जैविक खेती सूचना पत्र
ORGANIC FARMING NEWSLETTER

वर्ष–4 अंक 4 दिसम्बर 2008
Vol.4 No.4 December 2008

जैविक खेती सूचना पत्र, राष्ट्रीय जैविक खेती परियोजना के अन्तर्गत जारी एक बहुभाषीय तिमाही प्रकाषन है। जैविक खेती के उत्थान, प्रचार प्रसार व इसके नियामक तंत्र से जुड़े लेख, नयी सूचनाएं, नये उत्पाद, विषेषज्ञों के विचार, सफल प्रयास, नयी विकसित प्रक्रियाऐ, सेमिनार–कान्फ्रेन्स इत्यादि की सूचना तथा राष्ट्रीय व अर्न्तराष्ट्रीय समाचार विषेष रूप से आमंत्रित हैं। सूचना पत्र में प्रकाषित विचार व अनुभव लेखकों के अपने हैं जिसके लिए प्रकाषक 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 पाठकों

शुरुआती हिचकिचाहट के बाद जैविक खेती व्यवसाय धीरे धीरे उन्नति की ओर अग्रसर है। पूरा जैविक खेती बाजार जो कि प्रारंभ में केवल निर्यात पर निर्भर था अब राष्ट्रीय बाजार में अब अपनी पहचान बढा रहा है। प्रदर्शनियों में जेविक खेती की बढती लोकप्रियता इसकी द्योतक है। इंडिया ऑर्गेनिक व्यापार मेले की एक अंर्तराष्ट्रीय मेले के रुप में स्थापना जैविक खेती बाजार के विकास व उसकी ग्राह्यता की सूचक है। जैविक खेती के बारे में कम उत्पादनशीलता की भ्राँति भी अब धुंधलाी पडने लगी है। अनेक प्रयोगों द्वारा अब यह स्थापित हो रहा है कि जैविक खेती पारंपरिक खेती के समकक्ष उत्पादनक्षम व लाभकारी है।

प्रस्तुत अंक में इंडिया ऑर्गेनिक 2008 व्यापार मेले की बढती लोकप्रियता की झॉकी दी जा रही है। किसानों के खेतों पर धान की फसल पर किये गये प्रयोग के परिणाम जैविक खेती की उत्पादनशीलता इंगित कर रहे हैं। जैविक खेती की उत्पादनशीलता तथा उसके आर्थिक पहलुओं पर किसानों के विचार एक पुस्तक समीक्षा के रुप में इस अंक की प्रमुखता है। आशा है यह अंक संपूर्ण जानकारी व सूचना भंडार के साथ पाठको के लिये उपयोगी होगा।

Dear Readers

With initial hiccups the organic agribusiness is taking roots and gradually getting strength. Entire organic agribusiness which was mainly export market dependent is now spreading in domestic market. Increasing number of exhibitions on organic food is the indication. Maturing of India Organic trade fair to an established international event is the example of growing organic market. The misconception of organic agriculture being low productive is also getting eroded. More and more studies prove beyond doubt that organic system, if adopted properly is equally productive and much more profitable.

Present issue highlights India Organic 2008 as the growing strength of Indian organic agribusiness. Studies conducted on farmers fields on production potential and profitable system with most challenging crop rice prove that organic management systems are capable of yielding good productivity. Findings of a nationwide survey about the farmers' opinion on productivity and economics of organic system in the form of a book review is also an added attraction. I hope the issue presents entire spectrum of latest information to our readers

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Organic Package of Practices for Chili and Potato from Uttarakhand

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सारांश

मिर्च: . मिर्च एक महत्वपूर्ण मसाले वाली फसल है। भारत में इसका सर्वाधिक उत्पादन, उपभोग एवं निर्यात होता है। विश्व के लगभग 90 देशों को मिर्च का निर्यात भारत से होता है। भारत के सभी राज्यों में इसका उत्पादन होता है। आंध्र प्रदेश 32% उत्पादन के साथ सर्वाधिक उत्पादन वाला राज्य है। कर्नाटक मिर्च उत्पादन में दूसरे स्थान पर है।

फसल पद्धति एवं ऋतु:
सामान्यतया मिर्च की खेती एकल फसल के रूप में की जाती है किन्तु कुछ स्थानों पर इसे गाजर, बैंगन आदि के साथ भी लगाया जाता है। यह खरीफ की फसल है जिसकी नर्सरी का निर्माण पहाड़ी क्षेत्रों में मार्च के द्वितीय सप्ताह में तथा तराई वाले क्षेत्रों में मई माह में किया जाता है। पौध रोपण का समय पहाड़ी क्षेत्रों में अप्रैल के अंतिम सप्ताह से मई के प्रथम सप्ताह का होता है जब कि तराई वाले क्षेत्रों में जून के द्वितीय सप्ताह से जुलाई तक होता है।

मृदा:
मिर्च सामान्यतया सभी प्रकार के मृदा क्षेत्रों में उगाई जाती है। इसकी फसल के लिये उपयुक्त pH मान 6.5–7.0 होता है। जिन क्षेत्र के खेतों में जल भराव 24 घंटों से ज्यादा तक रहता है उनमें इसकी फसल खराब हो जाती है। भारी मिट्टी की अपेक्षा हल्की मिट्टी में इसकी खेती भली–भॉति होती है।

फसल परिपक्वन का समय भी विभिन्न क्षेत्रों में बदलते तापमान के साथ बदलता है। पहाड़ी क्षेत्रों में इसके परिपक्वन में 7–8 माह जबकि अन्य क्षेत्रों में 6–7 महीने लगते हैं।

प्रजातियॉ:
मिर्च की कई प्रजातियॉ उपलब्ध हैं जिनमें विभिन्न रंग, आकार एवं आकृति के फल लगते हैं।

पारंपरिक प्रजातियॉ:
लाल मिर्च: यह प्रजाति कम सिंचाई में भी हो जाती है। इसका फल पौधे से नीचे की तरफ लटका रहता है।
पीली मिर्च: इस प्रजाति की उपज लाल प्रजाति से ज्यादा होती है।
लाखूरी मिर्च: इसका आकार छोटा होता है तथा रंग में पीली होती है। यह स्वाद में अत्यधिक तीखी होती है अतः इसका व्यावसायिक रूप से काफी प्रयोग होता हैं।
जान्जीरी मिर्च: यह आकार में बड़ी और तीक्ष्णता में लाखूरी मिर्च से ज्यादा तीखी होती है।
अन्य विकसित प्रजातियॉ: पूसा ज्वाला, पूसा सदाबहार, पंजाब लाल, भाग्य लक्ष्मीं आदि हैं।

बीज चयन एवं उपचार:
जैविक विधियों द्वारा मिर्च के उत्पादन में बीजों का चयन देशी प्रजातियों से किया जाता है। सामान्यतया खेत में खड़ी फसल से ही बीज प्राप्त किये जाते हैं। ज्यादा ऊॅचाई तथा गहरे रंग के पौधे जिनके फसल ज्यादा तीखे होते हैं, से बीज प्राप्त किये जाते हैं। पहाड़ी क्षेत्रों से चयनित बीज अंकुरण की दृष्टि से अच्छे होते हैं। बीजों को भण्डारण से पूर्व 10–12 दिनों तक सुखा लिया जाता है। बीजाई से एक हफ्ते पहले बीजों को फलों से निकालना लाभदायक होता है। बीज/पौध को C.P.P., बीजामृत, अमृत पानी, पंचगब्य या ट्राइकोडर्मा से उपचारित करें।

बीजाई एवं नर्सरी निर्माणः

मिर्च खेती बीजों के सीधे छिड़काव द्वारा बुवाई कर तथा पौध रोपण विधि द्वारा की जाती है। सामान्यतया एक हैक्टेयर खेत के लिये 1.5 कि.ग्रा. बीज पर्याप्त होता है। बीज छिड़काव कम वर्षा वाले शुष्क क्षेत्रों में किया जाता है बीज छिड़काव खेत की तीसरी जुताई के बाद किया जाता है। बीजाई कतारों में भी की जा सकती है तथा दो कतारों के बीच 15–20 से.मी. की दूरी रखी जाती है। बीजाई के बाद 2–3 टन/एकड़ की दर से FYM डालें। जिन स्थानों पर पर्याप्त वर्षा होती है वहॉ पर नर्सरी में मिर्च की पौध तैयार की जाती है। इसके लिये बीजोपचार के बाद नर्सरी में FYM मिलाकर नर्सरी तैयार करें।

खरपतवारः

मिर्च की फसल के साथ अत्यधिक मात्रा में खरपतवार भी उगते हैं जिनको समय–समय पर निकालना जरूरी है अन्यथा ये मिर्च उत्पादन पर बुरा प्रभाव डालते हैं। सर्वप्रथम पौध रोपण से 20–25 दिन के मध्य खरपतवार निकालें, दूसरी बार खरपतवार निकालते समय खाली स्थानों पर नई पौध लगा दें। पहाड़ी क्षेत्रों में सामान्य रूप से पाई जाने वाली खरपतवार में प्रमुख दूधिया, दूब, कोदोन आदि हैं।

मृदा उर्वरता प्रबंधन एवं सिंचाईः

- शाम के समय 4–5 टन वर्मी कम्पोस्ट/ BD कम्पोस्ट को बीडी 500 के स्प्रे के साथ लगायें।
- हरी खाद के रूप में दलहनी पौधों का प्रयोग करें।
- सिंचाई के द्वारा अमृत पानी, पंचगव्य, वर्मी वाश आदि डालें।
- बीज/मृदा उपचार के रूप में एजोटोबैक्टर एवं एजोस्प्रिलम का प्रयोग करें।
- 4–5 दिनो के अंतराल पर सिचांई करें।

रोग नियंत्रणः

पौध गलनः

- नर्सरी निर्माण से पूर्व क्षेत्र की हरी पत्तियॉ एवं झाड़ियॉ हटा दें।
- नर्सरी से जल निकास की उचित व्यवस्था रखें।
- कमजोर पौधों को निकाल दें।
- राख का छिड़काव करें।
- 100 ग्रा. लहसुन 30 ग्रा. खाद तथा साबुन को आधे लीटर पानी में घोल लें। इसे 5 लीटर पानी से पतला कर खड़ी फसल पर छिड़क दें।
- 50 ग्राम ट्राइकोडर्मा कल्चर 8 x 8 मींटर के क्षेत्र में प्रयोग करें।
- बीजों को एजोटोबैक्टर से उपचारित करें।

चित्ती रोगः

- स्वस्थ बीजों को गो–मूत्र से उपचारित कर प्रयोग करें तथा फसल चक्र अपनायें।
- BD-501 के दो छिड़काव करें।
- अरण्डी, करंज एवं नीम की खली भी इस रोग के नियंत्रण में फायदेमंद है।
- एक कि.ग्रा. ट्राइकोडर्मा को वर्मीकम्पोस्ट के साथ मिलाकर एक एकड़ क्षेत्र में प्रयोग करें।

सफेद फफूंदीः

- बीज चयन के समय रोग ग्रसित बीज निकाल दें।
- 100 ग्राम मिर्च को पीसकर एक लीटर पानी में उबाल लें। इसे 10 लीटर पानी में मिलाकर एक नाली क्षेत्र में डालें।
- 1:9 के अनुपात में दूध एवं पानी के मिश्रण का छिड़काव करें।
- पुष्पन के समय BD–501 का छिड़काव लाभदायक होता है।
- एक लीटर गो–मूत्र के साथ लहसुन, यीस्ट एवं नमक के मिश्रण को 8 लीटर पानी में मिलाकर एक एकड़ खेत में छिड़काव करें।

कीट नियंत्रणः

थ्रिप्सः

- अयर को हरी खाद के रूप में प्रयोग करें।
- पुष्पन से पूर्व BD –501 का छिड़काव करें।
- प्रकाश जाल का प्रयोग करें।
- गोबार, गो–मूत्र, यीस्ट तथा BD खाद तथा शाकों को आठ लीटर पानी में मिलाकर छिड़काव करें।

कटवर्मः

- रोग ग्रसित पौधों को निकालकर जमीन में उपस्थित कीड़ों को नष्ट कर दें।

- 2 किलो ग्राम बाकान की पत्तियों को 10 लीटर पानी में मिश्रित कर एक नाली जमीन में डालें।
- 1 कि.ग्रा./एकड़ की दर से नीम की खली का प्रयोग करें।
  - BD–501 का छिड़काव करें।

आलू

भारत के लगभग सभी राज्यों में आलू की खेती की जाती है। आलू का अधिकतम् उत्पादन पंजाब, हरियाणा, उत्तर प्रदेश, बिहार एवं पश्चिम बंगाल में होता है। सामान्यतया आलू की फसल सर्दी के मौसम में ली जाती है। किंतु कुछ क्षेत्रों में इसे गर्मी एवं वर्षा ऋतु में भी उगाया जाता है। भारत में आलू के कुल उत्पादन का 81 प्रतिशत उत्पादन सर्दी में 13 प्रतिशत गर्मी में एवं 6 प्रतिशत वर्षा ऋतु में होता है।

फसल पद्धति, मृदा एवं परिपक्वन समयः

आलू की फसल एकल एवं मिश्रित फसल के रूप में ली जाती है। रबी में आलू की फसल मिश्रित फसल के रूप से ली जाती है। मिश्रित फसल में आलू के साथ मूली एवं पालक लगाया जाता है। खरीफ की फसल साधारणतया एकल फसल के रूप में ली जाती है। उत्तरांचल में आलू की रबी फसल से पूर्व धान या सोयाबीन एवं रागी की मिश्रित फसल ली जाती है। आलू की फसल लेने के पश्चात् खेत को कुछ समय खाली छोंड़ दिया जाता है तत्पश्चात् उसमें जून–जुलाई माह में धान की फसल लगाई जाती है। आलू की फसल सभी प्रकार की मृदा में ली जाती है। अम्लीय भूमि में आलू की फसल अच्छी होती है। सामान्य पी.एच. मान 5.5–7.5 उपयुक्त है। खाली मिट्टी में आलू में सूखापन आ जाता है। पहाड़ी क्षेत्रों में फसल परिपक्वन में 5–6 महीने लगते हैं। धरातलीय क्षेत्रों में फसल का समय 90–120 दिन तक का होता है। घाटी वाले क्षेत्रों में रबी की फसल 4–5 महीने जबकि खरीफ की फसल 3–4 महीनों में पक जाती है।

