Trichoderma* culture mixed with one litre of water may be sprayed on the crop.
- Treating the seed overnight with jeevamrut helps it to develop resistance to diseases.

White rust (*Albugo candida*)
This disease is caused by a fungus and infests all parts of the plant except the roots. White or light yellow spots of various shapes appear on the leaves, stems and flowers of the infested plants.

Management
Before sowing, the field is subjected to 2–3 deep tillings.
The crop cycle is strictly adhered.
Treatment of the seed with cow urine before sowing increases its disease resistance.

Recommendations
- A solution of 100 gm of garlic and 30 gm of khadi soap in 0.5 litres of water is mixed in five litres of water and sprayed on the crop. This quantity will suffice for one acre.
- Vermiwash mixed with water in the ratio 1: 13.5 protects the crop from fungal infestations.
- Treatment of seed using 10 gm Trichoderma per kg of seed is highly recommended.

Miscellaneous Pests
Rats, small animals and birds can also cause harm to the crop.

Crop protection
To protect the crop from birds, scarecrows are erected in the fields.

Beneficial Creatures
Honeybee, myna, snakes, butterflies, bhaunras (black bees), are useful for the mustard crop. Snakes eat the rats, birds eat the worms and honeybees, butterflies and bhaunras (black bees) help in pollination, resulting in net increase in the yield.

SOYBEAN

Background
The soybean (*Glycine max* L) is a member of the family Leguminosae, sub family, Papilionoideae. It is a major source of protein. It has twin uses – as an edible oilseed and also as a pulse. The protein in soybean is at least three times higher than any other food grain. Besides oil and protein, soybean also contains appreciable amounts of vitamins and mineral salt.

सोयाबीन

सोयाबीन की उत्पत्ति 100 वर्ष ईसा पूर्व चीन के पूर्वी भाग में हुई थी। वर्तमान में अमेरिका सोयाबीन का प्रमुख उत्पादक देश है। सोयाबीन का पौधा कम उम्र का पौधा है तथा गर्म एवं नमी वाले स्थानों में उगता है। बीज अंकुरण के लिये उपयुक्त तापमान 30^0 से. होता है। सोयाबीन की फसल खरीफ की फसल है। इसकी बीजाई मई के दूसरे सप्ताह में शुरू होकर जून के प्रथम सप्ताह तक चलती है।

Origin and distribution

Soybean farming originated around 100 BC in the eastern parts of north China. Presently, the USA is the largest soybean producer in the world. Soybean cultivation enjoys a prominent position in the world's total oilseed production. In 1965, soybean's share in world oilseed production was 32 percent. It rose to 50 percent in 1980 and continues to be on the fast upward move. Soybean cultivation came to India from China through Himalayan routes and also through Myanmar.

Cultivation area and yield

In India, in 1990, soybean was cultivated on 2.2 million hectares of land, with a net output of over 2.4 million metric tonnes. This has now increased to 7.46 million ha with production of 7.51 million metric tonnes.

Climate

Soybean is a short duration plant and different cultivars differ in the length of time required for crop growth. A hot and humid climate is most appropriate for soybean cultivation. The optimum temperature for rapid germination of soybean is 30^0C, (minimum is 5^0C and maximum is 40^0C). Temperature of 18^0C or less does not permit pod setting. Seed size is largest when plants are grown at 27^0C and the number of pods per plant is highest at 30^0C. With good irrigation facilities, soybean can be cultivated even in areas with little rainfall.

Growing season

Soybean is a kharif crop. In the hilly regions, sowing begins in the second week of May and is completed by the first week of June. In bhabhar, tarai and in the plains, the crop is sown between the last week of June and the first week of July.

Excess of rainfall immediately after sowing hampers the germination of the seed. Therefore, sowing in the third week of June is advised. If soybean is sown in the first week of June, the crop duration gets longer, but sowing after the middle of July affects the growth, quality and productivity of the crop.

Soil

Sandy loam soil (domat), having adequate drainage, is considered most suitable for soybean cultivation while alkaline soil is considered unsuitable. Soil with a pH range of 6 to 7.5 is favorable for cultivation.

Duration

In the hills, soybean takes 5–6 months to mature, while in the tarai, bhabhar and plains, the crop duration is 4–5 months.

Varieties

Taking into consideration climatic and soil conditions, the different regions of India are grouped into five soybean zones, and varieties of soybean are accordingly recommended for cultivation. The main soybean varieties are: Bragg, Lee, PK- 262, PK-308, PK-327, Pusa 16, Pusa 20, Pusa 24, Shilajeet, Shivalik, Alankar, Anku, Durga, Gaurav, Gujarat Soybean, CO-1, Davis, Hardee etc. Besides these, there are a number of local varieties that are traditionally used in some areas.

Traditional varieties and their significance

- Kali (black) soybean: Chances of pest infection are least in this black, round/elliptical variety.
- Peeli (yellow) soybean: This light yellow coloured soybean is commercially more useful.

- Hari (green) soybean: Its seeds are smaller in size. It is cultivated on a small scale at very few places.

New varieties

- Stem fly resistant varieties – UPSL2773, UPSL586, UPSL80, PLSO77B, PLSD66, IC18736, etc.
- Caterpillar resistant varieties – JS-72-44 (Gaurav)
- Maggot sensitive varieties – Clark-63, Adelphia, Harosoy 63.
- Varieties sensitive to leaf minor – PK-672, PK74-262, VL7, MACS100.

मृदा एवं प्रजातियां

दोमट मिट्टी सोयाबीन की फसल के लिए अच्छी होती है, इसकी फसल के लिये जमीन का पीएच मान 6–7.5 उपयुक्त होता है। पहाड़ी क्षेत्रों में फसल परिपक्वन 5–6 महीनो जबकि तराई, भाभर एवं समतल क्षेत्रों में इसका परिपक्वन 4–5 महीनों में होता है।

सोयाबीन की पारंपरिक प्रजातियों में काली, पीली एवं हरी सोयाबीन प्रमुख हैं जबकि नई प्रजातियों में तना मक्खी, शुंडी आदि की प्रतिरोधी प्रजातियॉ उपलब्ध हैं।

Seed Selection

For selecting seed, healthy plants are first located from the standing crop in the field itself. The selected plants are separately harvested. If the entire crop is healthy and disease free, there is no need for separate harvesting. Seed from plants grown at high altitudes is preferred as it germinates quicker at lower altitudes. This also helps in controlling diseases that can affect the crop as the plants attain early maturity.

Treatment

Generally, there is no need for any pre-sowing treatment as the oil content in the seed reduces the danger of pests. Nevertheless, to be on the safe side, the seed is sun-dried from time-to-time during the storage period. The seed is also treated using cow urine, cow pat pit, beejamrut, jeevamrut, panchagavya , etc. For controlling seed-borne diseases including root rot and wilt, the seed of soybean should be treated with *Trichoderma* @ 10 g for one kg of soybean seed. Being legume crop, *Rhizobium* treatment is a must and helps in increased productivity.

Seed rate

Generally, seed rate of 75–80 kg/ha is recommended for the kharif crop and 100 kg/ ha for the rabi crop. Seed is broadcast in the field. Under conditions of optimum moisture, in heavy soils, the crop is sown at 2–3 cm depth, whereas in medium to light textured soils, it is sown at 3–4 cm depth.

बीज चयन, बीज दर एवं बीज उपचार

बीज चयन हेतु रोग मुक्त फसल के पौधे को निकालकर बीज निकालें। बीजाई हेतु 70–80 कि.ग्रा./है. की दर से खरीफ एवं 100 कि. ग्रा/है. की रबी की फसल हेतु बीजाई करें। बीजाई से पूर्व बीजों को 10 ग्राम ट्राइकोडर्मा/एक कि.ग्रा. बीज की दर से उपचार करें। राइजोबियम जैव उर्वरक का प्रयोग भी करें।

Cultivation

Field preparation and tillage practices adopted for soybean cultivation depend upon the type of soil and the region where it is grown. For the seed to establish well there should be sufficient moisture in the soil. If there is less moisture, then pre-sowing irrigation is required. Being a leguminous crop, soya requires a fine seedbed with the least amount of clods. One deep ploughing or disking followed by two harrowings or two ploughings with a desi plough is sufficient. In Uttarakhand, soybean is generally cultivated as a mixed kharif crop along with ragi, maize or amaranth, to reduce the possibilities of pest infection and to maximize productivity. During the first tilling, the remains of the wheat crop are exposed to the sun so that they decompose into manure for the soybean crop. In many areas, the remains of the harvested wheat crop are burnt in the field as a pest control measure. In some areas, after

harvesting the soybean, the field is kept fallow and is used as a grazing ground. This retains the fertility of the land as during grazing the animals deposit dung and urine in the field.

Recommendations

Burning of crop residue and other undesirable vegetation in the field itself is not an eco friendly practice. It affects the soil health by destroying beneficial microbes as well. So instead of burning this material in the field, the farmer should be encouraged to follow any of the following
practices:

- Plough the field to uproot weeds and the residue of the previous crop and compost the material
- Mulch the field with the vegetation.
- Remove the unwanted vegetation from the field and burn it outside the field area.

