

# Knowledge Gaps in Organic Agriculture: A preliminary study on Agricultural Universities, Changing State Agricultural Policies and Organic Farming Practices in India

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Rethinking Universities for Development: Intermediaries Innovation & Inclusion

## Rethinking Universities for Development Intermediaries Innovation & Inclusion



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## **Knowledge Gaps in Organic Agriculture** **A preliminary study on Agricultural Universities,** **Changing State Agricultural Policies and** **Organic Farming Practices in India**

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India's food policy has been dictated by fear rather than promise. Ever since India gained independence, the government was in constant fear of famine and its response was the Green Revolution wherein inputs of high yielding hybrid seed varieties, synthetic fertilizers, pesticides and herbicides gave a dramatic increase in food grain production from 50 million tonnes to 130 million tonnes by 1980. Food grain production for 2012 is estimated to be above 250 million tonnes. Table 1 below shows decadal growth of population, GDP and food grain output. The technology used has achieved the purpose of self-sufficiency in food for the country. But this has come at a very heavy environmental cost. Soil degradation, pest and weeds gaining resistance, salinity due to water logging, pesticide residues in human and animal food, pollution of ground water, rivers and coastal waters due to run off of synthetic farm inputs and loss of biodiversity due to monocultures are the major ill effects of the Green Revolution technology. In short Green Revolution technology is found to be both unsustainable and unsafe for humans, animals and plants.

Table No. 1 Population Growth, GDP and Food grain Production, India: 1950-1951 to 2010-2011

<b>Year</b>	<b>Population (in Millions)</b>	<b>GDP at Factor Cost (at constant price in ` crore)</b>	<b>Output of Food Grains (millions tonnes)</b>
1950-51	361	224786	50.8
1960-61	439	329825	82
1970-71	548	474131	108.4
1980-81	683	641921	129.6
1990-91	846	1083572	176.4
2000-01	1028.7	1864300	196.8
2010-11	1210.2	4493743	218.2

*source: GDP and Foodgrains from Economic Survey, 2010-11. GDP (quick estimate) and food grains production (4th advanced estimate) correspond to 2009-10*

The Green Revolution technology that is now also called conventional farming displaced traditional farming practices and knowledge in India. Traditional agriculture was based on inputs generated within the farms such as green manures, compost and animal dung. Seeds were stored for use in the next season and would also be exchanged with other farmers. A large amount of knowledge was generated by farmers and textual foundations of these are evident in literature such as Vrukshayurveda. Farmers have lost much of this knowledge in the years subsequent to the Green Revolution, though there were and continue to be groups attempting to preserve it. The majority of our farmers are small holders in rain fed areas and they grow roughly 40% of our food needs. It is believed that since input costs are heavy these farmers practice traditional agriculture rather than Green Revolution technology. They, and not the agricultural universities, may well be the last repository of knowledge on sustainable and safe agricultural practices.

## **The Agriculture Universities in India**

“The challenge facing India’s State Agriculture Universities (SAUs) for the next century will be to complement the concern for the immediate needs of increased production with a greater emphasis on productivity and long-term sustainability; to balance the focus on disciplinary and commodity research with a greater emphasis on interdisciplinary research and a systems perspective; and to move from being reactive organizations to proactive ones, from hierarchical organizations to participatory ones, from agricultural universities to universities for rural development.”<sup>1</sup>

This was the conclusion of a review of SAUs for USAID in 1988. Thirty years on, the SAUs are still focused on increasing production levels whereas it is the rural development ministries that seem to be taking the agriculture agenda forward. This is most visible in states such as Andhra Pradesh where the rural development department has driven the sustainable agriculture initiative and not the agricultural department or university. The SAUs also seem to be twice removed from Organic Farming. Only two out of the 53 Agriculture Universities have a course or department for Organic Agriculture.<sup>2</sup> Thus, if organic farming and ecologically sustainable agriculture are to be national priorities, as they are in age of Climate Change, we need to examine the state of SAU’s research, knowledge and dissemination on organic farming.