प्रजातियॉ

पारंपरिक प्रजातियॉः गोल आलू, लम्बा आलू, तूमड़ी आलू

उच्च उत्पादन प्रजातियॉः

कुफरी आनंद, कुफरी बादशाह, कुफरी स्वर्णा, कुफरी सिंदूरी, कुफरी चंद्रमुखी, कुफरी ज्योति, कुफरी मुतु, कुफरी लावकर, कुफरी देवा, कुफरी बहार, कुकरी लालीमा, कुफरी मेघा, कुफरी अशोका, कुफरी जवाहर, कुफरी सतलुज, कुफरी पुखराज, कुफरी गिरीराज, चिप सोना–3 और चिप सोना–2।

बीज चयन एवं बीज दरः

फसल कटाई के समय रोग रहित, अच्छे आकार के तथा अच्छे अंकुरण के बीजों को अगली फसल के लिये भण्डारित कर लिया जाता है। भण्डारण के लिये आलू को 1.5 मीटर गहरे गड्डे में डालकर मिट्टी और घास से ढ़क दिया जाता है। जैविक उत्पादन पद्धति में आलू के बीजों का कोई विशेष उपचार नहीं किया जाता है। बीजाई से पूर्व इन्हें एक दिन के लिये धूप में सुखा दिया जाता है। विभिन्न बीज–जनित बीमारियों से बचने के लिए बीज को रात भर जीवामृत में डुबोया जाता है।

25–55 मि.मी. से 25–75 मि.मी. आकार के कंद बीजाई के लिये उपयुक्त होते हैं। 35–40 से 45–50 ग्राम भार के कंद सर्वाधिक उपयुक्त होते हैं। फसल का उत्पादन बीज मात्रा के आधार पर बढ़ जाता है। आलू की बीजाई के लिये उपयुक्त बीज दर 20–25 या 30–35 क्विंटल/हैक्टे. तक होती है।

मृदा उर्वरा प्रबंध एंव सिचाईंः

उचित मात्रा में मृदा की उर्वरा शक्ति बनाये रखने के लिये खेत को कुछ समय के लिये खाली छोड़ दें तथा अनावश्यक खरपतवार को निकाल दें। खेत की जुताई के समय FYM डाले तथा बीजाई से 15 दिन से एक महीने बाद एक और FYM डालें। FYM के अतिरिक्त हरी खाद एवं कम्पोस्ट डालना भी फायदेमंद रहता है। CPP कम्पोस्ट डालने के बाद BD-500 एव अमृत पानी या जीवामृत या वर्मी वाश या पंचगव्य भी डालें। नत्रजन व फास्फोरस के लिये एजोटोबैक्टर एवं पी.एस.बी. जैव उर्वरकों का प्रयोग करें। खेत में सिंचाई का उत्तम प्रबंध रखें। पहली सिंचाई बीजाई के तुरंत बाद कर दें। दूसरी सिंचाई 12–15 दिन पश्चात् करें। तत्पश्चात् 6–10 दिन के अंतराल पर सिंचाई करते रहें। वर्षा ऋतु में जल भराव से बचने के लिये खेत से जल निकासी की सुचारू व्यवस्था रखें।

रोग नियंत्रण

पछेती झुलसा

- बीजाई से पूर्व खेत की 3–4 बार जुताई करें।

- ऊकेर का निर्माण करें जिससे आलू भली–भॉति मिट्टी में दबे रहें।
- रोग ग्रसित पौधों को निकाल कर खेत से दूर जला दें।
- फफूँद जनित रोगों से बचाव के लिये BD-501 का छिड़काव करें।
- 10 ग्राम ट्राईकोडर्मा कल्चर को 1 लीटर पानी में मिलाकर छिड़काव करें।

<u>अगेती झुलसा:</u>

- पछेती झुलसा में दी गई विधियॉ अपनाएं।
- वर्मीवाश व पानी का 1:13.5 लीटर की दर से मिश्रण बनाकर छिड़काव करें।

35 ग्राम BD-500 को 13.5 लीटर पानी में मिलाकर छिड़काव करें

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 and Tamil Nadu have already been published. Organic packages for Chili and potato specific for Uttarakhand is presented here.

Agriculture in Uttarakhand

The agriculture of the Himalayan state Uttarakhand has always been nature- and eco-friendly due to its rich traditional and distinctive practices. These areas have always been prosperous in biomass. Despite the limited irrigation facilities, fragmented and small land holdings, and non availability of modern inputs, agriculture in the Himalayas has supported its people for generations in adverse conditions and continued to remain, even today, the principal source of livelihood. The present study is an attempt to document the package of organic practices of the Himalayan farmers used in the cultivation of chilli and potato. The basic objective of the study is to make available information and literature on packages of practices for these two crops to the small and marginal farmers who need them the most and who can then use them to strengthen the movement for organic farming.

CHILI

The chili (*Capsicum annum L*) is an important spice crop, valued for its diverse commercial uses. India is a major producer, consumer and exporter of chili. Indian chili reaches over 90 countries in the world including Bangladesh, Bahrain, Canada, Italy, Israel, Japan, Malaysia, Netherlands, Philippines, Singapore, Spain, Sri Lanka, Saudi Arabia, USA, and UAE. Chili cultivation has its origin in South America. The Portuguese introduced the plant in India during fifteenth century.

Area and distribution - In India, chili is grown in almost all the states. Andhra Pradesh is the largest chili growing state and accounts for 32 percent of the country's total chili cultivation area. Next in importance are Karnataka and Maharashtra. As per statistics of 2002–03, the total area of chili cultivation was 7,58,000 ha with annual production of 12,87,000 tonnes, at an average productivity of 16.98 q/ha.

Climate - The chili plant requires a warm, humid climate during early stage of growth and dry weather at maturity. Chili is grown both in tropical and subtropical areas up to 2100m above sea level. In rain-fed areas, annual rainfall should not exceed 75–100 cm. Excessive rainfall causes defoliation and rotting. In north India, chili is grown in the summer season. Ideal temperature for the growth and budding of the crop is 21–27^{0}C. Excessively high or excessively low temperature and dry winds adversely affect the crop.

- **Cropping system -** Chili is usually cultivated as a mono crop but in some places it is cultivated along with ugal, brinjal, carrot, etc. Mixed cropping is usually

adopted in those areas where the transplantation method is used. In non-irrigated areas, the field is kept fallow for some time before chili is cultivated and after it is harvested, wheat, mustard or a mixed crop of wheat and mustard is cultivated in the field.

Growing season - Chili is cultivated as a kharif crop. The schedules of chili cultivation in different geographical areas are as follows:

Hill areas

- Nursery preparation: second week of March.
- Transplantation: last week of April–first week of May
- Broadcast sowing: third week of February–first week of March

Plain areas

- Nursery preparation: in the month of May
- Transplantation: last week of June–second week of July

Soil - Chili is grown in different types of soils, ranging from sandy to heavy clay. A well drained, fairly light, fertile loam with fair moisture holding capacity and pH ranging from 6.5–7 is considered to be ideal. Heavy soil is not suitable for raising chili during the rainy season. Water stagnation for more than 24 hours leads to the death of chili plants. Light soils produce better quality chili compared to heavy soils.

Duration - Due to its cultivation at different temperatures and timings, the duration of the crop also varies. In the high hills, it takes 7–8 months while in the valleys, tarai and plains the duration is 6–7 months. Seedlings are kept in the nursery for around 30–35 days before being transplanted in the main field.

Varieties - There are several varieties of chili with large variations in fruit colour, shape and size. Varieties having thin pericarp, low seed content and strong spike are suitable for use as dry chili.

Traditional varieties

- Red chili : A variety that can survive with minimum irrigation. The fruit hangs from the plant, inclined downward.
- Yellow chili : Its yield is higher than that of the red chili variety. Its fruit hangs downward from the plant.
- Lakhauri chili : Small in size, light yellow in colour and very pungent. Commercially preferred due to its pungency.
- Janjiri chili : Larger in size and even more pungent than the Lakhauri chili. It points upwards while growing on the plant.

Improved varieties

Pusa Jalwa : The variety is resistant to fungal diseases. Fruits are thin and approx. 8–12 cm long and they hang vertically on the plant. Dry chili yield, 10–25 q/ha.

Pusa Sadabahar : A red-coloured variety, can last for 2–3 years. Its fruits are 6–8 cm long and stand straight on the plant while it is growing in the field. Its yield as dry chili is 8–15 q/ha.

Punjab Lal : Red coloured variety 4–5 cm long and stands straight on the plant. Its yield as dry chili is 6–8 q/ha.

Bhagya Laxmi : This variety can be cultivated even in dry and arid areas. Its leaves are small and the fruit is 4–5 cm long and dark in colour. Its yield as dry chili is 8–11 q/ha.

Besides these, Andhra Jyoti, Aparna, Arka Lohit, Kashi Anmol, Kashi Vishwanath, Utkal Ava, CH-1, CH-21, NS-101, 3, Jawahar, K1, K2, MDU1, Musalwadi, NP 46a, Pant C-1, Pant C-2, Sankeshwar 32, Sindhur, Ujjwala are the other important varieties.

Seed Selection - Under organic system, seed is selected from locally grown crops. In fact, the seed plants are selected in the field itself from the standing crop. Tall, dark plants with greater pungency are chosen for the purpose. The selected plants must be healthy and free from disease. The fruit must taste good. Chilies from selected plants are separately dried and stored to avoid contamination from infected fruit. Seeds from plants grown in higher altitude area are preferred as seed from colder climate germinates faster at lower altitudes. Early germination helps to control the growth of weeds and early maturity of the crop protects it from pests.

Treatment - Chili seeds are carefully dried for 10–12 days in the sun before storage. In regions where chili is cultivated by transplantation, the chilies are first broken in a well-cleaned vessel, 2–3 days before the sowing and the seed is soaked in cow urine and water. Chili seeds remain viable for two years. Extracting seed from the fruit one week before use ensures best results. If chili is cultivated by broadcasting, the chilies are threshed lightly to spread the seeds. Treatment of seed with cow pat pit, beejamrut , amrut pani, panchagavya or *Trichoderma* ensures good yield and healthy crop. Treatment of seedlings with jeevamrut can protect the crop from disease.

Cultivation - The appropriate time to cultivate chili depends upon temperature, rainfall and the availability of irrigation facilities. Before sowing the chili seed by the broadcasting method, the field is ploughed at least thrice. About 3–4 tonnes of FYM are applied to the field. The field is tilled three to four times to get rid of pests. Tilling ensures that the insects together with their eggs, larvae and pupae hidden in the soil are brought to the surface where they are eaten by birds or insects or destroyed by exposure to the heat of the sun. In the highlands which are prone to snowfall, FYM is spread over the field to protect the seed from the snow and to assist in its timely germination. Burning of crop residues and other vegetation in the field is not an eco-friendly practice. It affects the health of the soil as burning destroys beneficial microbes too. Instead of burning weeds and shrubs, farmers 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 unwanted vegetation.
- Remove the unwanted vegetation from the field and burn it outside the field area.

Sowing methods - Chili is cultivated in hills both by direct broadcast of seed in the field and also by transplanting seedlings from a nursery. Approximately 1.5 kg seed is sufficient for one hectare.

Broadcasting - Seed broadcasting is done in the rain-fed areas and areas with deficit irrigation facilities. In the broadcasting method, the seed is sprayed after the third ploughing. Thereafter, the field is levelled with the help of a hand harrow or kudal and the seeds are covered with a thin layer of soil to prevent them from sinking too deep into the ground. Seed can also be sown in rows, in alternate lines made by the plough. The distance between two seeds in the line is 15–20 cm. After sowing, the pata (plank) is applied to the field to level it and FYM @ 2–3 tonnes/acre is spread over the field. FYM supplies nutrients to the plants by providing necessary mulch. In order to maintain uniformity of seed distribution in the field and to protect the seed from flying away, the seed is mixed with dung before being broadcast. Goat dung also enhances the germination power of the seed.

Nursery preparation techniques - In areas with appropriate irrigation facilities, seedlings are grown in nursery and subsequently planted in the main field. Nursery beds are preferably located in partially shaded areas. The nursery beds are raised by repeated ploughing. Weeds and shrubs are burnt and the ash spread over the portion of the field selected as the nursery. Thereafter, FYM is applied by spreading it all over the nursery. With a hand harrow or a spade, the nursery is tilled and levelled so that the ash and the FYM are mixed with the soil. The treated seeds are then uniformly spread all over the nursery. It is covered with paddy straw and grass as mulch material to provide optimum conditions for quick germination. This helps to retain the moisture of the soil and protect the seed from birds and other creatures. The plants in the nursery are watered every morning and evening. Watering by hand or sprinkling reduces the possibility of seed displacement.

Spacing - In Maharashtra and Karnataka, spacing of 75 x 75 cm or 90 x 90 cm is generally practised whereas in Andhra Pradesh and Tamilnadu, closer spacing of 45 x 45 cm is followed. The short stature chili Jwala and NP- 46 require a spacing of 60 x 45 cm. Generally, closer spacing is ideal in light soil. For rain-fed chili cultivation,

closer spacing of 90 x 20 cm is recommended.

Weeds - Weeds are found in plenty in chili cultivation and if the fields are not periodically weeded, the weeds compete with the chili plants and prevent their growth, thus affecting production. In hilly areas, the major weeds found in chili fields are dudhia (Euhorbia geniculata), doob (Cynodon dactylon), kodon (Eleusine indica), etc. To protect the crop from weeds, the field is harrowed and weeded three to five times during the crop season. Weeding is first done after 20–25 days of plantation. In case of crops sown by broadcasting, the first weeding is done after the growth of 4–5 leaves on the plant. The second weeding is done 15 days after the first one. Gap filling and spacing is also done during the second weeding. The weeded out plants are left in the field itself to dry up in the heat of the sun. They act as cover for the plants, and subsequently transform into manure. The third weeding is done at the stage of 8–10 leaves. The first and the second weeding are done using a kutla with a long sharp edge whereas the third weeding is done with a kutla having a small edge. The fourth weeding is completed before the flowering of the plants so that the flower does not fall during the process. During this period, soil is heaped around the plants. Mulching soon after sowing is recommended to prevent the growth of weeds.