Weeds

Weeds in soybean fields reduce the quantity of the produce as they compete with the crop for water, nutrients and light. The major weeds found in soybean crops are doob (*Cynodon dactylon*), tipatia (*Oxalis latifolia*), kondo (*Elusine*), malkauni (Setaria glauca), bandara-bandari (*Setaria glauca*) and crab grass (*Digitaria sanguinalis*). A danyala (wooden comb-hoe) is applied to the field 25–30 days after sowing, either by hand or with the help of bullocks. This helps in controlling the weeds at the initial stage itself. It also helps in regulating the growth density of the soybean and the other mixed crops being cultivated along with it and in maintaining the stipulated distance between the plants to ensure their proper growth. The danyala is a two feet long wooden strip with six holes, fitted with 8–10 inch long, pointed, sharp studs at a distance of 8 cm from each other and an 8–9 feet long wooden axle in the centre with which it can be pulled, either by hand or by using a bullock. To maintain uniformity of the distance between plants and to eradicate weeds which have once again emerged, the field is harrowed with a kutla 10–15 days after the danyala is used. In a single cropping of soybean, the harrow is not needed, as undesired plants can be manually weeded out 25–30 days after sowing. To keep the crop weed-free, the following preventive measures are to be adopted at the time of sowing:

- Acquire weed-free seed from certified agencies;
- Clean uncertified or home produced seeds before sowing;
- Pick up all rhizomes, bulbs, tubers and stubbles of weed and burn them after they are collected;
- Clean all agricultural implements and tools before and after their use;
- Existing weeds, if any, should be uprooted before they reach maturity and drop their seed in the field.
- Rotate the crop.

Other crop-specific agronomic practices

In Garhwal, after the plants germinate, instead of using the danyala , the field is ploughed into six inch wide furrows. This decreases the density of the plants, facilitates their proper growth and thus enhances the yield. After threshing and winnowing, the seeds are separated according to their colour, size and shape. The healthy and well-shaped ones are preserved as seed for the next crop.

Managing Soil Fertility

In the hills no special effort is made to enhance the fertility of the soil except the use of farmyard manure (FYM). The first deep tilling transforms the remains and roots of the previous crop into manure. Crop rotation is another means by which farmers maintain health of the soil.

Nutrients

The main nutrients for soybean are nitrogen, phosphorus and potash. Nitrogen and phosphorus are needed when the beans ripen. They are not required during budding and during transformation of the buds into beans. Potash is required in the initial stages of the crop and need for it decreases as the plant grows.

Recommendations

- Apply FYM @ 15 tonnes/ha or poultry manure @ 5 tonnes/ha or biogas slurry @ 12.5 tonnes/ha.
- Dual inoculation of seed with *Bradyrhizobium japonicum* @ 5 gm/kg of seed and phosphate solubilising bacteria (PSB) @ 5 gm/kg seed is very effective.
- In clay loam irrigated areas, co-inoculate *Bradyrhizobium* along with PGPRs (*Azospirillum* or *Pseudomonas*) on the soybean to get higher grain yield.
- *Bradyrhizobium* inoculation saves starter dose of nitrogen to the extent of 20 kg/ha.

Water Requirements

Soybean is a kharif crop and hence is largely dependent on rains but in the absence of adequate rains, the field must be irrigated before sowing by alternative means. At the same time, there should be no excess water in the field as extra moisture adversely affects germination and growth. Irrigation is also needed during budding – around a month after sowing – which is generally taken care of by timely monsoon rains.

मृदा उर्वरा एवं जल प्रबंधन

- 15 टन/है. की दर से FYM या 5 टन/है. की दर से मुर्गी की मिंगनी या 12.5 टन/है. की दर से बायो गैस स्लरी का प्रयोग करें।
- एक कि.ग्रा. बीजों को 5 ग्राम ब्रेडी राइजोबियम एवं 5 ग्राम PSB से उपचारित करें।
- सोयाबीन की फसल खरीफ की फसल होने से अतिरिक्त सिंचाई की आवश्यकता नहीं होती है किंतु वर्षा नहीं होने की स्थिति में उपयुक्त सिंचाई करें।

Water conservation techniques

Traditionally, in the hills, the villagers used to collectively construct khals (water ponds) for harvesting rainwater from the entire region through gravity flow. Khals are a very effective way of irrigating farmlands in these areas. Unfortunately, as khals are no longer being maintained and are gradually drying up, they may soon become a relic of the past.

Problem Insects and Diseases

Stem fly (*Mdanagro myza sujae*)

As its name suggests, this insect causes maximum damage to the stems of the plant. At mature stage, this fly is brown in colour and acquires a dark colour as it grows older. As soon as the plant begins to grow, the female pest lays her eggs on the underside of the leaves. The eggs are generally white and cylindrical. After 2–5 days, maggots are formed and they enter the main stem. This causes the leaves to turn yellow and the stem develops spots and slowly turns hollow. This finally destroys the crop.

Management

- Adhere to the crop cycle
- Ploughing in summer, after harvesting the rabi crop, must be deep.
- Sow resistant/tolerant varieties
- Spray cow urine
- Leaves sighted with eggs of the stem fly should be removed and destroyed.

Recommendations

- Two foliar sprays of BD 501, one at the stage of 4–6 leaves and the second at fruiting time @ 1 gm/acre will protect the crop from stem fly infestation.
- Spray organic pest controller at a ratio of 1 : 8 per acre.
- At the stage of 2–3 leaves, spray a mixture of ash and cow urine.

Hairy caterpillar (*Spilisoma obliqua*)

This is a light-brown coloured fly with black spots on its front wings. It acquires a length of 5–6 cm at maturity. The female flies are longer than their male counter parts. They live in groups and lay eggs on the underside of leaves. The insects perforate the leaves and also eat them. When the crop matures, the grains of the infected plants are small in size and appear unhealthy. Thus, the caterpillars adversely affect both the quality and the quantity of the yield.

Management
- Infected plants are not selected for seed.
- Adhere to the crop cycle.
- Seeds are treated with wood ash before storage.
- Two kilos of ash in a cloth or jute packing are added to 25 kg of seed for protection.

Recommendation
- Spray liquid manure at a ratio of 1 : 8 on the standing crop.
- Spray chili-garlic solution @ 75 gm/litre.

कीट एवं रोग नियंत्रण

तने की मक्खी
- B.D. 501 का छिड़काव 4–6 पत्ती की अवस्था एवं परिपक्वन के समय 1 ग्राम/एकड़ की दर से करें।
- 2–3 पत्ती की अवस्था में राख एवं गोमूत्र के मिश्रण का छिड़काव करें।

शुंडी
- मिर्च एवं लहसुन के मिश्रण का 75 ग्राम/लीटर पानी में घोल बनाकर छिड़काव करें।

Girdle beetle (*Oberia brevis*)
This beetle is 1 cm long and dark yellow or orange in colour. It makes round circles on the stems and in the centre of the leaf. It always makes two parallel holes and lays eggs in one of them. The stem becomes hollow, the leaves fade and fall and eventually the plant dies.

Management
- Use healthy seeds only.
- Bury the remains of the previous crop in the soil during the first tilling of the field.
- Adhere to the crop cycle.

Recommendations
- Use light traps in the field.
- Spray cattle urine and dung.
- Spray organic pest control at the ratio of 1 : 8 on the standing crop.

Bacterial blight (*Pseudomonas glycinea*)
This is a bacterial disease and generally found in the bhabhar (foothills), tarai and the plains. Plants affected by blight develop yellow spots on the leaves. These spots slowly get bigger and the leaves begin to fall off.

Management
- Before sowing, the remains of the previous crop should be well covered under the soil.
- Adhere to the crop cycle.

Recommendation
- 3.2 kg of *Trichoderma* powder should be mixed with 25 kg cow dung manure for one week and then applied per acre, before sowing.
- Apply one kg *Trichoderma* mixed with compost per acre during field preparation.
- Before sowing, treat the seed with *Trichoderma* @ 10 gm/per kg of seed.
- Apply BD 500 and two foliar sprays of BD 501 at the time of field preparation.

Yellow mosaic Virus
This disease is generally found in the tarai, bhabhar and the plains. It affects the leaves of the plants. First, yellow spots appear on the leaf, then the entire leaf becomes yellow and finally the leaf falls.

Management
- Burn the remains of the previous crop and other undesirable biomass before sowing.
- Adhere to the crop cycle.

Recommendations
- 3.2 kg of *Trichoderma* powder should be mixed with 25 kg cow dung manure for one week and then applied per acre, before sowing.
- In order to conserve naturally occurring bio-control agents like Coccinellid beetles, Chrysoperla, etc., biodiversity should be encouraged on the farm through inter-cropping. In rain-fed areas, inter-cropping of soybean with maize, sorghum or a short duration crop of pigeon pea is advised.
- In the mountains, apart from the above insects and pests, ghughuti and chokor

(species of Himalayan dove), monkeys and wild pig also harm the soybean crop. To prevent monkey attacks, dogs are used. Scarecrows are erected to ward off the pigs. Ghughuti and chokor relish the newly germinated plants. To protect the crop from them, sowing must be completed in the month of May itself so that the plants grow big enough before the birds arrive.

Managing storage Insects

Soybean that is well dried in the sun develops immunity to pest infection. If necessary, it may be once again dried in the sun, 6–8 months after storage. Being a pest resistant crop, soybean does not need much attention during storage.

Experts call for organic farming to be the future model for European agriculture

In a European Seminar on organic food and farming and its political framework the call was delivered by the IFOAM EU Group in Hungary. Thirty European experts from 20 EU and EFTA countries, meeting at the seminar in Hortobagy, Hungary – "Organic food and farming and its political framework" – welcomed the French Presidency's initiative to review the CAP post-2013 and called on the Council to adopt organic farming as the future model for European agriculture. The CAP has arrived at a pivotal turning point: budget cuts, rising food prices, production of agro-fuels, climate change, environmental problems. These call into question the current system of agricultural production and funding. The French Presidency has recognized this and will be discussing future orientation of the CAP at the informal meeting of the Ministers of Agriculture in Annecy, France, this weekend. "Organic farming can offer solutions to all these problems", said Francis Blake, president of the IFOAM EU Group. "We are past the time for piecemeal measures, which tend to work against each other, and therefore cost more. We need a holistic approach, and only organic farming provides this." The French EU-presidency suggested in its paper for the Minister's council four objectives to be met by the future CAP: Ensure food safety, including public health aspects, Contribute to global dietary health to participate in world food safety, Preserve the equilibrium of rural areas and Participate in the fight against climate change and for environmental improvement. The participants of the seminar concluded that organic farming delivers a unique combination of positive effects to all the above aims: health and food quality; food security (self reliance particularly in developing countries); rural society and quality of life in rural areas, e.g. through creation of jobs, local marketing; and environment (including lower energy use and carbon sequestration) "therefore organic farming should become the overall model for farming in Europe – and the future CAP should be designed according to this model". (Publication date: 9/22/2008)

Identifying Priority Areas of Research in Organic Agriculture

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Organic Agriculture also involves, over and above the agriculture sciences, the aspects of socio-economic and ecological systems. And research into these multi-disciplinary systems faces the complex challenges of the understanding of the agro-ecosystem interactions and the practices of people in social systems. Organic agriculture system research, necessarily involves questions concerning different interests and values in a society.