The Indian Agriculture University system largely created after independence, has, in effect, been modeled on the lines of Land Grant University in the USA. The origins and philosophical roots of these universities are in a 19th century 'science' and economic crisis situation and its Malthusian economic understanding then. The nature of USA’s hold on Indian agriculture education system is acknowledged in the first chapter on agriculture education in the Indo-US Knowledge Initiative in Agriculture (KIA) signed between the two governments in 2009 as follows:

“India, since independence, followed a path of science-led growth of its agriculture. Agricultural education was placed in the forefront of this strategy. A comprehensive educational system has been evolved for building human resource that could undertake location and situation specific research and transfer its results to improve productivity, profitability and stability of agriculture. Not only the educational system was patterned on the Land Grants Colleges of the USA, but faculty was also trained in the US universities through a joint Indo-US programme....”

Not only did the agriculture faculty in Indian universities train in US universities, they also seem to have adopted a view that agriculture developed in India around the same time that it developed in the USA, effectively becoming blind to agricultural knowledge of earlier periods. In fact the introductory course material for the Acharya N. G. Ranga Agricultural University (ANGRAU) and University of Agricultural Sciences (UAS) on agronomy provides a chronology of agriculture in India which traces its evolution only from the later part of 18<sup>th</sup> century.

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<sup>1</sup>Universities for development: Report of the Joint Indo-U.S. Impact Evaluation of the Indian Agricultural Universities A.I.D Project. Impact Evaluation no. 68 by Lawrence Busch ( University of Kentucky, Lexington, Kentucky) U.S. Agency for International Development September 1988

<sup>2</sup> A list compiled from the internet is available [www.kicsforum.net/uniid/ICAR.docx](http://www.kicsforum.net/uniid/ICAR.docx).

The KIA is an attempt to comprehensively revise the agriculture system in India and in the process revive the US control over the Indian food market whose dependency on the world market for basic food items had fallen since the green revolution. The KIA aims to ensure that the Indian market will continue to provide market and business opportunities for companies in different parts of the world, particularly the USA. The rationale for the revised Indian draft proposal<sup>3</sup> is to promote , “...approaches that move from: (i) piece-meal to holistic solutions, (ii) commodity to production systems, (iii) applied to basic and strategic research, (iv) mono-disciplinary to interdisciplinary research, (v) single institution to cross organization and trans country working and (vi) home-based to consumer and market-driven agriculture....”

The KIA itself provides for easier access of the faculty to methods such as ‘Re-Usable Learning Objects’ (RLO). These are self-contained standardized agriculture learning units or materials developed for US universities. Available RLO materials do not indicate any localized content. They cover commercialised agriculture growth and practices and topics where adequate material is available in US universities. The shift from applied to basic and strategic research indicates adoption of tools such as RLO which find effective application in top-down implementations such as military and corporate entities. Local adaptation may vary in a tactical sense and not significantly. As one of India’s global agriculture experts puts it, “There cannot be a significant method of correcting the agricultural university system as it is structured like an army”.

The lack of engagement with other social science discipline is apparent; there is hardly any ‘social science’ engagement within the agriculture system. There are but two research establishments that are even categorized under social science in the entire agricultural system in the country - one of them focuses on statistical methods and another on policy impact. The ‘science led agriculture’ in effect ushered in a “technology” centric agricultural education which has made the agriculturally educated class into a new social category amongst agriculturists. “We cannot ask our students to study organic farming as it is seen as ‘going back’. They want to do/learn something that is novel, new and technically fancy” stated a young faculty in an agriculture university. The Prime Minister’s Scientific Advisor perhaps amplifies this sentiment when he supports Genetically Modified technology for food production as otherwise the scientific community will feel that they are not ‘included’ in the global scientific community.