Other crop-specific agronomic practices - To protect the crop from pests and disease, the field used for chili cultivation is changed every year and is left fallow for 3–4 months before planting the next crop. To increase the intensity of chili seeds, branches of the plant are trimmed at a distance of 2–3 cm and dung manure is applied to it. This protects the plant till the next crop, and they start budding again in March–April. The chili fruit obtained from these plants is more pungent. In the local language, such plants are called muni/pedi (ratoon).

Managing Soil Fertility - A variety of organic fertilizers are used depending on the area in which chili is grown and on the fertility of the soil. Application of 4–5 tonnes of vermi/BD compost, supplemented with one spray of BD 500 in the evening increases the yield by increasing the fertility of the soil. Major nutrients required for good production of chili are nitrogen, phosphorus and potash. Green manure, cultivation of legumes, incorporation of cow pat pit manure, supplemented with one spray of BD 500, application of amrut pani through the irrigation water and frequent sprays of vermiwash/panchagavya fulfill this requirement. Use of biofertilizers, e.g., azotobacter and azospirillum is also recommended for chili cultivation. Azospirillum is more effective than azotobacter. It can be applied as seed treatment, seedling treatment or directly mixed with the soil.

Water Requirements - During the first month of transplanting, the plants are lightly irrigated.

In summer, irrigation on alternate days is sufficient. Chili farming in Uttaranchal is by-and-large dependent on the rains. In case of inadequate rain, the crop is irrigated in accordance with the variety of the seed and the quality of the soil. After transferring from the nursery to the main field, the plants are watered for a month, at intervals of 4–5 days. In case of directly sown chili, weekly irrigation is needed during peak summer. Traditional khals are also used for irrigation.

Plant diseases

Damping off (Pythium apharidermatum) - Damping off disease caused by fungus, generally infects the plants at nursery stage. Under its impact the plant becomes weak and its leaves fade and fall. This disease is sighted at nursery stage itself and is caused by excessive number of plants or crowding, lack of appropriate drainage and high temperature.

Management

- Before preparing the nursery, green leaves and bushes in the field are destroyed.
- Proper drainage in the nursery is maintained.
- Weaker plants and weeds are weeded out to ensure proper plant density in the nursery.

- Ash is sprayed in the field.
- A mixture of 100 gm garlic and 30 gm khadi soap dissolved in 0.5 litre of water diluted with five litres of water may be sprayed on the standing crop on one nali of land.
- 50 gm of Trichoderma viride compost for an area of 8x8 metre chili nursery is reported to be effective in protecting the seedlings from damping off disease.
- Seed treatment by azotobacter is recommended to protect the crop from fungal infestations.

Anthracnose (Collectotrichum caprici) - This fungus-based disease causes maximum harm to the chili crop. The top of the infected plant starts drying, leading to the eventual death of the plant. The infection also affects the beans when they are ripening, causing black spots to appear on them and gradually the beans themselves become black and fall. This disease infects the plants from budding stage onwards.

Management

- To protect the infection from spreading, the infected plants are weeded out from the rest of the crop.
- Extract of one kg leaves of khin (Sapium insigne) mixed with 20 litres of water is sprayed on the crop.

- Treatment of seed using jeevamrut , beejamrut , azospirillum and azotobacter is also recommended.
- Dusting of ash, spraying of sour butter milk and spraying of cow/goat urine also help to control the spread of disease.
- Treating the seedlings with 20 gm of Trichoderma mixed with one litre of water is also useful.

Chitti rog (Xanthomonas vesicatoria) - This disease infects the crop during September–October. It affects the leaves, stem and the fruits. Small spots are sighted on the infected leaves and the fruits gradually become yellow and eventually fall. This disease infects the standing crop during the rains and continues to have impact till the ripening of the crop.

Management

- To avoid the disease, only healthy seeds treated with cow urine are used and the crop cycle is strictly adhered.
- Two foliar sprays of BD 501 are effective in controlling this disease.
- Use of castor cake, karanj cake and neem cake is also effective.
- One kg of Trichoderma mixed with vermicompost/compost and applied per acre to the field during field preparations protects the crop from chitty rog.

Powdery mildew (Leveillula taurica) **-** White spots appear on the leaves and stems and white wounds on the lower sides of the leaves. The disease appears at the time of flowering of the plants and infects the older leaves more easily. Gradually it spreads to the other leaves as well.

Management

- Infected chilies are avoided when selecting seed.
- A solution of 100 gm of crushed chili, boiled in one litre of water and mixed with 10 litres of water is sprayed over one nali of land.
- A solution of milk and water in a ratio of 1 : 9 sprayed on the plants is highly recommended.
- At flowering stage, foliar spray of BD 501 is also effective.
- One litre mixture of cow urine, garlic, yeast and salt mixed with eight litres of water and sprayed per acre of land protects the crop from powdery mildew.

Problem insects

Thrips (Scint othripsdorsalis) - The insect infects the standing crop. It sucks the juice of the plants and causes maximum harm at the time of flowering. The leaves fade and the yield is adversely affected.

Management

- Leaves of ayar (Lyonia ovalifolia) used as green manure minimize damage from this pest at night.
- Spray of BD 501 before flowering is useful to check the pest infestation.
- Light traps in the field are also a useful measure to control the pest.

- Spraying per acre one litre of liquid manure (mixture of cow dung, local herbs/grasses, cow urine, yeast and BD preparations) mixed with eight litres of water helps in protecting the crop from the insect.

Cutworm (Agrotis ipsilon) - It is a thin, brown-coloured insect, 2–4 cm in length. Its shape is like that of a white grub and in the local language it is called uksu. This worm grows underground and infects the roots of the chili plant. It cuts the plant on the surface of the field in the initial stages itself and the plant dies.

Management
- The infected plants are removed and the pest inside the earth located and killed.
- The pests are killed by spraying an extract of 2 kg bakain leaves mixed with 10 litres of water on one nali of land.
- Neem cake extract @ 1gm/acre protects the crop from cut worms.
- Foliar spray of BD 501 at the stage of 3–4 leaves during the northwards lunar position is also recommended.

Aphids (Aphis gossypii) - This light-green coloured insect sucks the juice from the flowers and the soft leaves, mutilating them and causing them to fall.

Management
- The insects are killed with a spray of the extract of 2 kg of bakain leaves mixed with 10 litres of water per nali of land.
- Light traps can be used to protect the crop from aphids.
- Spray of 1 gm BD 501 in one acre land at the stage of flowering protects the crop from infestation by aphids.

Other general solutions
- Apply 4–5 tonnes of vermicompost/BD compost supplemented with one spray of BD 500 in the evening. Application of BD 500 in the evening before sowing increases the yield.
- For better yield and tolerance to fungal diseases two foliar sprays of BD 501 are recommended.
- In case of bunchy top disease, dusting with ash, or spraying with sour butter milk or liquid waste of tanned leather or cow/goat urine are also resorted to by some tribes.
- In the case of soil borne diseases such as root rot and collar rot, castor cake, karanj cake or neem cake are applied to the soil.
- Milk solution (one litre milk in nine litres of water) effectively controls powdery mildew and viral diseases.

POTATO

The potato (Solanum tuberosum) is an important vegetable belonging to the family Solanaceae. It is believed to have been introduced in India from Europe in the early seventeenth century. China, Russia, Ukraine and India are the leading potato growing countries of the world. India stands at fifth position, both in terms of area and production of potato. The potato is rich in protein, fat, carbohydrates and minerals. In fact, it is considered to be a complete, nutritious staple food.

Distribution - In India, the potato is grown in almost all the states. Nearly 80 percent of the crop is grown in the Indo-Gangetic plains comprising Punjab, Haryana, Uttar Pradesh, Bihar and West Bengal. Potatoes accounts for about 1.23 percent of the gross agricultural produce in India. The potato is generally cultivated in winter but in a few areas it is also cultivated during the summer and rainy seasons. Of the country's total potato production, 81% is cultivated during winter season, thirteen percent in summer and six percent during the rainy season.

Area and production - According to 2003–04 data, the potato is cultivated in 1.28 million ha in India with a production of 23.27 million metric tonnes. In Uttaranchal, potato is cultivated in 19,000 hectares with a yearly production of about 3,40,000 metric tonnes. A cold climate is most suitable for potato cultivation, although it can be grown in a wide range of climatic zones. In the plains, the potato is grown in winter whereas in the hills it is cultivated in summer. Optimum temperatures for potato growth and development range from 15°C and 25°C. Minimum night temperature is of great importance for tuberisation and yield. Temperature below 21°C is favourable for

tuber formation. At temperatures above 21°C, there is a sharp fall in tuberisation. At low temperatures, the vegetative growth of the plants is restricted and when the temperature is near freezing point, permanent injury is caused to the plant.

Cropping system and the crop pattern
The potato is grown as a single as well as a mixed crop. The rabi potato crop is generally cultivated as a mixed crop. It is mixed with radish (mooli) and spinach (palak). The kharif crop is generally cultivated as a single crop. But in some high mountain regions, after the crop is ready in July, it is left inside the ground, and mustard is cultivated as a mixed crop in the field. In October, along with the harvesting of the mustard, the potatoes are dug out while tilling the field. This pattern is prevalent in the Urgam valley of Garhwal in Uttaranchal. Before cultivation of the rabi potato crop, paddy or a mixed crop of soybean and ragi is grown in the same field. After harvesting the potato crop, the field is kept fallow for some time and is then used for paddy cultivation in June–July. In those regions which do not have adequate irrigation facilities, instead of paddy, soybean and ragi are cultivated in the fields after the harvesting of potato. As a kharif crop, before potato is sown, the field is kept fallow for a minimum of three months (December–February). In some areas, sowing of French bean or soybean prior to sowing of potato is also a well established practice. For better yield of potato, and also to protect it from pests, annual rotation of the field is considered to be a healthy practice. Some of the important rotations are: Rajma/potato + mustard-Potato, Paddy-Potato, Soybean + ragi-Potato and Maize/soybean-Potato.

As a summer crop, the fields are ploughed during May and June to reduce the incidence of soil-borne diseases and control perennial weeds. In some areas, green manure crops like dhaincha and sunhemp are also sown before the onset of the monsoon. The crop is ploughed and buried in soil after 7–8 weeks. This practice supplements the nutrient requirement of the crop by 20–30 percent and improves potato yields. At the time of final field preparation, 5–6 ton/acre of FYM is used. After one to one and a half months of sowing, another 2–3 ton/acre of FYM are applied near the roots. Alternatively, 4–5 tons of vermi/BD compost can be ploughed into the soil before planting. After deep ploughing and good pulverisation of the soil, when the seed bed is ready, the tubers are planted in lines. The first line is drawn with a rope and subsequent lines are marked at distances of 60 cm, row to row, with the help of a marker. Planting is done in the morning or in the evenings to avoid the midday heat.

Soil - The potato can be grown in all the types of soils, but light, well-drained, sandy loam soils are ideal. With adequate nutrition, the potato grows well even in sandy soils. Heavy types of soils are not well suited for potato cultivation. Potato plants grow better in acidic soil but can also grow in the neutral range (pH 5.5–7.5). Black soils are prone to cracking and drying, and will expose the tubers to sun and hence are not suitable.

Duration - In hilly areas, the average crop duration is 5–6 months, though in a few regions farmers start digging out the potato earlier, by July itself. However, the crop is generally left in the field till October, after which it is harvested. The late-harvested potato is considered to be fully ripened and most suitable as seed. In the plains, the crop duration varies from 90–120 days, depending upon the varieties sown. In the valleys, the duration for the rabi crop is 4–5 months and 3–4 months for the kharif.

Growing season - The planting and harvesting schedule in different regions needs to be carefully timed in order to provide favourable temperature for crop growth and tuberisation for the longest possible period. In the hills, planting is undertaken when the chances of ground frost occurrence are over or are remote. In the plains, the main planting commences when the temperature does not impair emergence of the bulb and the normal growth pattern of the plant. Planting time in mid-hills is in January, in high hills in March–April and in very high hills, in May–June. In general, for every rise of about 200 meter elevation, the planting and harvesting times

are delayed by about a month. Planting in the northern plains starts from October and extends to November. In the mid-hill regions of Uttaranchal, sowing begins in the first week of April and is completed by the end of the month. Harvesting begins in October. In the valleys, the potato is a rabi as well as a kharif crop. As a rabi crop, its sowing begins in the first week of November and the crop is ready for harvesting by the first week of March. As a kharif crop, its sowing begins in the month of April and the crop is harvested in July.

Varieties - The traditional varieties of potato are as follows:

- Gol Aaloo – A red coloured, round, very tasty potato. Its seed is easily available in the local markets.
- Lamba Aaloo – It is elliptical in shape and has 5–6 budding points so that 5–6 seeds are cut from one potato. It gives very good yield.
- Tumadi Aaloo – Very tasty and high yielding.

High yielding varieties - In recent years, a number of potato varieties have been developed by the Central Potato Research Institute, Shimla, to suit different climate and soil conditions. Some of the important and popular varieties are: Kufri Anand, Kufri Badshah, Kufri Swarna, Kufri Sinduri. Some other varieties developed are Kufri Chandramukhi, Kufri Jyoti, Kufri Muthu, Kufri Lauvkar, Kufri Dewa, Kufri Bahar, Kufri Lalima, Kufri Megha, Kufri Ashoka, Kufri Jawahar, Kufri Sutlej, Kufri Pukhraj, Kufri Giriraj, Chip Sona-1 and Chip Sona-2.

Seed Selection - In Uttaranchal, during the harvesting of the crop, disease-free, well shaped, big size and healthy potatoes with good germination possibilities are selected and stored as seed for the next crop. These seed potatoes are stored in a 1.5 metre deep pit, covered with soil and grass above ground level to avoid seepage of water.

Under organic management the potato seed is not subjected to any special treatment. Before sowing, the seed is dried in the sun for a day. For obtaining higher yield and preventing infestation of pests and diseases, it may be useful to treat the seed by soaking it overnight in jeevamrut .