There is therefore, scope to explicitly address how values in the form of intentions and social interests feature in organic agriculture research. The role of values is particularly evident with regard to organic farming, because its special values and goals are highly important and that these values are clearly different from the values of mainstream inorganic agriculture. These special values of organic agriculture are further elaborated here. How, some of these key values can be accounted for, incorporated, and made use of, will form the subject matter of research investigations and experimentations in the days to come.

Organic farming has differentiated itself from the conventional agriculture by way of alternative agricultural practices and values. Most notably, the organic movement has explicitly formulated basic principles and standards for organic production and processing. The organic principles are based on a perception of the human society. Understanding the ecological processes that drive productivity and environmental impact through soil biology, vegetation dynamics, pest population dynamics, disease epidemiology and so on, leads innovation and research to improving organic systems. This does not imply that they are unimportant in inorganic farming. Organic farming does, however, not have access to all the technological means for overcoming natural and ecological insufficiencies and problems, that conventional farming has (such as pesticides, fertilizers and preventive medicines), and it therefore relies on cooperation with natural ecological systems to a greater extent. Values of biodiversity and livelihoods are also an integral feature of organic farming. This comprehensive, integrated view of nature and ethics presents the original key ideas of organic agriculture and remain the source of its inherent value systems.

From the perspective of research into value systems of organic agriculture, the four principles of organic agriculture - Health, Ecology, Fairness and Care, advocated by IFOAM reflect the key areas of investigation, so as to enhance our understanding of the chain of values in organic agriculture.

Scoring values in principles of organic agriculture (IFOAM 2005):

1. **Principle of health** – Organic agriculture should sustain and enhance the health of soil, plant, animal and human as one and indivisible.
2. **Principle of ecology** – Organic agriculture should be based on living

ecological systems and cycles, work with them, emulate them and help sustain them.
3. **Principle of fairness** – Organic agriculture should build on relationship that ensures fairness with regard to the common environment and life opportunities (trade included)
4. **Principle of care** – organic agriculture should be managed in a precautionary and responsible manner to protect the health and well being of current and future generations and the environment.

The organic agriculture values do enter into important phases of the research processes, such as problem identification, design of methods and experiments, model assumptions and the use of normative concepts which are value laden. Obvious examples include sustainability, food quality, soil quality, nature quality, animal welfare, farmer's incomes and livelihood security and rural development as a whole, as well as human well being.

There is always a choice of researchable issues in it. The choice will depend upon the perspective that is used and what is taken as problematic from the present point of view. Accordingly the efforts toward approaches to research in organic agriculture can be divided into four groups:

1. Systems research, including long term crop rotation trials and farming system experiments. The sustainability of the organic farming in the long term is of major interest. In this regard some like to experiment on comparing the value of organic with inorganic production systems while others would rather focus on comparing different management systems within organic farming (vermincompost, FYM, biodynamic, low input, integrated etc) in order to improve the system.
2. Holistic methods, such as food quality linkages of organic food production systems. The organic food is considered healthier then conventional, research into testing this hypothesis in a scientific way is needed to prove the value addition.
3. Participatory approaches that involve stakeholders in research, including on-farm research and action research.
4. Cross-disciplinary approaches that include, non-agricultural disciplines, social sciences and the humanities in a comprehensive systemic research methodology.

The fundamental issue is the comparison of systems rather then modification to individual management practices, even though for people working within the organic systems, such as farmers, agribusiness, comparison of individual management practices appears more important.

The desire to make value systems research in organic more holistic or systemic is based on ideas and aims within organic movement: a holistic perception of health, aspirations towards more fair food systems, fair ways to livelihood security and income of farmers.

Possible thrust areas of research in organic agriculture

A. Soil health dimension of the value addition

Agronomical, ecological and economic value additions made through farming organically. Scientific investigations into organic technologies/ practices, validating the ways soil health and fertility is improved. Organic practices of soil improvement while focusing on enhancing the soil organic carbon lead to restoring soil microflora and fauna (biodiversity). Here the type and quantum of these soil borne organisms would determine the sustainability of production systems.

B. Safe food dimension of value addition

It relates to adding value by way of producing safe food. It has two aspects that the food produced does not contain any harmful chemicals, which pass into the plant either from soil with minerals (e.g. heavy metal contaminated water or compost or chemical

nutrients) or through plant protection means, i.e. pesticides and insecticides. Organic value chain here should enable us differentiate us what bad additions organic farming helped avoid and what good additions it helped make as against the conventional produce. It may form a value chain containing health value to consumer and both ethical as well as economic value to producer.

C. Economic benefits dimension of the value addition

Advocating the adoption of organic agriculture in the present scenario of market economy means that it will become popular with farmers only if there exist an environment of economic profitability. That will happen only when a wider range of organic products, both niche products and staple food items, are physically and economically accessible to consumers at various places (regions in the country), in good volumes and at all times. It is practical issue, which is determined by the state of supply chain mechanisms, both type and vibrancy that need to be developed and put in place.

As an example, between the organic producers and consumers of India, there could be five different kinds of supply chains in operation. Whenever there is a mismatch between demand and supply, it will happen largely because of the absence of efforts to evolve appropriate supply chain mechanisms. There could be certain common principles governing organic value chains but it is also possible that each crop will have certain specificities added to its marketing related value chain, making it unique. We do not know as yet and there are no studies to confirm or deny it.

Value systems research is important in the development of organic foods and farming. To fulfill this role a broad range of methods and approaches are needed. It is a great challenge to include very different methods, applied within a wide range of perspectives, in an interdisciplinary or trans-disciplinary research effort of this kind.

Examples of priority research areas in organic agriculture

- To develop and validate organic production systems for selected crops.
- To assess soil health dimensions of the value addition in the organic systems (changes in structure, organic carbon and soil micro-flora and fauna etc).
- To assess safe food dimension in the value chain of rice-wheat and vegetable production systems (determine and quantify parameters).
- To investigate nature and size of viable organic supply chain systems for domestic and export commodities, validating the economic dimensions.
- To validate appropriate combinations of organic inputs, including folk organic soil management and crop management practices for selected crops.

Domestic Regulation for Organic Certification Notified

Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India vide Extra-ordinary Gazette Notification Dated 19th January 2009 has notified “Organic Agricultural Produce Grading and Marking Rules, 2009”. Agriculture Marketing Advisor, Directorate of Marketing and Inspection shall be the controlling authority under these rules. National Programme on Organic Production (NPOP) notified under FTDR act shall be the main regulatory document. All agencies accredited under NPOP shall be eligible for authorization under these rules, on application to AMA.

The Impact of Organic Cotton Farming on the Livelihoods of Smallholders Evidence from the Maikaal bioRe project in Central India

Executive Summary by
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Background

To investigate the economic viability of organic cotton farming and the impact on the livelihoods of the involved farmers, the Swiss Agency for Development and Cooperation (SDC) and the WWF Switzerland mandated the Research Institute of Organic Agriculture (FiBL) to conduct a detailed study on organic cotton farming in the Maikaal bioRe project in Central India. Over a period of two years, an Indo-Swiss research team collected and compared agronomic data of 60 organic and 60 conventional farms. These data were complemented with socio-economic information gained in interviews. Main results and conclusions of the comparison study are being discussed here in brief. Attempts have also been made to analyse the potential of organic cotton farming for rural development.

Economic performance

Labour and material inputs - Surprisingly, as is perceived, total labour inputs were not significantly higher in organic cotton fields. While organic farmers invested more time for weeding, they required less time for pest management. Average application of organic manures was almost double in organic cotton fields. Overall inputs of nitrogen and phosphorus (of manures or natural mineral fertilizers) were about half compared to conventional cotton fields

Production costs - Variable production costs were 13-20% lower in organic cotton. This was mainly due to 40% lower costs for inputs (seeds, manures, organic pest management items). The requirement for taking up loans was thus far less in organic farms. If opportunity costs of farmers' own labour are included in the calculation, overall production costs were 15% lower in organic cotton fields.

Yields – Interestingly average cotton yields in organic fields were not lower, but even 4-6% higher in the two years of observation, though this difference was statistically not significant. It can be excluded that the higher productivity is due to differences in the farm sample, such as better land, better access to irrigation or different production patterns.

Gross margins in cotton - Due to slightly higher cotton yields, the 20% organic price premium and lower production costs, gross margins in organic cotton fields were 30-43% higher. Even without organic price premium organic cotton farming achieved higher gross margins in the two years of observation. However, the price premium is needed to compensate for costs of conversion and for yield drops in rotation crops.

Efficiencies – In per kg of seed cotton harvest, the organic farms in the study required slightly less labour and considerably

less nitrogen (of manure) than conventional cotton farms. Input costs to produce 1 kg seed cotton were about half under organic management. However, in the average of the two years, organic farms required 6% more irrigation water per kg seed cotton (in total 3'400 litres/kg).

Economic impact on the farm - Average yields as well as production costs of most rotation crops were slightly lower in organic farms. Nevertheless, the total gross margin from major crops of an average farm was about 15% higher in organic farming. If part of the rotation crops could be sold with an organic price premium, incomes of organic farms would further increase.