The preoccupation of looking outward amongst academics in India may happen across other technology areas as well, but, in the sphere of agriculture it presents a contrasting picture. A look at the different agriculture university curricula and the availability of organic farming courses<sup>4</sup> indicates that though India has the largest number of practicing organic farmers it has never been a priority area in the agriculture university system. Indeed, the growth of practicing organic farmers is in spite of the formal system. The knowledge acquired through the agriculture university systems is at odds with reality in the Indian context. This disconnected knowledge system is most pronounced in the sphere of organic farming and sustainable agriculture. Needless to say the harshest criticism on the Indo-US KIA has emerged from those who are practicing and professing organic farming in the country.

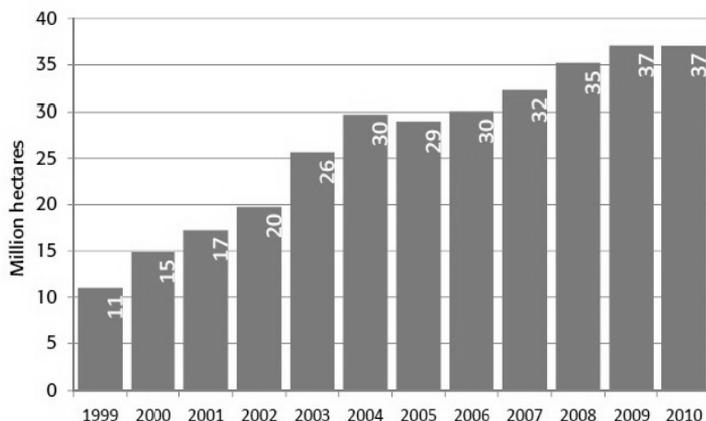
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<sup>3</sup> Draft: US-India Knowledge Initiative on Agriculture: Indian Proposal.  
[www.dare.nic.in/bil\\_Usa/Draft](http://www.dare.nic.in/bil_Usa/Draft) Indian proposal (revised).doc

<sup>4</sup> List of ICAR supported Agricultural Universities showing Organic Courses/Depts.  
[www.kicsforum.net/uniid/ICAR.doc](http://www.kicsforum.net/uniid/ICAR.doc)

## Organic Farming in India

“Conventional farming” was imported from the developed nations and these countries too are facing the environmental consequences of large scale adoption of this technology. Farmers in those countries have responded by taking up organic farming, which disavows the use of synthetic chemical fertilizers and all other synthetic inputs. Each country has developed a set of standards that describe in detail what can and cannot be considered organic practice. In most standards, inspection and



certification is an annual process due to which trends can be accurately determined. This graph from IFOAM shows the growth of area under organic cultivation since 1999 worldwide.

In India the National Accreditation Body comprises of representatives from the Ministry of Agriculture, Ministry of Commerce and

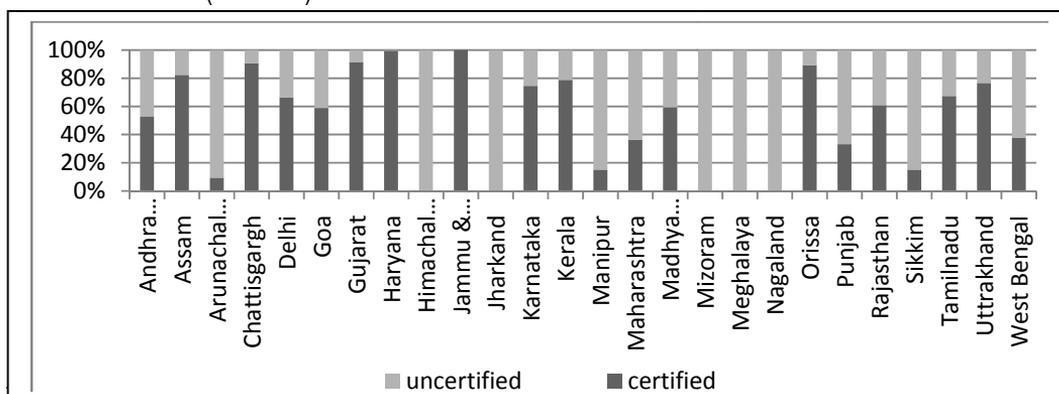


Source: FIBL-IFOAM-SOEL Surveys 2000-2012, based on data from governments, the private sector and certifiers.