Seed size and spacing - All sizes of tubers can be utilized as seed but medium size (25–55 mm or 25–75 g) tubers are better than other grades. Tubers of 35–40 mm or 45–50g are considered to be ideal. The potato yield increases with increase in seed rate. The optimum seed rate for getting high yield is 20–25 or 30–35 quintals/ha depending upon the tuber size. In recent years, true potato seed (TPS) is being promoted in certain regions for avoiding or reducing the incidence of viral and other diseases. TPS seedlings are first raised in a nursery and then transplanted after 30 days (3–4 leaf stage) in the field at 50 cm x 10 cm spacing.

Cultivation - For potato cultivation, the following practices are adopted in the hilly tracts of Uttaranchal:

- Burning of leaves and other weeded out vegetation and trash, to protect the crop from soil-borne diseases. But as burning is not permitted under organic management, it should be avoided.
- Use of green leaves as manure, to increase pest resistance and improve soil.
- Before sowing, the field is subjected to 3–4 deep tillings to expose the eggs and larvae of pests and other harmful worms to the sun.
- At the time of the second harrowing, the soil is heaped around the stem to prevent pest infection of the underground growth of the potato.
- Dry grasses and organic wastes are burnt in the field identified for potato cultivation. The ash is evenly spread over in the field followed by the use of dung manure (FYM). The field is then covered with green leaves collected from the forest. For green manure, generally the leaves of oak *(Qurecus incana*), burans (*Rhododendron* sp), pati (*Artemisia* spp .), poplar (*Populus* spp.), etc., are used. The manure of these leaves also has pest control qualities.
- The field is then tilled using a local indigenous plough and a wooden plank (pata) is applied to it to level the soil.

- Then the field is left for 10–15 days so that the manure and the leaves are assimilated in the soil.
- The well-crushed FYM is again spread over the field before it is once again tilled. The last tilling takes place 5–6 days later.
- Now the field is ready for planting the tuber. The drains along the straight lines are made by a pickaxe or a spade.
- The seeds are sown at appropriate distances in the heaps between the drains. These are then covered with soil from both sides with a spade.
- Sometimes, heavy rainfall after a month of sowing hardens the upper layer of the soil and there is a possibility of the seed rotting. In such a situation, the hard layer is lightly harrowed with a kudal to facilitate quick germination.
- In order to protect the crop from pests and diseases, the crop cycle is strictly adhered to.

Managing soil fertility - In order to maintain the fertility of the soil, the field is left fallow from time to time so that it can rejuvenate itself. For retaining the fertility of the soil, the extra growth of any vegetation and the weeds are pulled out during the first tilling of the field. FYM is normally provided during field preparation and after one to one and half months of sowing. The manure is directly applied near the roots of the plants. Besides FYM green manure and compost ensures, further enrichment of the soil. Application of cow pat pit followed by a spray of BD 500, amrut pani or jeevamrut or vermiwash or panchagavya as per convenience gives good result. Besides, inclusion of legumes in the system as inter or cover or companion crop also helps to supplement nutrient requirements. Biofertilisers, namely azotobacter and phosphobactrium provide nitrogen and phosphate to the soil.

Interculture - Interculture is confined to weeding and earthing-up. Earthing-up and weeding of potato fields are done as soon as weeds emerge, but preferably when potato plants are about 8–10 cm high. After around one month of planting, light harrowing is done with the kudal. The weeds, thus tilted and exposed, are left in situ to be transformed into manure. The second harrowing is done 10–15 days after the first one. The first harrowing is done with a very pointed kudal, whereas the second harrowing is done with a less pointed kudal. During the second harrowing, apart from weeding, soil is heaped around the roots of the potato plants. This process is called uker (earthing up) in local parlance. Uker helps to increase the yield and protect the crop from pests.

Water requirements - Adequate and regular water supply is needed for sustained growth. The crop in the high hills and plateau regions in the kharif season is rain-fed, whereas in the plains it is grown under irrigated conditions. First irrigation is given immediately after planting, particularly if the soil is dry. Second irrigation may be given after 12–15 days. Subsequent irrigations may be given at intervals of 6–10 days, depending upon the nature of the soil and the availability of water. Deficiency of water reduces tuber yield. Mulching helps to get higher yield and saves on water. The rabi potato crop in the mountains generally depends upon rainfall for irrigation. But whenever there is insufficient rain, the crop is irrigated as needed. To save the crop from excessive rain at the time of harvesting, a drainage system is created in between the rows.

The rainfall in the hills is much higher than the evapo-transpiration rate. The excess water can be stored in farm reservoirs and used in the form of supplementary irrigation when required. Even a single irrigation at the critical tuber initiation stage can increase the yield considerably. In the plains, the potato is grown under assured irrigation because the winter rainfall is very little. In general, three methods, i.e., furrow, sprinkler and drip are adopted in different areas as per availability.

Management of diseases

Late blight (Phytopthora infestans) - Late blight disease, in the local language, is known as jhulsa rog. It is caused by a fungus which affects the leaves, stems and roots. Its symptoms appear in the form of green spots on the leaves, which gradually

change into black and brown spots. Some cotton-like growth appears on the underside of the infected leaves. A 2–3 cm long, purple scratch appears on the stem of the infected plant and the plant looks thin and weak. The infested potato has brown spots on it and is pink inside.

Management
- The yearly crop cycle is adhered to.
- The field is subjected to 3–4 deep tillings before sowing so that the soil gets treated by the heat of the sun.
- Uker (soil heap uniformly constructed along the rows) is created to ensure that the potatoes are not left uncovered.
- The infected plant is taken out and burnt somewhere else and not in the field.
- Pest-resistant seed should be used. Advisable varieties of seeds for the plains of north India are Kufri Jyoti, Kufri Badshah, Kujri Sinduri and Chipsona I & II.
- For mountainous regions Kukri Jyoti , Kufri Swarna and Kufri Kanchan are advised.
- To reduce the chances of fungal diseases, two foliar sprays of BD-501 are recommended during the flowering and fruiting stage.
- 10 gm of Trichoderma culture mixed in one litre of water should be sprayed on the crop.

Early blight (Alternaria solani) - Locally known as ageti jhulsa rog, infects the leaves. It is caused by the periodic summer. The fungus spreads through the air and spreads under excessive wetness in the soil and favourable temperatures. Big dark-brown spots appear on the infected leaves. If preventive measures are not taken, the infection spreads to other plants, which are weakened. Gradually the entire crop dies.

Management
- Before cultivating, the field is subjected to 3–4 deep tillings so that the soil is treated by the heat of the sun. The wild growth in the field is converted into green manure which enhances the immunity of the soil and reduces the chances of infection.
- Strict adherence to the crop cycle decreases the possibilities of this disease.
- 35 gm of BD 500 diluted with 13.5 litres of water should be sprayed before sowing the seed.
- Spraying of vermiwash mixed with water in a ratio of 1 : 13.5 litres protects the crop from fungal infestation.
- Ten grams of Trichoderma culture mixed in one litre of water may be sprayed on the crop.

Black scurf (Rhizctonia solani) - This disease is caused by a soil borne fungus. It infects different organs of the plant including the eyes of the germinated seed, the stem and the flowers. The leaves of the infected plants become red and brown. Tubers of the infected plants have brown spots on them.

Management
- Crop cycle is adhered.
- Sesbania or corn is cultivated in the field before cultivating potato in it.
- 35 gm of BD 500 diluted with 13.5 litres of water should be sprayed before sowing the seed.
- Sprinkle jeevamrut and Trichoderma on the standing crop.

Brown rot (Pseudomonas solancearum) - The stem of the infested plant turns brown. The plant bends and falls. The leaves also gradually turn brown and eventually the plant dies. This disease generally spreads through infected seeds. It enters the plant through the roots and destroys the tissues of the plant; consequently the flow of water from the roots to the upper parts of the plant is blocked and the plant withers away. This disease generally occurs in the summer and increases with a rise in heat and humidity.

Management
- Infected potatoes should not be used for seed.
- The seed is not cut in order to prevent pathogens from entering and affecting other seeds as well.
- Sowing is completed by February and the crop harvested before the beginning of the rains.
- Before sowing, treat the seed with cow pat pit or jeevamrut or beejamrut .

Problem inects

Aphids (Myzus persicae) - In its fully-grown stage, this is a green, yellow-green or light pink
coloured insect. During this stage, these insects do not have wings. They suck the juice from the leaves due to which the leaves are mutilated. With excessive infection, the leaves dry up and fall. Aphid attacks come usually in the month of August.

Management

- Manure from the leaves of the basing (Adhatoda vasica) plant reduces the damage caused by aphids.
- 250 grams of tobacco mixed with four litres of water should be boiled for 30 minutes. One litre of the extract should be mixed with four litres of water, and the solution is sprayed on one twentieth part of an acre.
- Cow urine and verticillium biopesticide may be applied in the field.
- Spray a solution of 100 grams of crushed garlic mixed with 50 litres of water.

Potato tuber moth (Pthorimaea operculella) - This is the most harmful pest the potato crop faces. It penetrates the potato and slowly eats it up. The brown coloured pest is 1.5–2 cm. Long and has green-brown spots on its wings. In the hills it damages the crop throughout the year. The female lays eggs on the buds of the tuber and on dissected parts of the seed. A female lays 100–200 eggs at a time, which grow to full size insects in 20–25 days which start attacking the crop. The infestation starts at the roots and gradually reaches the stem and the leaves. In local parlance, the moth is known as bareek keeda .

Management

- During the second harrowing, the soil is heaped around the plants (uker).
- The crop is regularly irrigated to cover any ruptures in the soil.
- Salt is sprayed in the field before sowing at the rate of 1 kg salt in 50 litres of water per nali .
- In non-irrigated areas, 250 grams of salt per nali is sprayed 3–4 days before sowing.
- Spray cow urine and bicchu ghas /lantana /rambans mixture at intervals of 15 days.
- Use BD 501 at the stage of 3–4 leaves.
- Treat the seed with jeevamrut and azospirillum.
- After harvesting, the potatoes should be covered with leaves. This prevents the female from laying eggs on the potatoes.

Leaf caterpillars (Spodoptera exigua) - This is a major pest that damages the crop in the field. It generally attacks the crop in the months of May–June and causes maximum damage in June. It infests the leaves of the plant, cuts its stem at the surface level and eats the leaves during the night. The entire infected plant is slowly destroyed.

Management

- The field is tilled deep 3–4 times before sowing so that the eggs, pupa and larvae are exposed and eaten by birds or killed by the heat of the sun.
- The caterpillar is physically removed and fed to birds or killed.
- NPV (nuclear polyhedrosis virus) solution can be sprayed on the field @ 100 litres/acre.
- A solution of 50 gm of tobacco boiled in four litres of water for 30 minutes can be sprayed on the field.
- BD 501 is to be used at the stage of 3–4 leaves.
- Spray ash on the field.

White grub (Anomela dimidiata) - This is also a major pest in the mountain regions and damages the crop when it is ripe. The white and grey coloured worm is 1–2 cm long in its initial stage and grows to 5–6 cm when it matures. It is called gubarela or kurmula in the local language. It is very common in the mountains and infects the potato when it is ripening by boring into it.

Management

- Physically remove the pest by digging near the root of the infected plant.
- 3–4 deep tillings before sowing also help in controlling this pest.

- 200–240 akarkara (*Spilanthes acmella*) plants planted in and around the field cause the grub to disappear.
- Do not use raw dung as manure. Only composted dung manure should be used.
- Salt solution should be sprayed in the field before sowing. In irrigated areas, the solution of one kilo salt mixed with 50 litres of water per nali is to be used. In non-irrigated areas, the salt is reduced to 250 gm of salt per nali.
- Apply 80–100 kg khali of neem (deoiled neem cake) per acre before sowing.

Miscellaneous other pests

Wild pig, monkeys, porcupines and other animals are also attracted to potato fields.

Management - To protect the crop from these animals, scarecrows are erected in the field. For protection from porcupines, parallel barbed-wire fencing with a gap of 15–20 cm is erected around the field. The first wire is erected not more than 5 cm from the ground to prevent direct entry and attempts at burrowing through.

International Study Meeting on the Development and Utilization of Biofertilisers for Promoting Sustainable Agriculture & Green Productivity

Asian Productivity Organization (APO) Japan, in collaboration with National Productivity Council India with financial support from the National Project on Organic Farming, Department of Agriculture and Cooperation, Ministry of Agriculture, Govt. of India organized a study meeting on the Development and Utilization of Biofertilisers for Promoting Sustainable Agriculture & Green Productivity from 5th Nov. to 11th Nov. 2008 at India International Centre, New Delhi.

The objectives and the scope of study meeting were : (a) To review the current status & recent development in biofertilizer development and use. (b) To examine and analyze issues and challenges in promoting the development and use of biofertilizers and (c) To formulate strategies and recommendations for promoting biofertilizer development & use in member countries.

The study meeting was participated by twenty-five participants from different countries of the Asia Pacific Region including 4 from India. The meeting was inaugurated by the Director General of Productivity Council of India. Dr. Muhammad Sayeed, Programme Officer, APO Japan delivered introductory speech.

Dr. Tong-Min-Sa Professor, Department of Agricultural Chemistry chung bwk National University Republic of Korea, Dr. Shotaro Ando, Research leader, Forage production & Agro. Environment Research Team, National Institute of Livestock & Grassland Science (NILGS) National Agriculture & Food Research organization Japan, Dr. A.K. Yadav Director, National Centre of Organic Farming, Ghaziabad, Dr. Hyah' Taib Chairman of Myagri Group of companies, Malyarium, Dr. (Mrs) Dolly Wattal Dhar, Head, Microbiology IARI, New Delhi delivered lectures on various aspects related to biofertilizer production technology and quality control. Total 13 countries presented their country status papers. All the delegates from the participating countries expressed their concern regarding the quality of biofertilizers.

Main Constraints like mass sterilization of carrier material, viability of microbes during storage & transportation were discussed in detail. The member delegates identify all these factors as the main bottle necks in harnessing this nobel technology for the benefits of Agricultural community. Members also advoacated for regulation Act for quality control.

The study meeting was concluded by vote of thanks by Programme Officer of APO Dr Mohammad Sayeed, Japan, APO and Dr. Raju KVR, Director, NPC, New Delhi, India

Organic Soil Fertility Management for Enhanced Paddy Production and Revenue Generation with Less Cost as Achieved in Some Model Paddy Fields in Orissa

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Background

Recently under a UGC, New Delhi and Navdanya Trust, New Delhi, funded project attempts were made to evaluate the potential and economics of organic system of paddy cultivation in comparison with natural cultivation (as control) and conventional system. Four scientists from H.M. College, Balasore Orissa and Navdanya Trust, evaluated the potential of three systems at farmers' field. Abstract findings on the practices used, costs incurred and net income levels attained are being presented here.