Impact on natural resources

Most of the interviewed organic farmers stated that the capacity of their soils to absorb and retain water has increased after conversion to organic management. Many observed that they need less rounds of irrigation and that the crops can longer sustain periods of drought. However, the comparison of water retention capacity in soil samples of organic and conventional cotton fields has not shown any significant difference.

Average irrigation water application was even slightly higher in organic cotton fields. This could be due to better access to irrigation, or due to more intense cropping. While most organic farmers observed that their soil has become softer and more fertile due to organic management, soil organic matter contents were only negligibly higher in organically managed cotton fields. Phosphorus and potassium contents were slightly lower in organic cotton fields, while levels of boron – an important micro-nutrient – were significantly higher. Organically managed fields showed less soil salinity and acidity than conventional fields.

Risk aspects and vulnerability

As organic cotton farming involves less production costs and generates higher incomes, farmers were less prone to become indebted. In addition, there were some indications that the risk of crop failure due to drought or pest damage was lower in organic cotton fields. Similar observations have been made in other studies, but to prove this further research would be needed.

Vulnerability of cotton farms – both for organic as well as for conventional farms – is highest when it comes to changes in cotton world market prices. Organic cotton projects could reduce the effect of drops in cotton prices by guaranteeing minimum purchase prices, and by developing organic marketing options for the main rotation crops.

In the long term, conversion to organic farming could significantly reduce vulnerability of farm households as the additional income enables them to invest in better irrigation systems (e.g. drip irrigation) and to diversify their income sources (e.g. dairy farming or small-scale businesses).

Obstacles and challenges ahead

According to interview results, the biggest obstacle in converting to organic cotton farming seems to be the initial drop in yields, resulting in lower incomes during the first 1-3 years of conversion. To reduce yield declines, it is important to ensure sufficient application of organic manures. While progress in organic production methods allowed achieving cotton yields that are on a par with those in conventional farms, yields of most rotation crops were still lower. This shows that efforts to improve production methods and extension services should be expanded to the rotation crops.

Farms that do not strictly adhere to the organic standards are a serious threat to the credibility and the economic stability of organic cotton projects. An analysis of the profiles of farms that were excluded from the Maikaal bioRe project due to the use of prohibited inputs showed that they were far wealthier than the average. A well-functioning internal control system and cultivating a spirit

of coherence are crucial to prevent opportunistic behaviour.

Conclusions for agricultural and development policies

Altogether, organic cotton farming can significantly contribute to improving the livelihoods of smallholders as it generates higher incomes and involves less risk. At the same time, it allows a more sustainable management of natural resources.

To further improve the performance of cotton based organic farming systems, efforts in developing production methods and in improving marketing options are needed, especially for the crops grown in rotation with cotton. The research results show that organic cotton farming, in the medium and long term, does have the potential to be an economically sound business proposition also for marginal farmers. It is thus important to find suitable approaches to enable poor farmers managing the hurdles of the conversion period. Competent training on farm management, technical advice during the conversion period and appropriate models for financing costs of conversion are crucial in this.

Further research is required to explore that the conclusions from central India can be transferred to other regions, and to other cropping systems.

Karnataka Organic Farming Mission

The Karnataka State Government, which often campaigned for organic farming, has formed a state level Organic Farming Mission Empowered Committee headed by A Sri Anand, one of the conveners of the Krishi Prayog Pariwar of Tirthahalli. The Committee, having 23 members, including 14 farmers actively involved in organic farming, and the vice-chancellors of two Agricultural Universities in Bangalore and Dharwad and of the Veterinary Sciences University in Bidar, will be responsible for all the policies, programmes and schemes to be planned by the Government. Responsibilities of the Committee include: coordination between different state and Central government agencies; fixing the subsidies for different organic farming, planning the marketing facility for the organic farm produce; proposing the related Acts and Rules; fixing the agencies to implement different schemes; preparing the guidelines to encourage organic farming; creating location-specific committees; reviewing the progress of organic farming and others.

Talking to reporters Anand said the Mission had planned to select 100 farmers in each taluk and educate them on organic farming. They will be trained to achieve self-sufficiency in the agriculture sector, adopting simple farm techniques, improving organic farm practices to international standards, helping the organic farmers get international recognition and market to their produce, establishing general and cold storage facilities at taluk level for organic farm produce, creating consumer awareness, helping the farmers to have value addition to their produce, helping the NGOs, farmers and institutions to do research, opening markets at taluk level and popularising organic farming.

To implement its programmes the Mission has planned to start seed exchanges of traditional crop varieties in each district, suitable exchanges to protect and develop local varieties of birds and animals, utilising lands belonging to temples and mutts for organic farming, protecting local cow varieties, starting taluk level counselling centres and call centres for farmers.

India Organic News

Organic farming brings hope to stressed Indian farmers - An organic farming initiative has brought hope to villagers in a drought-prone area in India commonly known for farmer suicides due to debts from high-cost modern agriculture. Low-cost, sustainable and environment-friendly farm technologies are helping boost the confidence and self-reliance of farmers in the drought-prone Vidarbha region of Maharashtra in India. The Integrated Natural Sustainable Agriculture Programme (INSAP) was initiated by the voluntary organisation YUVA (Youth for Unity and Voluntary Action)-Rural. The project is being implemented in five districts in Vidarbha - Buldhana, Washim, Akola, Amravati (all in western Vidarbha) and Wardha (in central Vidarbha). It is based on low-cost, sustainable and environment-friendly farm technologies which, in the process, help boost the confidence and self-reliance of farmers. INSAP minimises farmers' dependence on expensive technologies and inputs (chemical fertilisers and pesticides, expensive seeds, including genetically modified ones). Instead, they are encouraged to work hard to make the best possible use of local resources like leaves, crop residue, cowdung and cow urine to provide nourishment to their crops and to protect them from pests and diseases. (source: peopleandplanet.net)

Karnataka launches organic farming mission - Karnataka farmers are more privileged when compared to other farmers across India as the state government is set to change their lives through organic farming. When Chief Minister Dr BS Yeddyurappa announced in his budget speech on July 17, 2008 that his government is seriously thinking of setting up Karnataka Agriculture Mission to boost agriculture sector, nobody imagined that it is going to be implemented so soon. The vision of the Chief Minister became a reality when Organic Farming Mission (OFM) was formed on August 29, 2008 with an allocation of Rs. 100 crore budget and on date 51,760 agricultural families in 173 taluks have voluntarily registered in the Organic Farming Mission Societies in their taluks. More than 50,000 organic farmers assembled in front of Vidhana Soudha on January 26, 2009 and took oath to remain organic farmer lifetime. Former President of India, Dr Abdul Kalam was also present on the occasion and oath was administered by Smt Meerathayi Koppikar, 82 year old self practicing organic progressive farmer from Mudhol taluk under Bagalkot district. According to AS Anand, chairman of OFM farmers in large numbers assembled in front of dignitaries like Dr Abdul Kalam, Chief Minister and the Chairman of Karnataka Agriculture Mission, Ministers, MP's, MLA's, MLC's, Officers, NRI's, etc., on January 26 and took oath to protect the mother earth from poisoning by not using chemicals. "Farmers have not come to Vidhana Soudha for demanding anything, but to declare that they will make the world beautiful by restricting themselves to organic farming. They wanted to prove a point that organic farming is complete by nature. They can produce the seeds and manure by themselves. There is no need to ask for the government to supply pesticides, as pesticides and chemicals are not used in organic farming. They equip themselves in this unique project, one of its kind in the country, as the farmers interested in organic farming, an ancient method of agriculture, get the benefit of experts advice, support and care by registering their families by paying one time of Rs. 250," he said. (Source: Organiser, 27/01/2009)

Organics market growing in India despite slowdown - The organic market in the US and Europe may have taken a hit because of the slowdown, with growth rate down to 5% in 2008 from 25% the previous year. But it is still

growing in India say regional as well as national players, including Fabindia and Hyderabad-based 24 Letter Mantra, albeit at a slow rate of 10-12%. "We have not witnessed a significant change in the pattern (in the last few months)... The demand is on the rise... The potential is tremendous and we are developing our supply base to keep up with the demand," Fabindia communication head Prableen Sabhaney told. The ethnic retail chain has some 120 SKUs including cereals, spices, honey, preserves and herbs. There has been no obvious change because of slowdown, says VR Ananthoo of reStore in Chennai, an organisation that initiates farmers into organic produce and helps them sell. "Growth has always been slow but steady at around 10-15%. There has been no cut-back in spend by regular customers as they probably look at spending on organics as medical insurance." Players are bullish on the potential of the domestic market and have introduced a slew of products in the last few months. Hyderabad-based Sresta Bioproducts, which retails its brand 24 Letter Mantra through Spencer's retail chain throughout the country, introduced ready-to-eat products and fruit juices. Fabindia added a range of soups to its kitty in January and is working on muselis and flavoured pastas for introduction soon. "India has a Rs 1,000 crore market available immediately," Sresta Bioproducts managing director Rajashekhar Reddy Seelam said, quoting from a International Competence Centre for Organic Agriculture report. He went on to add that in the next decade or so 3-5% of the $116 billion food industry in India would turn organic. Pricing is one factor due to which organic products, which are 15-40% more expensive than their regular counterparts, do not have immediate acceptance. But returning NRIs and expats have given a boost to organic sales, says Gomathi Viswanathan of Enfield Agrobase, which has 200 acres under organic cultivation and gets 65% of its revenues from exports. The hospitality industry too has started taking interest in this segment, with client requesting organic items. "Supply issues have to be considered before incorporating anything on the menu as we cannot turn away a request for a dish because the items are not available on the particular day," Radisson GRT vice-president Vikram Cotah told. (Source: The Economic Times, Chennai, 12/02/2009)