Industry, Agricultural and Processed Foods Products Export Development Authority (APEDA), Coffee Board, Spices Board and Tea Board. Inspection and certification is required for those who wish to export their produce. The government was forced to get into certification, because many countries were imposing non-tariff barriers on Indian food exports due to excessive pesticide residues. There is no law requiring labeling of products sold as organic.

In India a large number of organic farmers do not get their produce certified. The graph<sup>5</sup> below based on ICAR figures below shows the converted organic farmers in different states in India. A majority of states have predominantly non-institutionalized organic farmers, i.e., organic farms that are ‘uncertified’. Institutionalizing of organic farming happens in those states where there is state sponsored commercial organic farming cultivation such as in Gujarat (where cotton dominates) and Jammu & Kashmir (orchards).



<sup>5</sup> ICAR absolute figures available at [www.kicsforum.net/uniid/icar.docx](http://www.kicsforum.net/uniid/icar.docx)

### **Propellers of Organic Farming in India**

The major reason for organic certification is better commercial returns. A good example of this comes from the tea estates in Darjeeling. Loss of soil fertility due to excessive chemical fertilizer usage was leading to lowering of yield of the tea leaves. Many large estates were being abandoned or closed down as economically unviable. A handful of estate owners in the late 1990s decided to improve soil fertility by taking to traditional organic practices. They now are in a position to export the tea leaves and also command a premium for their product. These owners took an economic decision and today many others have followed suit. However the major reasons for organic farming include costs of inputs, lack of irrigation, culture and environmental consciousness.

By Default, small and marginal farmers in rain fed areas cannot depend on costly inputs like synthetic fertilisers and associated pesticides for economically viable farming. Non-availability of irrigation limits their utilization of chemicals which are heavily water dependent for their effective usage. Many such farmers are organic by default depending largely on on-farm inputs to grow and protect their crops. A study undertaken by scientists from International Crop Research Institute for the Semi-Arid Tropics and Haryana Agricultural University has shown that for such farmers high yield is possible with biologic approaches. The study also explains a wide variety of technologies required to do this<sup>6</sup>.

Cultural Reasons: The Jain community with its *dharma* of *Ahimsa* and cow protection has worked on organic farming as a natural outcome of "reverence for life". The cow is seen as an integral part of organic farming as it produces dung and urine both being valuable inputs for crops. The Ahimsa Research Foundation is devoted amongst other things to "Environment and Ecological Balance– which means toxin-free agricultural practices"<sup>7</sup>. The case of Namdharis is also an unusual pathway. They have always practiced sustainable agriculture; one could even say it was sustenance farming, producing only what they need.

Environment Consciousness: Increasing awareness of consumers and producers of the harmful environmental effects of synthetic fertilisers on the soil and of pesticides on the local flora and fauna and on the human body has seen a rise in crop land under organic practice. For the

#### Centre for Indian Knowledge Systems (CIKS)

Initially CIKS concentrated on seed multiplication of traditional varieties. They would give a farmer 1 kg of seed and ask the farmer to return 2 kg of seed at harvest. CIKS would help the farmers to sell the rest of the produce, mostly to urban customers. Once CIKS had built up their seed bank they looked to groups of farmers to cultivate the varieties organically. It was a 15 year long struggle. Farmers had to be trained in organic cultivation practices and later, on the procedures for inspection and certification.

Marketing and selling organic produce was still a problem. A for profit company, Arogyam Organics Private Limited was created. Inventory management and cash flows became a stumbling block. Arogyam had to keep stock of a large variety of products. They had to deal exclusively in non-perishables. Cash flows was also a problem as they were paying farmers for their produce a premium upfront. Even the costs of quality control, packaging, pricing, on time supply and other logistics were creating cash flow problems. After nearly 5 years, Arogyam had a profitable quarter this year.

CIKS meanwhile has inspired several such ventures in Tamil Nadu and elsewhere to create other models and movements on organic farming.