Introduction

More than six decades ago, Sir Albert Howard explained the nature of soil fertility in his famous book, "An agricultural Testament" as under: "The nature of soil fertility can be understood only when it is considered in relation to Nature. To study soil fertility we have to understand the natural working system and to adopt methods of investigation in strict relationship with nature. We must look at soil fertility as we would study a business where the profit and loss account is taken along with the balance sheet. We have to consider the world, not the individual tree". According to him, a fertile soil is one which has humus in abundance. If the soil is deficient in humus, the volume of pore space is reduced and the aeration of the soil is impeded. If there is insufficient organic matter for the soil population, the soil machinery runs down, the supply of oxygen, water and dissolved salts needed by the root hairs is reduced, the synthesis of carbohydrates and proteins in the green leaf proceeds at a lower tempo hence the overall growth is affected.

After four decades of green revolution in India, the situation is pathetic; soil in general has become humus deficient, excessively hard and bears no pores for holding air and moisture. The soil no longer harbors beneficial microbes but the pathogens and pest eggs, requiring excessive use of synthetic pesticides. The impacts of these agro chemicals, the artificial chemical fertilizers and synthetic pesticides are well observable. The disastrous consequences of use of these synthetic pesticides over several decades are now clearly visible. There is constant rise of pesticide resistance in the pest species and diseases causing microbes at the expense of the beneficial organisms like beneficial insects (honey bee) and scavenging birds (vultures). Reports of crop failure are also linked to the changes in natural status of the soil. Reports of methane emission are obviously owing to excessive use of nitrogenous fertilizers like Urea. Reports of occurrence of agricultural pesticides in underground water (bottled water and soft drinks) are certainly due to their excessive applications and non degradations. There are reports of people in villages dying after consuming water from shallow tube wells in Orissa (Chakulia, Balasore, 2005).

Search for alternatives

It was thus felt essential to search alternatives for both, enhance crop yield

through enhanced soil fertility organically without further degrading its status and keep the pathogens and pests at bay through the use of natural pest repellants, botanical pesticides and employing biological pest control methods. The hypothesis of Sir Albert Howard also need due attention for developing the system based on profit-loss balance sheet, which can ensure crop cultivation system as a profitable enterprise. Such an approach is also essential to avoid disastrous future situations like resource retirement, contract farming and above all exodus of the agrarian communities from villages to cities. With the above objectives in mind the authors experimented the organic system of cultivation with the principal crop of Orissa, the paddy, both in Kharif and Rabi. Methodology of approach, application of inputs, observation and cost benefit ratio of three such ex-situ experiments, one in Rabi and two others in Kharif are detailed below:

Materials, Method and Observations:
Experiment-1 : Rabi 2003 -04
Farmer's name and address – Sri Surendra Nath Patra, Vill- Dharampur, Fulwar Kasba, Balasore, Orissa. Soil type – Deltaic alluvial, Crop - Paddy (HYV)- Lalat, Duration: 125-130 days. Grain type: Medium Slender, Potential Grain yield/hectare: 40 quintals (as on record) Experimental Unit Area: 1 Acre, Source of seed : Farmers own saved (OS)

S.No.	Activities associated	Control Rs	Chemical Rs.	Organic Rs
1.	Seed cost (own seed)	0.00	0.00	0.00
2.	Seed bed preparation a. Human labour (2 no) b. Bullock (1 pair)	 100.00 80.00	 100.00 80.00	 100.00 80.00
3.	1st cultivation (Tractor 2 hrs)	600.00	600.00	600.00
4.	Farm yard manure	Not applied	Not applied	0.00 2 tonnes
5.	Puddling	460.00	460.00	460.00
6.	Basal application	Nil	800.00 Gromor+MOP	400.00 (OC+Azolla)
	Transplantation cost	1750.00	2000.00	1750.00
8.	Interculture operation cost	250.00	350.00	250.00
9.	1st top dressing	Nil	60.00 (Urea) 30.00 (MOP)	200.00 (OC) 0.00 (Cow urine)
10.	2nd top dressing	Nil	50.00 (Urea) 25.00 (MOP)	0.00 (Cow urine)
11.	Pest management	Nil	400.00	200.00
12.	Irrigation (total)	250.00	250.00	250.00
13.	Harvesting and threshing	1250.00	1550.00	1250.00
14.	Miscellaneous expenses	Nil	100.00	150.00
15.	Total cost involved (in Rs)	4740.00	6855.00	5690.00
16.	Grain yield a. Quantity in qtls b. Total value (Rs)	 12.7qntls 6604.00	 20.2qntls 10504.00	 23.5qntls 12220.00
17.	Straw yield a. Quantity in qtls b. Total value (Rs)	 15.85 1268.00	 25.07 1755.00	 29.47 2358.00
18.	Total Returns (in terms of Rs.)	7,872.00	12,259.00	14578.00
19.	Net benefit	3,132.00	5,404.00	8,888.00
20	Cost benefit Ratio	1.66	1.788	2.562

Experiment -2: Kharif 2004-05:
Name and address of the farmer: Raghunath Barik, Bhimpur. Soil type: Coastal alluvial Crop: Paddy HYV (Pooja). Experimental unit area: 1 Acre. Source of seed: Farmer's own saved seed (OS)

S.No.	Activities associated	Control Rs	Chemical Rs.	Organic Rs
1.	Seed cost (own seed)	0.00	0.00	0.00
2.	Seed bed preparation c. Human labour (2 no) d. Bullock (1 pair)	 100.00 80.00	 100.00 80.00	 100.00 80.00
3.	Ist cultivation (Tractor 2 hrs)	600.00	600.00	600.00
4.	Farm yard manure	Not applied	Not applied	0.00 2 tonnes
5.	Puddling	460.00	460.00	460.00
6.	Basal application	Nil	800.00 Gromor+MOP	810.00 (VC+BF+Sesbania)
	Transplantation cost	1750.00	2000.00	1750.00
8.	Interculture operation cost	400.00	500.00	400.00
9.	1st top dressing Urea	Nil	60.00 (Urea) 30.00 (MOP)	50.00 (BF) 0.00 (Compost)
10.	2nd top dressing	Nil	50.00 (Urea) 25.00 (MOP)	50.00 (BF) 0.00 (Compost)
11.	Pest management	Nil	400.00	0.00
12.	Harvesting and threshing	1250.00	1550.00	1250.00
13.	Miscellaneous expenses	Nil	100.00	150.00
15.	Total cost involved (in Rs)	4,640.00	6,755.00	5,700.00
16.	Grain yield c. Quantity in qntls d. Total value (Rs)	 16.50qntl. 8,580.00	 21.9qntl. 11,388.00	 22.10qntl. 11,492/-
17.	Straw yield c. Quantity in qntls d. Total value (Rs)	 22.10 1,768.00	 27.5 1,925.00	 29.4 2,352.00
18.	Total Returns (in terms of Rs.)	10,348.00	13,313.00	13,844.00
19.	Net benefit	5,708.00	6,558.00	8,144.00
20	Cost benefit Ratio	2.23	1.971	2.429

Soil fertility condition of the above crop field in experiment No. 2 at different stages.

Plot	N (Kg/ha) Subiah and Asija, 1956			P (Kg/ha) Olsen's method			K(Kg/ha) Ammonium Acetate method		
	Initial	45DAT	After harvest	Initial	45DAT	After harvest	Initial	45DAT	After harvest
Control	511.9	499.4	426.49	50.00	44.6	15.2	312.0	300.8	200.25
Chemical	511.9	561.2	520.57	50.00	52.2	26.16	312.0	346.6	241.9
Organic	511.9	560.7	564.4	50.00	43.7	18.24	312.0	336.8	251.32

Experiment. 3. Kharif 2004-05
Name and address of the farmer: Sri Pitamber Jena, At- Mangalpur, P.O.- Chengua- Mangalpur, Via- Bhimda, Dist; Mayurbhanj (Orissa), Soil type : Sandy loam, Crop type : Paddy (HYV) Kasturi, Source of seed : Purchased from other farmer (PI) (7.5 kg @ 5/- per kg= Rs. 37.50p). Known yield potential of the variety (Kasturi) ± 20 quintals per acre (chemical). Plot size : 30 decimals (100 decimals = 1 Acre).

Ingredients applied:

1. Sesbania (Dhanicha) seed @ 12 kg/acre = 3kg 600gm @ Rs. 11/- 1 kg = Rs. 39.60
2. Pongam oil cake @ 150kg/acre = 45 kg @ Rs. 4/-kg = Rs. 180.00
3. Cow urine soaked cowshed soil @ 4 quintals / acre = 1.2 quintals (Internal input)
4. Fresh cow urine @ 7-8 liters twice in a week for 6 weeks (internal input)
5. Home made heap compost - 2 cartloads (I I)

Observations

1. Soil samples were collected at different stages for study of soil fertility conditions and the NPK values were ascertained.

Study of sample	N(Kg/ha)	P(Kg/ha)	K(K/ha)
Initial	283.7	42.6	168.3
45 DAT	458.2	45.8	273.6
75 DAT	462.1	39.9	260.1
After harvest	393.6	35.2	254.7

Cost benefit calculation

S.No.	Component	Quantity	Value
1.	Yield of grains at harvest	8.5 quintals	Rs. 5100.00
2.	Yield of straw at harvest	9.9 quintals	Rs. 792.00
3.	Total Sale value		Rs. 5892.00
3.	Calculation of cost		
	Total expenditure incurred on inputs a. Cost of paddy seeds : Rs 37.50 b. Cost of sesbania seeds : Rs. 39.60 c. Cost of pongam oil cake :Rs. 180.00		Rs. 1317.10
	Cost of labour a. Seed bed preparation 1 HL :Rs. 50.00 b. Ist cultivation 1 BL : Rs. 80.00 c. Puddling I BL : Rs 80.00 d. Transplantation 10 HL : Rs. 500.00 e. Interculture 1HL : Rs 50.00 f. Crop cutting 4 HL : Rs. 200.00 g. Threshing 2HL : Rs.100.00		Rs. 1060.00
	Total expenditure		Rs. 2377.00
	Net Benefit		Rs. 3515.00
	Cost benefit ratio (2/1)		4.47

Methodology of use

Sesbania seeds were sown in the soil after the first ploughing and allowed to grow up to preflowering stage where after the field was ploughed and the plants were incorporated into the soil together with pongam oil cake, cow urine soaked cowshed soil and home made compost. The farm land top soil was thus converted into a paste of soil, sesbania plants, pongam oil cake, urine soaked cow shed soil, home made compost and stagnated water (just enough to create a muddy condition). It was allowed to stand overnight. The field was then transplanted with the paddy seedlings two days after. Thereafter, the field was periodically weeded and fresh cow urine* applied at regular intervals to add more nutrients to the soil.

[*The authors found out that fresh cow urine is a rich source of available potash to the plants and help in better fruiting.]

Conclusion

All the three studies clearly indicate that organmic management of cultivation is not only low cost and sustainable, but it was also highly profitable with very high cost benefit ratio.

Acknowledgement:

The authors are indebted to the University Grants Commission, Bahadur shah Zafar Marg, New Delhi-2, and the Navdanya Trust, A/60 Hauz Khas, New Delhi-16 for the financial assistances received from them to undertake the ex-situ field studies and laboratory assessments. (Report abstracted from www.articlesbase.com))

Biofertilizer Quality Testing Kit

Scientists, world over are trying to develop quick methods for estimating bacterial populations in bioinoculants which can be used by quality control laboratories to check strain purity and inoculants quality. A quick biofertilizer testing kit, using genetic marker has been developed by the scientists at CCS, Haryana Agricultural University, Hisar under "All India Network Project on Biofertilizers". Strains of Azotobacter, Pseudomonas, Bacillus and Rhizobium were tagged with a genetic marker encoding for the enzyme β-galactosudase and the end product was detected using chromogenic substrate. The amount of enzyme activity was correlated with the viable cell number to estimate the viable cell population in broth as well as charcoal based inoculants. This test can be performed either quantitatively in liquid cultures or qualitatively using filter paper discs. Viable cell population in liquid cultures can be estimated in 1 hour.

For estimation of cell number in charcoal based inoculants sample of bioinoculants (10 g) is suspended in 90 ml of water and shaken for 30 min of a magnetic stirrer. The suspension is filtered through Whatman filter paper. One ml filtrate is mixed with 1.4 ml of solution 1 and incubated at 37^0C till the development of yellow colour. Reaction is stopped by adding 2.0 ml solution II and the colour developed is read by using a spectrophotometer. This method has been standardized using bioinoculants of Azotobacter, Pseudomonas and Rhizobium. Viable cell population of 10^6 cells/g of charcoal can be estimated using this method.

(Source – D.L.N. Rao (Ed), Biofertilizer Research Progress 2004-2007, All India Network Project on Biofertilizers, IISS, ICAR, Bhopal, M.P.)

INDIA ORGANIC - 2008

India's Biggest Event of Organic Agribusiness

International Competence Centre for Organic Agriculture (ICCOA), in association with National Centre of Organic Farming (NCOF), Department of Agriculture and Cooperation, Ministry of Agriculture and APEDA, Ministry of Commerce, are organizing India's biggest event on organic agri-business annually since 2005. India Organic is one of Asia's biggest organic events. It provides the best platform for the organic stakeholders to showcase the advancement of organic agriculture, newer technologies, products, processes and its derivatives. The fourth edition, 'India Organic-2008', was organised at IARI, Pusa, New Delhi from 27-30 November 2008.

The four-day mega event was inaugurated by Smt Pramila Rani Brahma, Hon'ble Minister of Agriculture, Govt of Assam and Mr T. Nanda Kumar, IAS, Secretary (Agriculture), Govt. of India. Shri Sompal, Former Minister for Agriculture delivered the key note address. Other dignitaries who graced the inauguration included Dr. Diana Barrowclough from UNCTAD, Ms Louise Luttikholt from IFOAM and Dr. S A Patil, Director, Indian Agricultural Research Institute.