Castor to get organic fertiliser status- The Solvent Extractors' Association of India (SEA) is seeking to promote castor as an organic fertiliser in India. Gujarat will probably be the first state to use castor as an organic fertiliser as the state government is in favour of promoting it as organic fertiliser. Meanwhile, a few agro companies are also trying to pitch castor as an organic fertiliser and they have sought the Centre's help for the purpose. It may be mentioned here that sometime ago the apex trade body had urged the Centre to add castor to the list of organic fertiliser. The Gujarat government has already shown a positive attitude towards the proposal. As a result, SEA and fertiliser companies are now planning to promote castor as an organic fertiliser in India. "Castor is a good organic fertiliser for crops like fruits and vegetables. The ongoing recession has led to a fall in export demand for castor and its derivatives. We are looking for areas where we can promote the use of castor. For that we are trying to create awareness on the use of castor as an organic fertiliser," said B V Mehta, executive director of SEA. (Source: Business Standard, 14/02/2009)

Organic cloves continue to fetch premium price- Kochi: Cloves grown organically continue to fetch a premium price in exports, but the growers receive only 25 per cent of the benefit as it is being done through intermediaries. Despite the premium price, the production cost of organic produce often exceeds the value realised due to sharp drop in output and high labour costs, says Renju Thaliath, an organic cloves grower in Kerala's Kollam district. Organic cloves cultivation is limited to Kerala, Tamil Nadu, Karnataka and Andaman and Nicobar Islands. Tamil Nadu tops with over 1,100 hectares under the crop and a production of over 1,000 tonnes

followed by Kerala with around 800 ha and an output of about 700 tonnes. Karnataka has around 260 ha with a production of around 200 tonnes. Andaman and Nicobar produce around 6 tonnes from about 130 ha, according to official sources. While a 23-year-old clove tree gives 23 kg of wet cloves, a tree aged 80 years yields 60-80 kg. It takes 3 kg of wet cloves to get one kg of dried cloves, says Thaliath. And, the cost for producing one kg of cloves works out to Rs 250 now because of the high wages. There is a good demand from Germany for organic cloves. Exporters buy the produce from growers at a 25 per cent premium over the market price and sell it at a 100 per cent premium overseas. (Source: Sify Business, 29/01/2009)

Why Organic and other Wines Going Green? - According to NOP (National Organic Programme) of the USDA an organic wine is the one which is made with organically grown grapes, but without any added sulphites. Less than 100 ppm sulphites are allowed as these can be naturally present and find their way into the finished wines. Now, sulphites (Sulphur salts or Sulphur dioxide) due to its anti-microbial qualities (also, antioxidant) becomes bound up by joining potential spoilage. These compounds, without sulphites, would otherwise result in undesirable aromas, flavours or colours, making the wine totally unpalatable. Green wine getting popular because it gets picked up by the discerning modern customers far too easily. Two, it helps the buyer consolidate the belief of the wine maker. And three, it obviously helps the environment. Decades ago, when farmers realized that by adding chemicals in the form of fertilizers and pesticides, their produce will increase manifold, they had no clue that they were, in fact, killing the goose that was laying the golden eggs for them. Nearly three decades ago when the wine makers woke up to this fact that they are not only causing irreparable damage to the environment (polluting water table, causing soil erosion, adding to the CO_2 output etc.) but their yield is also going down, it got many of them thinking. The 'pool-table' resembling vineyards suddenly started looking dangerous and not-so-soothing for the senses anymore. Conventional farming therefore once again became the obvious thing to do. Monoculture of grapes addicted to chemicals, pesticides and fertilizers started getting increasingly replaced by one of the three methods – 'organic', 'sustainable' or 'biodynamic' farming. (Source : Indian Wine Academy, 05/02/2009)

Organic farming to be promoted in 83 villages - As part of a project of the Vegetable and Fruit Promotion Council Keralam (VFPCK) to develop thousand organic vegetable villages, 83 such villages have been formed in the district. The project, sponsored by the State Horticulture Mission (SHM) and the Rashtriya Krishi Vikas Yojana (RKVY), aims at starting organic cultivation in at least five hectares in each such village. An amount of Rs.188.5 lakh has been earmarked for implementing the project. The amount will be used for building Swayasraya Karshaka Vipanies (SKVs) and for providing training to farmers on modern methods of farming. Sources in VFPCK said that initial work has already begun in all the selected villages. Twenty-five villages in the district that cultivate vegetables in more than five hectares would be given a subsidy of Rs.10,000 each, while the rest would get Rs.2,500 each. The project aims at starting cultivation in 415 hectares to produce 83,000 metric tonne of vegetables, they said. Four schemes supported by SHM are underway in the district for spreading winter farming and the cultivation of plantain, vegetables and pineapple. The areas are selected considering the climatic and soil conditions. (Source: The Hindu 02/02/2009)

Global Organic

Organic Agriculture-Worldwide 2009 - Organic agriculture is developing rapidly, and statistical information is now available from 141 countries of the world. Its share of agricultural land and farms continues to grow in many countries. The main results of the global survey (presented during BioFach 2009) on certified organic farming show:

- 32.2 million hectares of agricultural land are managed organically by more than 1.2 million producers, including smallholders (2007).
- In addition to the agricultural land, there are 0.4 million hectares of certified organic aquaculture.
- The regions with the largest areas of organically managed agricultural land are Oceania, Europe and Latin America. Australia, Argentina and Brazil are the countries with the largest organically managed land areas.
- The highest shares of organically managed land are in Europe: Liechtenstein, Austria and Switzerland.
- The countries with the highest numbers of producers are Uganda, India and Ethiopia.
- Almost half of the world's organic producers are in Africa.
- About one third of the world's organically managed land – almost 11 million hectares - is located in developing countries. Most of this land is in Latin American countries, with Asia and Africa in second and third place.
- Almost 31 million hectares are organic wild collection areas and for bee keeping.
- Almost two thirds of the land under organic management is grassland (20 million hectares). The cropped area (arable land and permanent crops) constitutes 7.8 million hectares - a quarter of the organically managed land. Compared with the previous survey, there is a clear trend for cropland to increase.
- Relatively high shares for some crops have been achieved; organically managed coffee and olive areas reported, for instance, account for more than five percent of the total harvested areas, and in some countries the shares are even higher – 30 percent of Mexico's coffee is organic.
- On a global level, the organic land area increased by almost 1.5 million hectares compared to the data from 2006.

IFAD Report on Organic Agriculture and Poverty Reduction in Asia: China and India Focus –

Aim and methodology - The Office of Evaluation of the International Fund for Agricultural Development undertook this evaluation to determine the role of organics in development programs and under what circumstances they should be integrated into its future poverty reduction strategies. This study evaluates organic initiatives that are diverse in terms of: agro-ecological zones, product types, institutional structures, geographic areas and market orientation. Taking a market-oriented focus, the document also addresses key investment issues and the organizational forms of organic agriculture such as adoption of standards, certification, civil organizations, value-chains and marketing channels. It draws primarily from the work of nine researchers on 14 case studies in China and India, as well as reviews of the organic sector in several other countries and more than 100 related studies and documents. Some anecdotal evidence is included when it is consistently reported and credible – this is necessary due to the lack of baseline studies and useful measurements in many small farmer projects. India and China are the dominant focus countries since these two together host more than half of the world's farming households. The methodology and output were reviewed by an international

team, organized in the evaluation's Core Learning Partnership. The final evaluation was critically reviewed by a five-member Scientific Committee and an International Advisory Panel

Executive summary - Generally speaking, there is no significant evidence that organic methods would be deleterious to small farmers. In fact, most of the cases clearly noted a number of benefits from which it is reasonable to conclude that the promotion of organic agriculture among small farmers can contribute to poverty alleviation and is well warranted.

In the context of development, the role of organic agriculture cannot be fairly assessed in the narrow economic terms of market premiums. Its value does not rest merely in the fact that it can provide higher incomes, but in that it can potentially contribute to long-term resilience and stability, particularly in terms of resource conservation, crop diversification, food security and a number of positive environmental externalities.

Further growth and meeting the demands for certification, quality and consistency of increasingly mainstream distribution channels, like supermarkets, will be difficult for most producers and will require the organization of small farmers and a combination of public and private support. **Local farmer associations** can facilitate the exchange of knowledge, support farmers through the early conversion processes, improve production and post-harvest controls, achieve economies of scale, improve farmers' bargaining position and play an important role in marketing of organic products. For small farmers, external private firms or NGOs can fill some of the gaps but may not be an ideal permanent substitute for farmer associations.

Poorer small farmers seem to experience a positive transition and outcomes when converting to organic farming. For many small farmers practicing rustic or traditional methods of agriculture, transition to organic results in an increase in both yields and overall incomes. The implications for converting conventional farmers that practice intensive cultivation methods would necessarily be different and more dependent on careful analysis of the probable outcomes. Transitional periods can mean uncertainties and even a decline in yields for those farmers that employ intensive agricultural methods and are dependent on external inputs, because the benefits of organics are not usually immediate in such cases. In most cases, overall farm incomes — though not always yields — soon recover. In the long run, organic methods can be more cost-effective and even more profitable, but only if properly applied. The transition process and the time it takes are a barrier to many conventional farmers, who therefore require various types of conversion support.

Organic production requirements, the sometimes lengthy conversion process and the realities of sometimes shallow organic markets can surprise farmers and development professionals alike. Those farmers that adopt a **holistic understanding** of organics and are focused on local benefits such as improved soils, fewer toxic chemicals and self-reliance in inputs, rather than just on the premium price for the crop, are likely to better withstand setbacks, reduced premiums and difficult periods, especially during the conversion stages. It is risky for a project to work with farmers that convert only because of the promise of higher prices, since such price premiums may not be readily available. Without adequate motivation and recognizable rewards for the positive environmental externalities they generate, farmers are more likely to only participate in a superficial manner, not adhere to the standards and receive only limited benefits.