<sup>6</sup><http://www.fao.org/fsnforum/sites/default/files/resources/High%20yield%20organic%20farm.pdf>

<sup>7</sup><http://www.ahimsaaresearchfoundation.org/index.html>

producer/farmer it is about making agriculture sustainable and keeping the local ecology unharmed. The consumers of the produce want the right to choose between pesticide laden food and organic products.

**Civil Society Action:** While individuals reached the organic farming framework through their own routes, institutions were created through civil society action over a period of time. Since the 1980s NGOs have worked to help farmers shift to organic cultivation across the country. These were driven by ideological, cultural, environmental and economic reasons. Centre for Indian Knowledge Systems (CIKS) (see box) is one such NGO operating in Tamil Nadu. Networks of such NGOs became dominant advocates of organic farming. These include the now defunct ARISE network, active Organic Farming Association of India (OFAI) based in Goa, Bio-dynamic Association of India (BDAI), the commercial export oriented ICCOA based in Bangalore, Alliance for Sustainable and Holistic Agriculture (ASHA) and many more.

**Climate Change:** Perhaps the biggest push for non-chemical farming in India will come from the climate change scare. The Indian government eager to show itself as progressive, formulated the National Mission on Sustainable Agriculture, one of the eight missions under the Prime Minister's National Action Plan on Climate Change. "The Mission...seeks to transform Indian agriculture into a climate resilient production system through suitable adaptation and mitigation measures in the domain of crops and animal husbandry. These interventions would be embedded in research and development activities, absorption of improved technology and best practices, creation of physical and financial infrastructure and institutional framework, facilitating access to information and promoting capacity building. While promotion of dryland agriculture would receive prime importance by way of developing suitable drought and pest resistant crop varieties and ensuring adequacy of institutional support, the Mission would also expand its coverage to rainfed areas for integrating farming systems with management of livestock and fisheries, so that agricultural production continues to grow in a sustainable manner."

### **Challenges before Conversion to Organic Farming**

There are several issues to consider before farmers in India can leave conventional farming and shift to organic farming. These include food security, risk mitigation, lack of support, sovereignty of seeds etc.

**Food Security:** Farmers need to secure their own food supply. Since farming is their livelihood they must seek security in that activity.

**No risk mitigation:** The biggest fear is a loss of crop either through a pest attack or a plant disease that they are not in a position to control by conventional means. The second impediment is the drop in yield, which is likely in the initial years of conversion. The drop in income needs to be mitigated

**State Support.** When converting to green revolution technology the Indian government gave plenty of support through training programmes and subsidies on inputs and seed material. This continues to date. Farmers wishing to move away from conventional farming have no such support system as of now. They are not even compensated for the seed and inputs subsidy that the government actually saves. Other State induced policies and trends that impact organic farming include reduction of pasture land, promotion of dairy based cattle breeds against agriculture centric conventional breeds, lack of quality seeds supply, inadequate access to credit, yield driven extension mechanism and increasing pressure for conversion of land from agriculture to industry, infrastructure and residences. Popular agricultural subsidy announcements to garner electoral advantage also privileges

conventional farming. In fact the latest plan by the Indian government to pay subsidies directly to farmers would completely by-pass organic farmers.

Protection from neighbourhood practices. Pesticides and chemical application from a farm in the neighborhood, will impact an organic farm. Further, when the pests are driven out of conventional farm through chemical means, it would move to the organic farms. Thus a major challenge to conversion to Organic is to get the entire to do so.