Inauguration - The inauguration ceremony and the day's proceedings were also attended by senior officials and experts, in particular Mr. Sanjeev Gupta (IAS), Joint Secretary (Agriculture), Dr. AK Yadav, Director- NCOF, Dr. KL Chadha, Chairman-ISAP and Former Commissioner of Horticulture, Dr. Tej Partap, Vice Chancellor (CSK HP Agri. University), Director of Agriculture and Horticulture from many states, officials from APEDA and other Govt. bodies and others. During the ceremony, the State of Assam was declared as the 'State of the Year' for their strong organic movement in that state under the able leadership of the Hon'ble Minister for Agriculture, Smt. Pramila Rani Bramha and for its most active participation at the fair. Secretary (Agriculture) Mr. T. Nand Kumar released the proceeding of the International Seminar.

India Organic-2008 lived up to its expectation and continues to be a growing fair. It proved to be a very successful one in terms of participation from various quarter and from all parts of the country, especially State Govt. participations. The statistics shows that more than 3700 Farmers visited the trade fair. In addition there were 7000 general visitors, 3500 invitees and over 1500 Trader visitors. Thus the total visitors to the fair were over 15000. International visitors came from Germany, Switzerland, Austria, Italy, The Netherlands, UK, Canada and USAThere was also good participtionfrom neighbouring countries like Nepal, Bhutan, Sri Lanka, etc. 114 Exhibitors from all over the country displayed their services and products in 192 stalls. The activities of India Organic 2008 were divided into five important events namely:

1. Trade fair
2. International seminar
3. Organic food festival,
4. Buyer-Seller meets, and other interesting events like workshops, cultural programs, etc.
5. Indian Traditional Cultural Programs

The main theme of the Trade Fair was on improving India's market share in the International Organic trade. It provided a platform for the Organic Stakeholders to showcase the advancement of organic agriculture, newer technologies, products, processes and its derivatives. It invited participation from the world of organic agriculture with a broad spectrum of stake holding groups. This trade fair is playing a

crucial role in accelerating the growth of business as well as brand-building by establishing a link for the trading community across India and World. A meeting ground for businessmen, technocrats, entrepreneurs, manufacturers, exporters, suppliers, importers, distributors, service providers amongst others.

International Seminar - International Seminar series is an integral part of the annual trade show for the organic stakeholders of the global organic family. International Seminar was Co-organized with NCOF, Ministry of Agriculture and NABARD. CSK HP Agriculture University was associated as technical partner. The seminar proceedings were organized in Dr. B P Paul auditorium of IARI, New Delhi during 27th – 29th November 2008.

The focal theme of the International Seminar was '**GLOBAL ORGANIC AGRIBUSINESS: INDIA ARRIVES!** The theme reflects the logical sequence from the previous three years' themes, starting in 2005 with 'India Positioning High in Organic Agribusiness', followed by 'India Organic Agribusiness Today: Global & Local' (2006) and 'India Organic Agribusiness @ Threshold of Growth' (2007). Now India is growing towards becoming a major hub of organic production worldwide and is therefore arriving at the Global scenario!

The Seminar was addressed by 34 experts, 24 from India & 10 International speakers (Germany, Austria, Italy, Switzerland, The Netherlands, UK & USA). They represented a broad range of institutions in the public as well as in the private sector and brought to the Seminar a valuable mix of experiences and perspectives. The papers provided by these experts were released as a publication during the Inauguration of the Trade Fair. The seminars were attended by over 150 delegates from all over the country and a few from abroad too.

B2B Meets - India Organic-2008, was able to organize 143 such meets. Of this 83 B2B meets were held with 11 foreign buyers and the remaining were between Indian buyers with producers/suppliers (28 Indian buyers participated). In addition to the meetings organized at the B2B lounge, some foreign buyers were also taken individually to all the stalls and had direct discussions with many exhibitors. Direct interactions of farmer groups with 4 International foreign buyers were also arranged. The meeting of Himachal group of organic farmers' forum, HIMORD, HIVOS-sponsored stalls (e.g. Jaivik Krishi Society), NCOF sponsored farmers groups, etc., were special feature of the B2B session.

Exhibitors Feedback - 65% of the exhibitors expressed that the fair had brought them good business as well as gave them many new contacts. The knowledge sharing platforms helped them learn a lot for their further improvement of organization and business. The farmer groups represented at India Organic Trade fair were 35%. They expressed satisfaction especially for the direct interaction with buyers and their growing confidence in utilizing the opportunity to eliminate middlemen in the supply chain. About 15% of the exhibitors also felt that selection of venue could be better (e.g. many opined that Pragati Maidan could attract more number of visitors, especially consumers).

Analysis of Feedback - Feedback received from the 114 exhibitors, over 14 international buyers, over 1400 Indian trade visitors and the inputs from 143 B2B meets indicate that India Organic trade fair-2008 has generated trade of organic products worth over INR 150 crores (INR 1500 million). The overall feedback about the India Organic fair was excellent and met the expectations of the maximum number of exhibitors as well to the visitors. Many, especially representatives from State Govts., expressed their strong desire to help organize such fairs at regional level in the States. They opined that this will bring still wider awareness and business of organic products across India. They were also very important feedback and suggestions for the further improvement of the fair, especially in terms of logistics, accessibility, greater promotion and

propaganda, wider participations, stronger Government support, etc.

Special Events

Farmers' Meet - An exclusive 'Organic Farmers Meeting' was organized on November 29 2008 in Hindi. The meeting was presided by Dr. A K Yadav, Director, NCOF and Moderated by Dr. RK Pathak, NHM. The meeting was organized in the trade fair venue itself and was attended by over 150 progressive farmers from different states viz. Himachal Pradesh, Punjab, Haryana, Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Jharkhand, Andhra Pradesh, Tamil Nadu, Assam, etc. During the interaction various issues like Adoption of Organic Farming, Certification Process and Cost, Marketing, etc were discussed and many issues were resolved by farmers themselves through experience-sharing and through advisory support from Dr. A K Yadav and Dr. RK Pathak.

Retailers Meet - Retailers meet was held at ICCOA Pavilion on November 28, 2008 at 3PM. This meet was moderated by Retailing Expert Mr. Ralph Liebing, FiBL, Austria and attended by many domestic exporters & retailers. During the meeting, various issues of retailing viz. products range, storage, presentation, educating customers, etc were discussed.

IFOAM Meeting - In addition to these events, IFOAM India members meeting was held at Conference Hall of Dept. of Extension, IARI on 29th Nov. 2008 at 3PM. The attendees were welcomed by Ms. Louise W.M. Luttikholt, IFOAM, Germany. She gave the synopsis and description of various IFOAM activities, recent developments including the new IFOAM board.

Meeting on PGS - PGS Council of India also organized a meeting on Participatory Guarantee System (PGS). The meeting was chaired by Mr Sanjeev Gupta, Joint Secretary (INM), Ministry of Agriculture and moderated by Dr. AK Yadav, Director, NCOF. The meeting discussed the future course of action of PGS Council and explained how important this system is from India point of view. Detailed proceedings of the said meeting are available under National and International events in the same issue.

Valedictory and Award Ceremony - The evening of Nov.30 marked the culmination of the four day India Organic Trade Fair with the Valedictory and Awards ceremony, presided by Shri Sompal jee with Mukesh Gupta, President, ICCOA, Dr. S A Patil, Director, IARI, Dr. A K Yadav, Director, NCOF and Shri Manoj Kumar Menon, Executive Director, ICCOA. The valedictory speech was delivered by Shri Sompal Ji, Former Minister for Agriculture who congratulated all the exhibitors and organizers for the successful participation in India Organic 2008 and shared the sense of delight on the growth of the organic sector.

A special 'Organic Farmers Award' was started by ICCOA in collaboration with International Traceability Systems Ltd, New Delhi. The award constituted a citation and cash award of Rs.10,000/- for farmers for their contribution towards organic agriculture. The award announced by Dr. AK Yadav was shared by Mr. Bharat Bhushan Tyagi of Distt Bulandshahar of U.P. and Mr. Harjant Singh of Distt Bhatinda, Punjab. The farmers in turn also honoured Dr. AK Yadav by presenting him a quilt.

A trophy and certificate was awarded to Assam Delegation, who was conferred with the 'State of the Year' status at India Organic 2008. Other Awards distributed during the Valedictory included the awards for Best Pavilions and Best Stalls. The state of Himachal Pradesh bagged the best pavilion trophy followed by the State of Tamil Nadu and State of Kerala as runners up. The Best stall award went to 'Hello Organic, followed by 'Govt of Chattisgarh' as runners up.

India Organic News

Some Farmers Innovations

Green manure and water conservation for paddy - For wetland paddy twigs and leaves of 'nochi' (Vitex negundo), 'pon avaram' (Cassia auriculata), 'kolunchi'/ 'kaaval' (Tephrosia purpurea), Ipomoea fistulosa, 'veppalai' (Wrightia tinctoria) and calotropis are used as green manure. Farmers have learnt that if leaves of Wrightia tinctoria and calotropis are used in excess, a disease called 'vemputtai' occurs leading to failure of the crop to bear grains. This is caused due to excess heat generated by application of above green manure. However, these two when applied in the paddy nursery do not affect the seedlings. In red, sandy soil the water requirement of paddy is higher and farmers have to irrigate such fields more often. Some farmers, in order to reduce the frequency of irrigation, incorporate into the soil, plants of Ipomoea fistulosa which, while rotting, enhance the water holding capacity of soil. (Innovator - Sri Ayyavu Post. Kasampatti, Tal-Natham Anna, Tamilnadu. Source - Honey Bee, 6(4):9, 1995)

Botanical growth promoter and pest control formulation - A decoction of 'sothukathali' (Aloe vera), 'neem', 'tulsi' (Ocimum tenuiflorum), 'nayuruvi' (Achyranthes aspera) and Aristolochia bracteata leaves is made in boiled water. The decoction is mixed with water (100 ml decoction per litre of water) and sprayed on the tomato and citrus crop. This prevents pest and disease attack in both the crops. It reduces flower shedding and increases the yield in citrus. (NAPDB: Aloe vera has antibacterial and antifungal properties. It is reported to inhibit the growth of Cuscuta reflexa. (Ref: Chauhan JS et al 1989 Indian J. Exp. Bid. 27 10:877-884) Aristolochia bracteata is reported to have anthelmintic insecticidal activities. (Ref: Rao VS 1980 in : Abstr. 4th Asian symposium Med Plants spices Bangkok, Thailand, September 15-19, 1980, pp 145, (Innovator – Sankarankoi, Tamilnadu, Reference Honey Bee, 9(2):7, 1998)

Termite management - `Akada' (Calotropis gigantia) plant material,8-10 kg, is soaked in water for at least 24 hours then filtered. This liquid is poured on termite-infested soil. Farmers evaluate the effectiveness by placing pieces of wood at various points in the field. If the wood remains pest-free for one week then the treatment is judged effective. It is used by 25-35% of the farmers in the area. (Innovator from Vill:Choryana Muvada, PO:Sandasal, Tal:Savli, Baroda, Gujarat. Reference from Honey Bee, 3(3&4):17, 1992).

Caterpillar control in Cotton - Caterpillar infestation can severely damage a cotton crop. Reportedly the latex of `Akda' (Calotropis gigantia), when diluted with 15 parts water and sprayed on the crop, effectively controls the pest within three days. The new growth after treatment is also free from infestation. (Innovtion from Vill:Khagiyali, Tal:Sihor Bhavnagar Gujarat Reference from Honey Bee, 3(3&4):17, 1992) .

Management of nursery bed pests - To control nursery bed pests such as white grubs, termites, and others-soak 0.5-1 kg of `Arithas' (Sapindus emarginatus), in one litre of water overnight. Crush the softened nuts, filter the pulp through cotton cloth strain, then pour the filtrate on the soil. (Innovator - Dhandhalya Bhargav K Vill:Gunjpur, Tal:Muli Surendranagar, Gujarat, Reference from Honey Bee, 3(3&4):17, 1992).

Strategies and models for agricultural sustainability in developing Asian countries - The green revolution of the 1960s and 1970s which resulted in dramatic yield increases in the developing Asian countries is now showing signs of fatigue in productivity gains. Intensive agriculture practiced without adherence to the scientific principles and ecological aspects has led to loss of soil health, and depletion of freshwater resources and agrobiodiversity. With progressive diversion of arable land for non-agricultural purposes, the challenge of feeding the growing population *without*, at

the same time, annexing more forestland and depleting the rest of life is indeed daunting. Further, even with food availability through production/procurement, millions of marginal farming, fishing and landless rural families have very low or no access to food due to lack of income-generating livelihoods. Approximately 200 million rural women, children and men in India alone fall in this category. Under these circumstances, the evergreen revolution (pro-nature, pro-poor, pro-women and pro-employment/livelihood oriented ecoagriculture) under varied terms are proposed for achieving productivity in perpetuity. In the proposed biovillage paradigm, eco-friendly agriculture is promoted along with *on-* and *non-farm* eco-enterprises based on sustainable management of natural resources. Concurrently, the modern ICT-based village knowledge centres provide time- and locale-specific, demand-driven information needed for evergreen revolution and ecotechnologies. With a system of farm and marine production by masses, the twin goals of ecoagriculture and eco-livelihoods are addressed. The principles, strategies and models of these are briefly discussed in this paper. (Source - Kesavan and Swaminathan, Philosophical Transactions of Royal Society, Vol 363, 2008, 877-891)

Organic amendments affect biochemical properties of a subtemperate soil of the Indian Himalayas - Evaluation of suitable organic amendments is prerequisite for sustainable agricultural growth in the northwestern Himalayan ecosystem. The effect of organic amendment applications on the activity of exocellular enzymes were examined on a silty clay loam soil of a subtemperate hill-agro ecosystem. The treatments involved addition of equivalent amounts of N through mineral fertilizer (MF) and two organic inputs, composted cattle manure (CM) and vermicomposts (VC), at four different doses. Soil enzymatic activities and fertility at crop harvest were measured after continuous 3 years of application, and its residual effects were also studied. In comparison with the control, CM and VC addition increased soil organic carbon (OC) by 54% and 52% at application rate equivalent to recommended dose, respectively, whereas there was a 12% increase following MF treatment. Bulk density of CM- and VC-treated soil were 1.16 and 1.14 Mg $m^{â^¯3}$, respectively, compared with 1.32 Mg $m^{â^¯3}$ in control after 3 years. Dehydrogenase activity was higher in the CM treatments by 44â€“204%, and by 22â€“108% in VC treatments than in control. The addition of CM and VC caused different responses in hydrolase enzymes. Protease and cellulase activity increased in both organic treatments significantly across treatments. However, urease and alkaline phosphatase activity was more influenced by application of CM compared with VC. Î²-glucosidase activity was higher in MF treatment and was at par with the highest rate of organic amendment application. Increase in phosphatase activity is attributed to soil pH and microbial stimulation by organic C and is correlated with the increase in dehydrogenase activity ($R^2 = 0.923$). Differences in activities of all evaluated enzymes were narrowed down in residual treatments compared with control without much change in the trend. Composted CM was found more suitable for sustaining quality of subtemperate soils. (Source Saha et al 2008, Nutrient Cycling in Agroecosystems Volume 80, Number 3 : 233-242)

Potential of some botanical powders in reducing infestation of chickpea by *Callosobruchus chinensis* L. (Coleoptera:Bruchidae) - The study deals with the efficacy of some leaf powders via free choice and no choice assay against infestation of chick pea seeds by the pulse beetle *Callosobruchus chinensis* during storage. Among the plant powders tested, *Murraya koenigii* and *Eupatorium cannabinum* were found to be the most effective in reducing the orientation, oviposition and causing the mortality of bruchids at dose of 2% (w/w). The F1 emergence from the infested chick pea was significantly reduced in treatments to which powders of *Murraya koenigii* (90.62%) and *Eupatorium cannabinum* (86.46%) had been added. The study demonstrates that these plant powders can play an important role in protection of chickpea from insect invasion during storage. (Source - Shukla, et al 2007 Journal of Agricultural Technology 3(1): 11-19).