Organic farming is primarily knowledge-intensive, whereas conventional farming is more chemical- and capital-intensive; organics can therefore be an advantage for poorer farmers. Accordingly, it is difficult to establish a one-size-fits-all approach, since conditions

will vary in different zones. Organic projects require that time be built into the process for farmers to test and learn new technology and methods. Knowledgeable extension services are critical. Local know-how, especially from experienced farmers and knowledgeable elders, can smooth the transition and reduce risks. It is also important to provide farmers good access to sources of knowledge about the application of organic methods to their crops and agro-ecological conditions. Nevertheless, holistic methods don't often provide a quick fix and require a **longer-term commitment**. Therefore, governments and local institutions such as NGOs need to be committed to supporting a multi-year process. Such a commitment might require: acquisition of organic production technology and training, especially for extension service agents; preparation for certification and initially covering its costs; and very limited subsidies to cover possible reduced income during the transition period.

Perhaps the single most important factor for successful organic adoption is the availability of a reliable **institutional support system** that can initially facilitate the access to the many components that farmers find difficult to reach. These include technology, initial financing for certification and input production, and marketing. **Capacity-building** at the farmer level (local farmers associations, local training and advisory services) should be a central aspect of any strategy aimed at using organic agriculture as a tool for poverty alleviation.

The process of **certification** can be difficult and costly, but in most of the cases reviewed, NGOs and partnering firms facilitated the process and even offset the initial costs for farmers. Nevertheless, improving access to certification by keeping costs low and facilitating Internal Control Systems will enable small farmer groups to have their own certification and thereby greatly improve their market position.

Development policies must recognize the critical need to integrate professional **marketing** support. Helping farmers to first assess their market orientation and then access targeted organic markets requires business and marketing skills that many NGOs and farmer associations often lack. It is not necessary to turn a farmer into a trader, but an apex body or a network of organizations can be fortified with outside support and training in order to take advantage of scale economies, improve bargaining and significantly reduce transaction costs. A private sector partner can also fulfill this role, provided that the arrangement secures a measure of equity for participating farmers. Any strategy to promote organic agriculture among the poor ought to also consider crop choices. Local varietal adaptability is important and so is the exercise of caution regarding commodities such as coffee or tea, whose international markets are inherently volatile.

On the surface, it appears that conversion can be an easier process where **agro-ecological conditions** are favourable for farming and environments are more pristine. However, some of the more dramatic examples of success have occurred under much more difficult conditions, such as semi-arid or degraded landscapes. In such cases, because organic agriculture builds soil quality and is generally less water intensive than conventional agriculture, it can be particularly productive where conventional farming would be impractical or too costly.

Key recommendations for IFAD and its partners - It is useful for IFAD initiatives to foster and encourage farmers associations as a central aspect of any strategy aimed at using organic agriculture as a tool for poverty alleviation in rural areas. These can be critical to ensure participation and equity for small farmers and can take up responsibility for critical aspects of the supply chain such as marketing, certification, and integration of a good internal quality management system to

help ensure quality, traceability and organic compliance.

IFAD can play a useful role by fostering reliable institutional support systems that can initially help provide the many components that farmers find difficult to access. These include capacity building and the acquisition of adequate technology and training, marketing, and initial financing for certification and localized input production.

In order to take advantage of scale economies (marketing, production, certification, etc) and significantly reduce transaction costs, IFAD can help to organize apex bodies or a network of organizations that can then be fortified with professional support and training. IFAD and partner agencies can play important roles to support mutually beneficial partnerships between farmers and private firms and can even enhance market relations by facilitating farmer groups to jointly engage in contract farming arrangements.

In order to improve the likelihood of success, IFAD and its partners must assure that planning and implementation integrate appropriate sequencing and pre-assessments and that any organic strategies build adequate time—at least three-five years – into the learning process.

Negative biases in public expenditures that favour conventional agricultural systems and discriminate against smallholders and organic systems can be improved at the government level by assessing the research, extension and perverse subsidies that hinder the development of organic options. IFAD's proven experience with poverty mapping systems and farmer assessments can ensure that the investment selection criteria adequately identify high poverty areas with smallholders and thereby reach farmers that most need support.

SA farmers in India to learn about organic farming - A 22-member team of farmers from South Africa, is currently touring India, to interact with farmers and activists on the practice of organic farming in the state of Kerala. The interaction was organised by the Kerala State Bio-Diversity Board and 'Thanal,' an NGO working in the area. Mariam Ayot, founder of African Centre for Bio-Safety, who is here with the team, said all African countries, except South Africa and Burkina Faso, had either banned or imposed a moratorium on use of GMOs (Genetically Modified Organisms). She said GM planting, which was started in 1986, had grown exponentially in South Africa in the last three years, covering an area of 1.1 million hectares at present. "Once you start growing GM, it opens a floodgate. Cotton farming has now displaced food crops," Ayot said. Sinda Manakuza, a farmer who is part of the team, said commercialised farming was profitable initially as the government used to give liberal subsidies. With the cut in subsidy, they were facing a difficult situation, she said. Another farmer, Mpompshare, said they wanted to go back to food crops like corn and sweet potatoes and were here to explore the possibility of taking up organic farming, shedding GMOs, chemical fertilisers and unwanted insecticides. The Southern leg of the farmers' tour has been arranged by Deccan Development Society, which has 25 years' experience in sustainable farming, `Thanal' activist Sreedhar said.

National and International Events

National Seminar on "Present Scenario of Organic Farming for Sustainable Soil,-Plant Health and Productivity" – A two days National seminar was organized jointly by Department of Botany, Bangalore University, National Centre of Organic Farming, Ghaziabad and Regional Centre of Organic Farming, Bangalore during 30-31st Januray 2009. The Seminar was inaugurated by Shri B.P. Kaniram, Secretary, Department of Horticulture, Govt of Karnataka. He informed the gathering that recently the Chief Minister of Karnataka, Dr. B.S. Yeddyurappa has sanctioned Rs. 100 crores for promotion of organic farming in the state. He also informed that organic farming is very much on the priority agenda of the Govt of Karnataka. The Horticulture Policy of the state, envisages for development of organic villages of about 100-200 acres and clusters of such organic villages in various districts of the state for furthering organic policy. Prof. P.G. Chengappa, Vice Chancellor, University of Agricultural Sciences, Bangalore released the souvenir and emphasized the importance of organic farming in the context of soil health, safe food and growing organic food market. A marketing policy with a focus on sustainability of farmers, farming and soil is essential. Dr A.K. Yadav, Director National Centre of Organic Farming, speaking as Chief Guest underlined the importance of modern scientific system based organic farming approach. With very small area and mainly small and marginal farmers in rainfed and marginal land areas as target, organic farming is no threat to food security. On the contrary the system offers to strengthen those farmers who in spite of being 65% in number contribute just 35% to the food basket of the nation. Organic farming promises to increase the productivity of these farmers thereby increasing their share from present 35% to 50% with out any additional burden on the scarce resources. Organizers of the seminar were highly appreciated for their efforts to honour large number of scientists, workers, social activists and farmers who contributed significantly to the cause of sustainable development of agriculture in general and organic farming in particular. Dr. Bagyaraja, former Vice Chancellor of UAS, Karnataka was felicitated with life time achievement award. Farmer of the year award was conferred to Shri Anjena Murthy. Besides, scientists, teachers, Senior Government officers and students the seminar was also attended by large number of farmers from Karnataka, Tamilnadu and Andhra Pradesh. An exhibition of organic and biological inputs was also arranged for the benefit of participating farmers. The valedictory function was chaired by Dr. G.K. Veeresh, Former Vice Chancellor, UAS, Bangalore and Dr. Krishan Chandra, Regional Director, RCOF, Bangalore.

(Report by Dr. K. Chandra, RD, RCOF, Bangalore)

First BioFach India in Mumbai from 29th April to 1st May 2009 - The international BioFach family is growing. The first BioFach India takes place at the Bombay Exhibition Centre in the Indian metropolis of Mumbai from 29.4.2009 to 1.5.2009. The youngest daughter of the proud mother BioFach Nürnberg, the World Organic Trade Fair, is organized by NürnbergMesse. Nürnberg Global Fairs, its international subsidiary, is

responsible for the organization of the event. The exhibition will be supported locally by the Indo-German Chamber of Commerce. BioFach already brings together a total of 3,700 exhibitors and more than 100,000 trade visitors from all over the world. The organizers assume more strong growth through BioFach India. After Japan, the USA, Brazil and China, it is the fifth offspring of the world's biggest platform for the organic industry.

"The BioFach family reflects the entire international organic market in an incomparable way. The demand for organic products and especially for raw materials of organic origin is increasing worldwide. India with its cultural tradition and market structure offers enormous potential. The supply of organic products is growing strongly and the demand is also expanding noticeably. We are delighted that BioFach is welcome in India", says Herta Krausmann, Managing Director of Nürnberg Global Fairs. The market prospects are brilliant: India actively promotes organic agriculture and the growth of the organic market is also strongly supported politically on the Indian subcontinent. 100 million EUR is to be invested in 23 states, says the Indian Minister of State for Food Processing Industries, Shri Subodh Kant Sahay. 580,000 tons of organic products were produced in India in 2006 and 2007, reports the Agricultural and Processed Food Products Export Development Authority, APEDA. The export volume is 47 million EUR. Estimates by the International Competence Centre for Organic Agriculture, ICCOA, show that the organic farming area could grow to 2 million ha by 2012. The current organically farmed area is 865,000 ha. IFOAM is the patron of all five international BioFach daughters: India, Japan, the USA, Brazil and China as well as the mother of all organic trade fairs BioFach Nuremberg. ICCOA could be gained as Indian partner. For further details contact: Indo-German Chamber of Commerce, Ms Tanu Ailawadi, Tel +91 (0)11. 26 87-87 21 tanu@indo-german.com

BioFach América Latina - São Paulo, Brazil's number one business location, again becomes the meeting-place for the Latin American and international organic industry from 28-30 October 2009. ExpoSustentat will present its sustainability products and projects for the fifth time parallel to BioFach América Latina. The organizers expect more than 350 exhibitors and the lively interest of international trade visitors. 7874 visitors from 28 countries were delighted with the range of products in 2008. "Environmentally orientated action is of great international relevance. The organic industry is known for its commitment in this area, as it has supported the preservation of natural resources right from the start. Sustainability and Fair trade projects make an important contribution in this respect. We are proud to offer an international platform for trading products produced by organic, sustainable and fair methods at our Brazilian BioFach, the parallel ExpoSustentat and the accompanying conference," says Herta Krausmann, Managing Director of Nürnberg Global Fairs. The spectrum of products at ExpoSustentat ranges from raw materials for food and natural personal care, products from FSC-certified forestry or sustainable fisheries to craft products. The conference at BioFach America Latina and ExpoSustentat takes up topical market issues parallel to the exhibitions. The outstanding development of the international markets for natural personal care and natural textiles is one issue the conference examines. Others include the strongly growing bulk consumer sector. Speakers from various pioneering countries

describe their experiences. The BioFach América Latina and ExpoSustentat exhibitions invite the industry to experience the Latin American organic market and its great variety of products and sustainable projects. For further details Contact Nürnberg Global Fairs Messezentrum 90471 Nürnberg Germany Tel +49 (0) 9 11. 86 06-86 92

Energy Farming Summit 2009-Technical workshop on Economic Viability of establishing a Decentralized Energy Farm and Biorefinery and Launch of Growdiesel Mission 2020-After the success of Algae Biofuel Summit-2008, Growdeasel Climate Care Council has announced second International Conference "Energy farming Summit 2009" on April 12t and 13th, 2009 at New Delhi. Summit is aimed for an innovative decentralized "Integrated Energy Farming and Biorefinery Farming Model" to create millions of jobs, revive the world economy, slash poverty and avert environmental disasters as a result of global warming. The noble plan-which will be formally launched during the summit, shall call on world leaders, economist, strategists and key policy makers to promote a massive redirection of investment away from the speculation into food, fuel nad job creating programmes to restore the natural systems that underpin the world economy. The summit present a wonderful opportunity for corporate, Govt. and entrepreneurs to venture into futuristic energy farming-one of the best opportunities of this time. Interested person may contact: Growdiesel Climate Care Council, B-196, Surajmal Vihar, Delhi-110092 for participation or may visit www.growdieselevents.com

African Organic Conference 2009 (May 19th-22nd,2009)- The Conference will focus on clearly bringing out attributes of Organic Agriculture as a science relevant to sustainable development, poverty eradication and assured food security in Africa. Organic Agriculture impacts on all development sectors and elements of sustainability in a characteristic way, which is seriously needed to achieve lasting solutions to factors limiting economic growth on the continent. Furthermore, the conference will explore Organic agriculture as a science in contrast to other schools of thought, and how it relates to Biotechnology in contributing towards sustainable agricultural and economic development. Therefore, the conference will exhibit up to date scientific innovations and other development initiatives achieved over years. Participants will share and exchange that knowledge, which is very much needed for national development of the Organic Agriculture sector and Bio-safety programmes. Participation will be open to all scientists, industry and the private sector actors, who are involved in strategic activities, geared towards achieving lasting agricultural and economic development, as well as set Millennium Development Goals. For further information contact: Dr. Ssekyewa Charles Director of Research Uganda Martyrs University (UMU) P.O. Box 5498, Kampala-Uganda. Tel: +256-(0)382-410611 Fax: +256-(0)382-410100 Mobile: +256 (0)772-517158 Email: cssekyewa@umu.ac.ug Web: http://www.umu.ac.ug

BioFach China 27 - 29 May 2009, **Shanghai**-BioFach China is first and foremost an exhibition for traders. However, in emerging organic markets business-to-consumer communication is of particular importance. Pioneering organic companies are required to show and explain their brands to consumers and consumers who need to develop a more comprehensive understanding of the special features and particularities of organic food production. As a consequence, BioFach China will not only open its doors to consumers on the last day of the exhibition but also offer a specific consumer-education programme. If you wish to receive more information about BioFach China International Organic Trade Fair please visit: http://www.biofach-china.com

Advanced International Training Programme- 2009 on Organic Agriculture Development 31 July- 25 August, 2008, Sweden-The Swedish International Development Cooperation Agency (Sida) offers, as part of its bilateral development assistance, Advanced International Training Programmes of strategic importance to the social and economic development in the participants' countries. The International Training Programmes are specially designed for persons qualified to participate in reform processes of strategic importance on different levels and holds a position in home organisation with mandate to run processes of change. This methodology is based on the assumption that your country wish to carry out changes and are willing to invest own resources to achieve these changes. In the long-term perspective the programmes shall contribute to institutional strengthening and capacity development in the participants' countries. Training is focused on support to indivual or team plans for change. The plan shall be well established in the participant's organisation and is a basic part of the programme concept. The training program Organic Agriculture Development aims at providing the skills and knowledge needed for organizations/key persons in the public and private sector working for organic agriculture sector development. For more details contact: Grolink Torfolk SE-684 95 Höje, Sweden Phone +46 563 723 45 Fax: +46 563 720 66 doa@grolink.se, www.grolink.se

Canadian Organic Standards Training- International Organic Inspectors Association (IOIA) is collaborating with Canadian Organic Growers (COG), Organic Trade Association in Canada (OTA), Canadian Food Inspection Agency (CFIA) and regional cosponsors on a training project for producers, processors, inspectors (verification officers), and certifiers. Training for all audiences will be provided across Canada from mid-February through mid-March. These will provide the most comprehensive training available on the new federal organic rules that come into effect June 30th, 2009. For more details visit: http://www.ota.com/otacanada/workshops.htm

Peoples' Commission for Farmers, announced, as Punjab farmers need sustainable agriculture revolution. Ludhiana, March 8th 2009: A People's Commission for Farmers was announced today evening in a day-long dialogue at Wheat Auditorium, Punjab Agriculture University on **"Future of Organic Farming in Punjab: Its Importance in Punjab"** organized by Kheti Virasat Mission - KVM here today. The dialogue was the second round of discussion with Punjabi farmers and their friends, in response to the report by Punjab State Farmers' Commission in December which stated broadly that organic farming in Punjab will jeopardize the national food security.

Announcing the formation of 'People's Commission for Farmers', Umendra Dutt, Executive Director KVM says that the 'People's Commission for Farmers' signify people's aspirations and a pro-nature, pro-farmer, and pro-people view of analyzing ecological crises like contamination of natural resources and environmental health and thus evolving sustainable and environmentally just solutions. This commission will shortly bring its report on prevailing agro-ecological crises of Punjab, role of chemical farming in devastating rural economy and ecology of the state, and the need for a shift towards sustainable/organic farming.

Speaking on the occasion, Dr A K Yadav, Director, National Centre for Organic Farming (NCOF) said that, "There are records to show that Indian farming with its organic practices before the advent of industrial agriculture models indeed had high productivity levels in different parts of the country. There is also scientific data available now that modern day organic farming, which emphasizes the revival of life in our soils, also yields on par with or more than conventional chemical farms. There need not be any doubt at all about the ability of organic farming to feed the country. In fact, both for improvements of livelihoods and to

improve food safety for consumers, we need to shift to organic farming in a realistic way".

Modern day conventional agriculture has although increased food productivity and helped Indian economy to usher in to an ara of non-availability to surpluses, but it has been achieved on great costs. The time has now come to correct our development course and initiate measures to ensure not only safety but also sustainability concerns with focus of all R&D programmes on sustainable development added Prof R S Ghuman, Economist, Punjabi University.

Professor Jagmohan, National President of Association for Democratic Rights said, "The biggest thing is to save the soil of Punjab. The soil of Punjab has become the worst victim of excessive use of chemical fertilizers and pesticides. We have to save Punjab today to save India tomorrow. A new threat in the form of GM crops is looming large over the soil and farm ecology of Punjab. We have to oppose all these technologies. GM crops are bound to deepen the crisis further.

The main speakers in the dialogue included Dr A K Yadav, Director, National Centre for Organic Farming, Ghaziabad; Dr D U M Rao, Principal Scientist, Indian Agriculture Research Institute; Mr Subhash Sharma, leading natural farmer from Yavatmal, Maharashtra and several prominent farmers' leaders of Punjab.

The meeting concluded with a strong demand to start thinking about how to initiate a sustainable agriculture revolution in Punjab considering the need of the hour.