Global Organic

Long-term organic farming fosters below and aboveground biota: Implications for soil quality, biological control and productivity - Organic farming may contribute substantially to future agricultural production worldwide by improving soil quality and pest control, thereby reducing environmental impacts of conventional farming. We investigated in a comprehensive way soil chemical, as well as below and aboveground biological parameters of two organic and two conventional wheat farming systems that primarily differed in fertilization and weed management strategies. Contrast analyses identified management related differences between "herbicide-free" bioorganic (BIOORG) and biodynamic (BIODYN) systems and conventional systems with (CONFYM) or without manure (CONMIN) and herbicide application within a long-term agricultural experiment (DOK trial, Switzerland). Soil carbon content was significantly higher in systems receiving farmyard manure and concomitantly microbial biomass (fungi and bacteria) was increased. Microbial activity parameters, such as microbial basal respiration and nitrogen mineralization, showed an opposite pattern, suggesting that soil carbon in the conventional system (CONFYM) was more easily accessible to microorganisms than in organic systems. Bacterivorous nematodes and earthworms were most abundant in systems that received farmyard manure, which is in line with the responses of their potential food sources (microbes and organic matter). Mineral fertilizer application detrimentally affected enchytraeids and Diptera larvae, whereas aphids benefited. Spider abundance was favoured by organic management, most likely a response to increased prey availability from the belowground subsystem or increased weed coverage. In contrast to most soil-based, bottom-up controlled interactions, the twofold higher abundance of this generalist predator group in organic systems likely contributed to the significantly lower abundance of aboveground herbivore pests (aphids) in these systems. Long-term organic farming and the application of farmyard manure promoted soil quality, microbial biomass and fostered natural enemies and ecosystem engineers, suggesting enhanced nutrient cycling and pest control. Mineral fertilizers and herbicide application, in contrast, affected the potential for top-down control of aboveground pests negatively and reduced the organic carbon levels. Our study indicates that the use of synthetic fertilizers and herbicide application changes interactions within and between below and aboveground components, ultimately promoting negative environmental impacts of agriculture by reducing internal biological cycles and pest control. On the contrary, organic farming fosters microbial and faunal decomposers and this propagates into the aboveground system via generalist predators thereby increasing conservation biological control. However, grain and straw yields were 23% higher in systems receiving mineral fertilizers and herbicides reflecting the trade-off between productivity and environmental responsibility (Source **-** Birkhofer et al Soil Biology and Biochemistry Vol 40 (9), 2008 : 2297-2308)

Effect of Implementing Organic Farming on Chemical and Biochemical Properties of an Irrigated Loam Soil - Conventional agriculture can lead to reduced soil organic matter and depletion in soil fertility. For that reason, Food and Agriculture Organization of the United Nations (FAO) recommends organic matter incorporation to soils to increase their agronomic quality. This work studies the effect of the transition to organic farming on chemical and biochemical properties of a loam soil (Xerofluvent), through a succession of five crops cycles over a 3-yr period. Two mature composts (vegetal and animal compost) were used for the organic fertilization. Soil chemical and biological status was evaluated by measuring total organic carbon (TOC), humic acids, bicarbonate-extractable P (Olsen-P), ammonium acetate extractable-potassium (AAE-K), Kjeldahl-N, microbial biomass carbon (MBC), microbial biomass nitrogen (MBN), enzymatic activities

(dehydrogenase, protease, glucosidase, alkaline phosphatase), soil respiration, MBC/TOC, and MBC/MBN ratios. At the end of the study, the organically fertilized soils showed an increase in quantity (TOC) and quality (humic acids) of organic matter compared to inorganically fertilized soils. Nutrient content (Kjeldahl-N, Olsen-P, and AAE-K) also increased in organically fertilized soils. In general animal compost improved chemical and biological properties more than vegetal compost. Soil respiration was highly influenced by seasonal variability, and the highest values were found in summer. The MBC/TOC values indicated that microorganisms converted C to MBC more efficiently in conventionally fertilized soil. Protease and phosphatase activities differed between treatments after the third crop cycle, and the highest values were observed in organically fertilized soil. The TOC and nutrient content were correlated ($P < 0.001$) with microbial biomass and enzymatic activities. Extracellular enzyme activities (protease, glucosidase, alkaline phosphatase) were found to be significantly and positively correlated with MBC and MBN. (Source – Melero et al 2008, Agron J 100:136-144)

Effects of organic farming on weed flora composition in a long term perspective - To study the effects of organic farming on weed population development and crop yields, two different crop rotations were designed, one adapted for animals (six fields) and one without animals (six fields). Each field contained a fixed 1 m^2 reference plot in which all the weed observations were done each year. During the period 1988–2002, number of weed plants in spring and weed biomass at harvest were recorded in the reference plots. No differences in these two parameters were observed between the crop rotations. Number of weed plants in spring did not differ between annual crops and did not increase over the 15-year period. Neither did weed biomass at harvest nor weed species diversity change over the 15 years. The two crop rotations kept weed pressure at the same level as under the previous conventional farming practice. General field observations suggest that invasion of *Cirsium arvense* (L.) Scop. is occurring along the field borders. Competitive ability of the crop showed to be important in weed regulation. Peas, a weak competitor, had significantly higher weed biomass at harvest compared with oats and winter wheat. Weather conditions during the period from April to September caused weed occurrence and development through the season to vary between years. To improve weed management in organic farming, advisors and farmers should recognise the importance of individual field and farm analyses to design location-specific, farm-adapted crop rotations (Source – Lundkwist et al European Journal of Agronomy Volume 28, Issue (4) 2008 : 570-578)

Rice cultivation using organic farming system with organic input materials in Korea - Organic farming, has played a crucial role from two points of view i.e. ecological protection and agricultural production. Since no chemical fertilizers and minimal inputs are allowed in organic farming, nutrients for the crop production are mostly supplied with organic fertilizer such as compost containing different organic materials. Therefore, the management of soil fertility in organic farming should be differentiated with other conventional farming. For this purpose the soil chemical and physical properties and crop productivity were determined on organically managed rice paddy soil to manage soil fertility in a proper way for long-term rice cultivation. Organic materials used were compost, rice straw, and hairy vetch and compared with conventional farming. K and Ca contents of soil were increased by application of organic materials compared to those of conventional farming while P content in soil was decreased in organic farming with application of compost and hairy vetch. Crop productivity was higher in application of hairy vetch compared to those of compost or rice straw. In conclusion, organic farming was more beneficial for the improvement of soil properties and the use of hairy vetch as green manure was more effective than compost or rice straw for the maintenance of crop yield and enhancement of soil properties (Source – Lee et al 2004, 4th International Crop Science Congress, www.cropscience.org.au)

National and International Events

PGS Consultative Meeting held on Saturday 29 November, 2008, at IARI Campus, Pusa, New Delhi - A meeting of the Participatory Guarantee System Organic India Council [PGSOIC] members, representatives of International Federation of Organic Agriculture Movements [IFOAM] and other NGOs with the representatives of the Government of India's Ministry of Agriculture was convened at 14.00 hours (2.00 P.M.) on Saturday the 29th November, 2008 in the Seminar Hall of the Agriculture Extension and Economics Department, IARI campus, Pusa, New Delhi, on the sidelines of ICCOA- NCOF led India Organic Trade Fair 2008. Mr. Miguel Braganza made a presentation on PGS in India, made through the participatory process with inputs from Dr. Claude Alvares, Mr. John Mathew and Mr. Joy Daniel. It was informed that there are already 180 "Local Groups", consisting of five or more farmers each, operating in India under the PGSOIC umbrella through nine Regional Councils. The "Basic Standards" are similar to those adopted by NPOP from the IFOAM documents on PGS in operation in may countries including USA, Brazil and New Zealand. Currently, the major growth centers of PGS are Andhra Pradesh, Maharashtra and Tamilnadu. The states of Uttar Pradesh and Kerala have made a beginning and states of Punjab, Haryana, Madhya Pradesh and Orissa have shown great interest. North East Indian states have initiated the process of harmonizing PGS with their organic shifting cultivation systems known as "jhum". The standards, pledge and appraisal formats are available in English, Hindi and six other Indian languages. Products with the PGS logo on the package as a symbol of farmer-guaranteed, PGS endorsed "Organic" content, are already in the market. Coffee from Keystone Foundation, Groundnut oil from Timbaktu Collective and Millets from Deccan Development Society were on display at both, the IOTF and the consultative meeting. Initiating the discussions, Dr. A.K. Yadav Director, NCOF stated that the Government of India would support the growth of "Participatory Guarantee System" or PGS and would be willing to participate in an advisory capacity, if a suitable structure is agreed on. It would be necessary for the PGSOIC to become a legal "body" by registering as a Society, Trust or Company under the appropriate Act in India so that an identifiable structure is available for interaction with the Government agencies. The PGSOIC should be an independent body. Budgetary provision need to be made. There are costs when the institutional upgradation takes place and these have to be budgeted. Ms. Vanaja Ramprasad Member World Board, IFOAM raised the issue of the farmers' participation in the planning and decision making processes if a central structure is agreed on. PGS is about organic growth of the farmers and goes beyond mere certification of products to issues of livelihoods and eco-restoration for the common good. Ms. Louise Luttikholt of IFOAM explained that under PGS practices are similar but the documentation is much simpler and farmer friendly. "IFOAM supports and promotes PGS". She informed that PGS is used and/or recognized as "organic" in many countries. Mr. Joy Daniel, Secretary PGSCOI explained that the PGS process was that of "mentoring" and not "monitoring" as in third party certification. Mr. K. Tachinamurthy and Mr. S.Kiran explained how there is capacity building through hand-holding to enable farmer to reach the standards set by PGS. Ms. Louise Luttikholt stated that the application of the "Basic Standards" to the processes in PGS assured the minimum standards of product quality. The need for random testing for pesticide residues was not felt necessary for the organic produce in the PGS system however, some members advocated random testing of the labeled products to ensure integrity. Mr. Sanjeev Gupta, Joint Secretary [INM], Ministry of Agriculture, Government of India, suggested that it may be possible for the Government to endorse "PGS Organic" through some executive order, without the need to legislate for organic produce in the domestic market. Provision can be made to support PGS but for this modalities and

institutional structure need to be agreed upon.

1st International IFOAM Conference on Animal and Plant Breeding -BREEDING BIODIVERSITY - Both organic plant and animal breeding are in early phases of development, although they share a great deal in common, primarily socioeconomic aspects, but also genotype-environment interaction, genetic diversity and robustness. Each field can inspire the other to develop and build upon successful strategies. Even though technical aspects may differ dramatically, organic farms ideally utilize integrated systems, and bringing both animal and plant breeding together in one international conference explicitly highlights the important interdependences and holistic approach of organic agriculture, while maximizing the use of limited resources to bring together a diverse constituency that shares common goals. The conference will be divided into three sections: (a) Technical aspects (Breeding techniques, Methods, Genotype environment interaction, Selection criteria, Breeding for farmers vs. hobby gardeners) (b) Socio Economic aspects (Participatory approach, Financing, Indigenous knowledge, Gender) and (c) Legal aspects (Registration, Intellectual Property Rights, Farmers Rights). The conference will take place in Santa Fe, New Mexico, in the central part of the US.Conference website: http://www.ifoam.org/events/ifoam _conferences/ 2009_ animal_ and _plant_breeding/animal_plant_breeding.html

BioFach America 2008 Boston, MA Trade Show - BioFach America was organized during October 16-18, 2008 at Boston, USA. BioFach - producers of Europe's largest organic exhibition - and New Hope Natural Media - producers of North America's largest natural and organic products trade shows - partnered to produces North America's largest all-organic and natural show. With more than 20,000 attendees, there is no other show in the United States that allows one to talk to so many potential customers. Organic Products Expo-BioFach America delivers cutting-edge organic finished products, raw materials, market intelligence and education that trade who and conference attendees can't find anywhere else in North America. Located at Natural Products Expo East, the all-organic Organic Products Expo-BioFach America delivered the largest retail-buying audience in the United States. Agriculture Processed Foods Export Development Authority (APEDA) of India also participated in the show with galaxy of Indian participants (For details visit **www.ifoam.org**)

Natural & Organic Products Exhibition, Cape Town/South Africa 2008 - The Natural and Organic Products Exhibition caters for environmentally aware, intelligent consumers and trade representatives looking for sustainable solutions to suit their changing life style and work style requirements. Key concerns are health, safety and the environment which are driving consumers to be more informed and to make better choices. For further details contact Exhibition Director: David Wolstenholme Exhibition Manager: Janine Johnston PO Box 23107, Claremont, 7735, 16 Thistle Street, Fernwood, Newlands, Cape Town, 7700, South Africa Tel: +27 21 671 0935, Fax: +27 21 671 0176**,** E-mail: info@specialised.com

International Seminar on Sustainable Utilization of Tropical Plant Bio-mass in Kerala State, India – The 'International Seminar and Workshop On Sustainable Utilization of Tropical Plant Bio-mass' is proposed at Thiruvananthapuram, Kerala State India during December 15 and 16 2008. It is being jointly organized by the University of Kerala and the Kerala Agricultural University in cooperation with other agricultural research institutions. The aim is to present a platform for discussing sustainable utilization of the tropical plant bio mass addressing not only to the day to day needs of the human beings regarding food, shelter, health and social well-being but also covering aspects of biodiversity, environmental hazards and climatic changes in a long term perspective.