1st International IFOAM Conference on Organic Animal and Plant Breeding - BREEDING DIVERSITY – is scheduled at Sante Fe, New Mexico, August 25-28 2009 Fostering the sustainable development of new successful low input breeds is urgent in the face of future challenges of food insecurity and massive threats to the livelihoods of millions of people caused by climate change. Through the conservation and promotion of Agro-Biodiversity of both animal and plant genetic resources, organic agriculture will again prove to be a viable alternative to genetically modified organisms. Both organic plant and animal breeding are therefore gaining momentum in several parts of the world. Successful organic breeding is the basis of organic production, but it is only in early phases of development. The conference is aiming at encouraging the dialogue between commercial and subsistence farmers; scientists and practitioners; professional farmers and hobby gardeners/animal keepers to promote the lively exchange of experiences and perspectives on organic breeding. Even though technical aspects may differ dramatically, each field can inspire the other to develop and build upon successful strategies. This conference provides for the opportunity to revive traditional knowledge from the global North and South and connect it with the current international organic research. Through the fusion of traditional breeding knowledge and newly developed organic breeding methods, there is a great opportunity of intercultural learning and also valuing knowledge which was kept through generations for the well-being of communities. Because of the key role women play in the selection of seeds and management of small livestock the conference will center around their knowledge and contributions. Bringing all together in one international conference explicitly highlights important thematic and geographic interdependences and strengthens the holistic approach of organic agriculture in respecting and including the voices of the world's regions in their full diversity. For more details visit: http://www.santafe.org/

Book Reviews

Handbook of Organic Composting/Sudeep Guha. New Delhi, Dominant Pub., 2009, viii, 336 p., ISBN 81-7888-620-0.- "This book is a combination of the works and experiments of two leading naturalists Steve Solomon and Joseph Jenkins. Both are avid food gardeners who have immense experience in making their own composts and growing their own crops. Handbook of Organic composting also addresses two quite different groups of composters. The smaller group includes serious food gardeners like me or Steve and Jenkins, who have traditionally been interested in composting, soil building and maintaining soil organic matter. The other larger audience, does not grow food at all, or if they do it is only a few tomato plants in a flower bed. A few are apartment dwellers who may want to live with greater environmental responsibility. Topics like complex composting methods and the connections between soil fertility and plant health are positioned toward the end of the book, keeping first two thirds for the larger, or casual members of audience." Contents of book includes. I. Composting from agrowastes and biomass: 1. What is compost? 2. Composting basics. 3. Practical compost making. 4. Ideal materials for composting. 5. Methods and variations in making compost. 6. Vermicomposting: worms in compost making. 7. Humus, earthworms and soil productivity. 8. Maintaining soil humus. 9. Making superior compost. II. Successful composting and hummanure: 10. Alarming realities on earth and humans. 11. Various human wastes and manuring. 12. Compost biodiversity, myths and miracles. 13. Recycling scenario in the world

Biotechnology in Sustainable and Organic Farming : Scope and Potential/Vinod Kumar Jain. Jaipur, Oxford Book Company, 2009, viii, 308 p., ISBN 81-89473-63-1. The present book aims to delineate for the readers the role of biotechnology in enhancing sustainable and organic farming. It analyses and makes assessment of the scope and potential of the field especially as the use of both sustainable and organic farming increases and biotechnology itself advances to new levels. In addition, the text incorporates current trends and developments in the field, especially those which are pertinent to sustainable organic farming. Critical perspectives have been included, which look into the future prospects. Contents of book includes 1. Introduction. 2. Traditional organic farming practices. 3. Inputs for organic farming. 4. Relevance of organic farming. 5. Sustainable organic plant breeding. 6. Organic transplant production. 7. Genetically modified plants and organic agriculture. 8. Weed control in organic farming. 9. Organic agriculture and biomass production. 10. Organic farming and climate change. 11. Organic farming and food safety. 12. Assessment of organic farming and food assertions. 13. Organic farming: current trends and future directions

Organic Agriculture/edited by J.C. Tarafdar, K.P. Tripathi and Mahesh Kumar. Jodhpur, Scientific Pub., 2008, viii, 372 p., tables, figs., plates, ISBN 81-7233-505-2. This book provides an overall review of different tools for organic agriculture followed by discussions on sustainability. It covers the chapters on old and traditional tools of organic farming such as Ley farming, crop sequencing, agroforestry options etc. with latest reviews on them. Modern tools for organic farming such as biofertilizers, composting, biopesticides and residue management are discussed in detail. Socio-economic implications and farmers'

perceptions of organic farming practices are also explained with a focus on ecological health. The possibilities of knowledge exchange in organic agriculture are evaluated and it is assessed how a large-scale conversion to organic agriculture would impact on food security. The information contained in this book would prove very useful to the researchers, teachers, students and environmentalists engaged in ecofriendly sustainable agriculture. Contents of Book includes Issues of organic farming, Organic farming and its relevance in India, Relevance of organic crop production in present scenario of increasing prices of energy and depleting Nutrients Reserve, Challenges before biofertilizer industry: role for government and private sector, Residue management and composting and many more aspects of organic farming.

2009 Organic Farm Management Handbook ***Nic Lampkin, Mark Measures and Susanne Padel University of Wales, pb, 2008-***This eighth edition of the 'Organic Farm Management Handbook' comes out at a very challenging time. It is difficult to predict how the organic market will respond to rising food and fuel prices and the 'credit crunch'. In such as rapidly changing situation it becomes important to use conservative estimates and sound sensitivity analyses when preparing budgets for businesses in the organic sector. Each gross margin within this new edition contains sensitivity analysis for a range of prices illustrating the impact of possible change. In addition, this version also considers the likely impact of regulation changes from 1.January 2009 throughout. An essential business tool for all organic farmers, growers, consultants, students - or anyone involved in organic production.

Handbook of Organic Farming and Organic Foods with Vermi-Composting and Neem Products, New Delhi, Engineers India Research Institute, 2007, 572 p., ISBN 81-89765-05-1 - The word 'Organic' means origin from a living thing and farming with the philosophy of organic is to make production system alive with long life. It is not just to replace fertilizers and pesticide with manure and predators but it is an ongoing dynamic process for making healthy soil, and ultimately a vital living system of the world. Organic farming is similar to the other sustainable farming systems e.g. permaculture, eco-farming etc., which are based on harmony with nature or near to nature approach. The only distinguishing character is the *certification* of production in organic farming. Certification is a procedure in which certain rules and regulation have to be followed. This is necessary to obtain certificate from recognized agency. This agency certify that the product is produced strictly with organic methods. In this handbook almost all the aspects related organic farming are covered with a balanced approach. The author demonstrates the newness of the organic concept for readers. This will help the readers to discover easily the philosophical and technical differences between organic and conventional (synthetic input dependent) farming systems."

राष्ट्रीय जैविक खेती परियोजना के अंतर्गत राष्ट्रीय एवं क्षेत्रीय जैविक खेती केन्द्रों के पते और उनके कार्यक्षेत्र राज्य **List and Address of National and Regional Organic Farming Centres with states of their jurisdiction**	
निदेशक राष्ट्रीय जैविक खेती केन्द्र 204 बी खण्ड, सी.जी.ओ. परिसर–2, कमला नेहरू नगर, गाजियाबाद–201 002 (उ.प्र.) 0120-2721896, 2721905, 2753844 वेबसाइट : : www.dacnet.nic.in/ncof ईमेल : nbdc@nic.in उत्तर प्रदेश, उत्तराखंड एवं दिल्ली	Director National Centre of Organic Farming, 204-B Wing, CGO Complex-II, Kamla Nehru Nagar, GHAZIABAD - 201 002 (UP). 0120-2721896, 2721905, 2753844 Web: www.dacnet.nic.in/ncof, Email: nbdc@nic.in UTTAR PRADESH, UTTARAKHAND AND DELHI
क्षेत्रीय निदेशक क्षेत्रीय जैविक खेती केन्द्र 34, दूसरा मेन रोड, हेब्ब्ल, बापटिस्ट अस्पताल के पास बंगलूरू–560 024 (कर्नाटक) 080-23330616 ईमेल : biofkk06@nic.in कर्नाटक, केरल, तमिलनाडु, पांडिचेरी तथा लक्षद्वीप	Regional Director Regional Centre of Organic Farming, 34-II, Main Road, Hebbal,Near Baptist Hospital, BANGALORE-560024 (Karnataka). 080-23330616, Email: biofkk06@nic.in Karnataka, Kerala, Tamilnadu, Pondicherry and Lakshdweep
क्षेत्रीय निदेशक क्षेत्रीय जैविक खेती केन्द्र ए 153, शहीद नगर, भुवनेश्वर–751 007 (उड़ीसा) 0674-2544381 ईमेल : biofor04@nic.in बिहार, उड़ीसा, झारखंड, पंश्चिम बंगाल एवं अंडमान निकोबार	Regional Director Regional Centre of Organic Farming, A-153, Sahidnagar, BHUBANESHWAR-751007 (Orissa). 0674-2544381, Email: biofor04@nic.in Bihar, Orissa, Jharkhand, West Bengal and Andman & Nicobar
सहायक निदेशक क्षेत्रीय जैविक खेती केन्द्र 798 पटेल नगर, सीआइडी कालोनी के सामने, हिसार–125 001 (हरियाणा) 01662-242709 ईमेल : biofhr05@nic.in हरियाणा, हिमाचल प्रदेश, पंजाव, जम्मू एण्ड कश्मीर	Assistant Director Regional Centre of Organic Farming, 798 Patel Nagar, Opposite CID Colony, HISSAR-125001 (Haryana). 01662-242709, Email: biofhr05@nic.in Haryana, Himachal Pradesh, Punjab, Jammu & Kashmir
क्षेत्रीय निदेशक क्षेत्रीय जैविक खेती केन्द्र राज्य कृषि फार्म, मंत्रीपुखरी, इंफाल–795 002 (मनिपुर) 0385-2422217 ईमेल : biofmm01@nic.in आसाम, अरुणाचल प्रदेश, मेघालय, मिजोरम, मणिपुर, नागालैंड, त्रिपुरा तथा सिक्किम	Regional Director Regional Centre of Organic Farming, State Agricultural Farm, Mantripukhari, IMPHAL-795 002 (Manipur). 0385-2422217, Email: biofmm01@nic.in Assam, Arunachal Pradesh, Meghalaya, Mizoram, Manipur, Nagaland, Tripura and Sikkim
क्षेत्रीय निदेशक क्षेत्रीय जैविक खेती केन्द्र हीरा भवन, मकान संख्या 21, न्यू चुंगी नाका, आधारतल, जबलपुर–482 004 (मध्य प्रदेश) 0761-2460972 ईमेल : biofmp06@nic.in मध्य प्रदेश, गुजरात, राजस्थान, छत्तीसगढ़, दमन और दीव	Regional Director Regional Centre of Organic Farming, Hira Bhawan, House No.21, New Chungi Naka, Adhartal, JABALPUR-482 004. 0761-2460972, Email: biofmp06@nic.in Madhya Pradesh, Gujrat, Rajasthan, Chhattisgarh, Daman & Diu
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