Natural Ingredients 2008 – is scheduled at Paris Nord/Villepinte, France November 4-6 2008, Natural ingredients (Ni) 2008 is the annual event for buyers, sellers and product developers of natural food ingredients, cosmetics, medical remedies,

beauty products and nutraceuticals. At the Organic Pavilion, a dedicated area on the show floor focused on the booming organics market, companies from Europe, Asia and North America as far away as Canada will be featuring their organic ingredients to the thousands of visitors. In 2008 Ni is co-located with Health ingredients (Hi) Europe. Hi Europe is the largest meeting place in Europe for buyers and sellers of a full range of health ingredients. For further details visit Internet www.ni-events.com

Workshop on Participatory Guarantee System in Organic Farming-16-17 December, 2008. This workshop is a collaborative effort by SAMBANDH, European Commission and Welthungerhilfe. To give the recognition to the organic product and avoid the extra cost under certification process, Participatory Guarantee System (PGS) is the simplest way. PGS offer a way for India to credibly certify, support and encourage millions of small farmers into an organic system of production, strengthening the social, environmental and agricultural fabric of rural India. Six technical sessions are scheduled to be held during the workshop, besides group discussion in two groups. The workshop will address various issues like package of practices of organic farming, institutionalization of organic promoters, marketing linkages of organic products etc. For details contact: Mr. Bibhukalyan Mohanty, Plot No. 2926/5198, Jayadevnagar, Lewis Road, Bhubaneshwar Phone: 0674-2436660 Venue: Bhubneshwer (Orissa)

Seminar on Organic Farming, 19-20 December, 2008-Organic Farming Organization, Vellore, Tamil Nadu is organizing a two days seminar on organic farming sponsored by National Centre of Organic Farming and supported by Government of Tamil Nadu at Vellor. Focused topics of seminar would be Technical intervention in vermicompost production, Opportunities of procurement and marketing through cooperatives, Opening of shop at Chennai for marketing of organic products through self help groups, credit vista for organic farming, vermiculture with credit support through VCCB, Role of MADP and ATMA in organic farming and Activites of National Horticulture Mission to organic farming. Many more topics are proposed to be included during this two days seminar. For further details contact: G.S. Purushoththamana, President, Ogranic Farming Organization, No. 15, 3rd Main Road, Anna Nagar West, Vellor. Phone: 09894784863

National Seminar on Present Scenario of Organic Farming for Sustaining Soil Plant Health and Productivity, 30-31 January, 2009-This two days seminar is going to be held at Jayanjyothi Convention Hall, Central College Campus, Bangalore University, Bangalore. The seminar is supported by the National Centre of Organic Farming, Govt. of India and National Horticulture Mission, Govt. of Karnataka. Department of Botany, Bangalore University is the main organizers of the seminar. It is aimed towards the generation of awareness on the need and relevance of organic and conservation of natural system, to impart knowledge and skill in organic farming and biofertilisers to farmers, to encourage production of organic inputs, inspire the public to value and healthy food, facilitation of organic certification etc. The seminar participants and speakers will be from various organizations, industries, equipment manufacturers, scientist, students etc. For more details about the event contact: The Organizing Secretary (Dr. D. Anusuya), Professor in Botany, Bangalore University, Bangalore-560056, Karnataka Phone: 09845154456, 080-22961313

HortiExpo – 2009 - 2nd International HortiExpo 2009 is scheduled to be organize at Pragati Maidan, New Delhi form 08-10 May, 2009 with support of Ministry of Agriculture, NHB NHM, TMNE, MoFPI, Department of AYUSH and APEDA. Expo is mainly providing exposure to various producers of all horticultural, agricultural, ornamental, medicinal products to facilitate their proper market linkages. Interested persons, organization, institution may display their products/ technologies in the said expo. For booking of stall and other information about the expo visit the official website of the expo at www.hortiexpo.com

Book Review

Organic Farmers Speak on Economics and Beyond (A Nation wide survey of farmers' experience in India) By Tej Pratap and C.S. Vaidya, 2008, Westville Publishing House, New Delhi ISBN-978-81-85873-45-9, Price Rs. 500/- US$ 25.00 – Ever since humanity started doing agriculture, it had been only organic based on natural principles and processes. Recent technological advancements have however brought in a host of chemical inputs to boost productivity. The initial results of the technology were quite impressive. Yields per hectare shot up by several folds and India came out of the era of food shortages. But with in two decades or so, the deleterious effects of the technology became starkly obvious. Soil started experiencing progressive fatigue. The chemicals took a heavy toll of friendly organisms and soil microbes, resulting into declining soil fertility and compounding pest problems. The consequence is a progressive reduction in the yield per unit of inputs. Farmers' profits are being continuously squeezed as the costs are rising, faster then the realizations, ushering the law of diminishing returns. The situation is really alarming and calls for immediate measures, which is none else but reverting back to natural or organic farming. Under present scenario whenever one talks of organic farming, the bogey of lower yields and lower income of farmers is raised as one of the most serious opposition. Experiments conducted by large number of farmers have clearly demonstrated that such apprehensions are misplaced. To convince more people about the strength and potential of organic farming processes it became absolutely necessary to compile knowledge and information generated by our successful organic farmers. The book "**Organic Farmers Speak on Economics and Beyond**" is the culmination of a first of its kind nationwide survey on the experiences and perceptions of organic farmers on important issues related to yield potential, economics, health benefits, response of crops to changing climate, market linkages and emerging marketing scenario. The analysis of experiences and perception of farmers not only dismisses many myths against organic agriculture and dispel fears of food insecurity but also strengthen the confidence and trust of practitioners. Some of the findings are on expected lines, but many of them are pleasant surprise. Meticulously designed methodology and balanced interpretation of facts collected during the survey without any bias speak volumes about the intellectual honesty and sincerity of authors. The expert combination of an agricultural ecologist-cum-policy expert Dr. Tej Pratap and an economist Dr. C.S. Vaidya shaped the treasure of information in establishing the fact that organic agriculture is the best option for small and marginal farmers of India. With its wealth of information on organic practitioners' experiences and opinion, it is a MUST READ document for policy planners, agribusiness professionals, scientists, promoters, critics and extension personals. (AK Yadav)

Organic Revolution! The Agricultural Transformation of Cuba since 1990 by Bharat Mansata, 2008, Earthcare Books, Kolkata, ISBN: 81-85861-32-3, Price Rs. 150.00 - "After the Soviet Union collapsed - and the US tightened its embargo - Cuba's Organic Revolution began suddenly, under compulsion. A decade later, in 1999, the Swedish Parliament presented the Right Livelihood Award, or 'Alternative Nobel Prize', to GAO, the Cuban Organic Farming Association - for "showing that organic agriculture is a key to food security and environmental sustainability. More recently, 'The Living Planet' report (2006) of the WWF and the Global Footprint Network declared: Cuba is the only country on earth to attain sustainable development! Not only has Cuba's food production greatly increased, its economy, health, energy efficiency and water security are all big gainers. Urban migration has reversed. In 2006, Havana city grew 3 million tons of food! The Cuban experience showed that the organic approach not only enhanced its national food security, productivity and diversity - to better meet the nutritional needs of all the people - but also enabled vital other

ecological, social and economic benefits. Holistically adopted, it can revitalise society, enhance human health and the environment, and safeguard future generations. In the current raging debate over rapid urban-industrial uprooting of farmers, here is one example the world cannot ignore." (Excerpts from the book) In the present crisis of unprecedented rise in oil and food prices, the Cuban experience proves that urban agriculture can be a valid alternative as far as food and diet is concerned: yield is high, produces are of good quality, free of any toxins, and growing one's own fruits, vegetables and leafy greens incite city dwellers to consume more of these fresh and healthy products. The book by Bharat Mansata is n excellent compilation of facts, growth and success story crated by Cuban farmers and policy planners. (AKY)

Organic Agriculture 2008, By Mahesh Kumar, K.P. Tripathi and J.C. Tarafdar, Scientific Publishers (India), ISBN: 8172335052 - To achieve sustainable cropping enterprise, maintenance of soil and environmental health is of fundamental importance. Conservation of natural resource hence assumes greater significance due to large-scale deterioration of the resources for crop production. The purpose of this book is to draw attention to health of the soil; to indicate some of the consequences of this; to suggest methodology by which the lost fertility could be restored and to enlist research findings to utilize in making farm products as well as farm resources free from chemical pollution. 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 information contained in this book would prove very useful to the researchers, teachers, students and environmentalists engaged in ecofriendly sustainable agriculture. (AKY)

Organic Farming: A Global Perspective By Subir Ghosh 2008 Publisher The ICFAI University Press, ISBN: 9788131414514 - Organic agriculture has developed rapidly worldwide during the last few years and is now practised in approximately 120 countries. The total area of land that was organically managed, either fully organic or in-conversion, fell by 8.1 percent between January 2005 and January 2006 to 619,000 hectares, having peaked in March 2003 at 741,000 hectares following several years of notable increases. The late 1990s and early 2000s saw increase in the area of organically managed land for various reasons. Significant factors operating during this period were: farmers seeking alternatives to conventional farming in response to the decrease in farm incomes, the scope of organic farming being extended by the European Union to include livestock production, in July 1999 and payment rates under organic farming support schemes being substantially increased. The market for organic products is also growing rapidly not only in Europe and North America (which are the major markets), but also in many other countries, including several developing countries. With this background, the present book tries to introduce socially, ecologically and economically viable production system through organic farming and its impact on the economy. (AKY)

Encyclopedia of Organic Farming By Daniel Howard, Penelope de Boer and Ellen Eddy Shaw. New Delhi, Dominant Pub., 2008, 6 Vols., 1856 p., (set). ISBN 81-7888-539-5 - The six volumes of Encyclopaedia of Organic Farming capture the entire panorama of traditional agriculture, practiced through different cultures, across the globe. The Encyclopaedia throws light on the industrial revolution and resultant commercialism which deeply affected traditional farming for worse. The advocates of 'profitable agriculture' were, for some time, successful in masking the fact that traditional manures and composts were actually capable of meeting the food demands of increasing population of the world and a health soil

gives the crop and immune system to fight diseases, and there are non-chemical means to fight pest and protect crops. The work makes an essential reading to students, agriculturists and regular farmers who believe in organic systems of eternal agriculture, and its undisputed utility to the mankind. Titles of these six volumes are : Vol. I - Organic Farming : Methods and Techniques of Ancient and Modern Times, Vol. II - Systems Safeguard and Stabilization in Organic Farming, Vol. III - Organic Farm Manures : Scientific Composting to Vermiculture, Vol. IV - Organic Farming : Principles and Techniques for Learners, Vol. V - Organic Methods in Farms and Orchards : Lessons for Specific Crops and Vol. VI - Organic Farming in Adverse Conditions : Taming Dry-Lands and Diseases. **(AKY)**

The Complete Book on Organic Farming and Production of Organic Compost By NPCS Board of Consultants & Engineers, ISBN: 9788178330433, Pages: 448 Price: Rs. 1,275.00 US$ 125.00, Publisher: Asia Pacific Business Press Inc - Organic farming is not new to Indian farming community. Several forms of organic farming are being successfully practiced in diverse climate, particularly in rain fed, tribal, mountains and hill areas of the country. The popularity of organic farming is gradually increasing and now organic agriculture is practiced in almost all countries of the world, and its share of agricultural land and farms is growing. The present book contains the organic farming management, production and uses of various organic compounds, which are well known and also for agriculture for their worldwide use. Compost serves as a growing medium, or a porous, absorbent material that holds moisture and soluble minerals, providing the support and nutrients in which most plants will flourish. Use of organic manure is extremely essential for better crop productivity and maintaining the fertility of soil to ensure sustainable production. (AKY)

Conversion to Organic Agriculture, by A.K. Singh, 2007, ISBN 81-8189-171-6 published by International Book Distributing Co. Khusnuma Complex, Basement, 7 Meerabai Marg (Behind Jawahar Bhawan), Lucknow-226001, U.P., India. 412 p, Price Rs. 1495.00 - Planting an organic garden requires planning. A properly planned and planted garden will naturally resist disease, deter insect pests, and be healthy and hardy. It is important to understand the magnitude of organic project before it begins. The organic operator must understand how everything is interrelated and how one set of circumstances will influence other factors in farming. This book provides a convenient and concise source of information for effective planning for conversion of conventional farming to organic farming. This book is intended to serve as an excellent guide-cum-resource material for researchers, progressive farmers, students, planners, extension officers, NGOs, agriculture-horticulture-animal husbandry-allied departments, and others actively involved in on-farm organic conversion. (AKY)

Botanicals as Ecofriendly Pesticides - Pramod P. Mahulikar and Kshama M. Chavan. Delhi, New India Publishing Agency, 2007, x, 264 p., tables, $35. ISBN 81-89422-57-X. - "The book deals essentially with the aspects that are of immediate concern to new researchers in the field of botanicals and natural products. It presents the first comprehensive overview of the plant products since they were introduced in the pest management covering both theoretical and practical applications. This book covers the key aspects of the plant products including: natural pest management agents from plants, extraction of plants products, characterization and formulation and bioassay of extracts against different pests. The book reports for the first time in the field of botanicals, a study on the stability of the prepared extracts towards their various biological activity against different microbial and stored grain pests through a large number of the prepared extracts and formulations in both water and organic media. The book is an indispensable and interdisciplinary text for researchers and scientists from chemical sciences, life sciences, agricultural sciences and related disciplines, working in this important and fascinating area of botanicals and natural products in Integrated Pest Management (IPM) concept." (AKY)