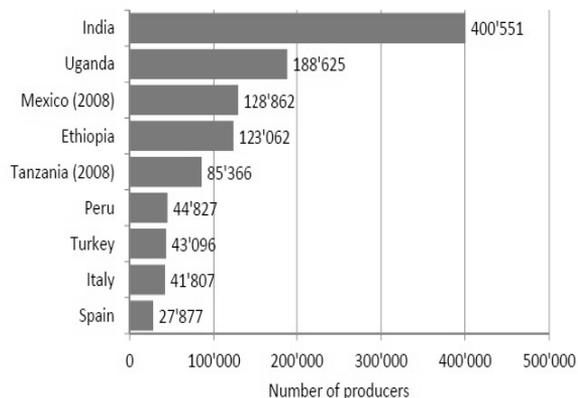
Sovereignty of Seeds: Another challenge is good quality seed. The quality of organic seeds is enhanced when there is a diversity of seed varieties, each developed in ecological interaction with the environment and other varieties. Conventional farming has reduced the variety of seeds, those that have the ability to withstand pest attack and plant diseases. Besides the reduction of gene pool in the public domain, the dominant varieties are controlled by a few companies. These companies are also pressuring the Government to allow and promote genetically modified seeds, further endangering seed sovereignty. For farmers to regain control over seeds the government must recognize and legitimize the farmer's right to control and freely exchange seeds.

Inputs: Organic farming needs biomanure and biofertilisers. These critical inputs have to be created within the farm and that may not always be possible due to inadequate land availability. Local community commons have to be rejuvenated to provide these inputs. Even when these inputs are available, farmers need to know how and when to apply these inputs.

Pest Management: Managing pests and plant diseases also requires the farmer to have a fairly in-depth knowledge of the pest and its life cycle as also the means of tackling plant diseases. They also need to develop area systems of knowledge on seasonal trends and onset of such afflictions.

Irrigation and Labour: In addition to all this timely availability of water and labour could also hamper the conversion. In many cases overuse of water would have rendered the soil saline. The farmer would then have to take remedial measure to rectify the same.

Marketing: As and when an Indian farmer has converted to organic practice, the next big challenge is to market his produce. In most countries organic produce sells at a premium compared to produce from conventional farming. In India, though consumers in urban areas are willing to pay the premium, the existing supply chain does not distinguish between conventionally grown and organic produce. Organic farmers have to create their own supply chain or become part of an existing organic supply chain if they are to realize a premium price.



Despite all these obstacles IFOAM data shows that India is the country with the largest number of organic producers. Data from the Agriculture & Processed Food Products Development Authority

(APEDA) for 2010-11 shows 4.43 million hectares of certified land under organic farming practice in India<sup>8</sup>. Madhya Pradesh leads the country in terms of area.<sup>9</sup> APEDA places the 2010-11 export of organic produce at 69000 metric tonnes consisting of over 80 organic farming products to many of the developed countries in the world<sup>10</sup>.

The large percentage of organic farmers, farm lands and farmer preference despite the limitations examined above are a definite case for serious academic study and research. Academic Institutions need to facilitate institutionalisation of organic farming at the knowledge level, rather than merely in marketing. For example the main area of institutionalisation vis-à-vis organic farming has been in certification processes.

### **Promotion of Organic Farming by the State**

The Government of India has taken different paths to organic farming. The central government has been creating support mechanism primarily for organic farming exports. The Department of Agriculture and Cooperation, Ministry of Agriculture has set up the National Centre for Organic Farming whose mission is

- Promotion of organic farming in the country through technical capacity building of all the stakeholders including human resource development, transfer of technology, promotion and production of quality organic and biological inputs, awareness creation and publicity through print and electronic media.
- Statutory quality control of biofertilizers and organic fertilizers under the Fertilizer (Control) Order (FCO), 1985, including revision of standards and testing protocols keeping in view the advances in research and technology and bringing remaining organic inputs under quality control regime.

The centre maintains detailed statistics of organic production in India and these can be seen at their website<sup>11</sup>.

The Ministry of Rural Development has come up with the Mahila Kisan Sashaktikaran Pariyojana (MKSP), which seeks to support women in agriculture, with sustainable agriculture as the focus. A budget of Rs. 100 crore is available for interventions at the grassroots level involving women in sustainable agriculture and allied activities 25% of the project cost is to be borne by the State Govt. or Project Implementation Agency. Importantly, the MKSP is being linked to the National Rural Livelihood Mission (NRLM) that has the mandate to continuously shape and monitor rural livelihoods over the next decades. Livelihood is the central component of the project, which will be linked to concerns such as Climate Change, millets production and processing, drudgery reduction, biodiversity, food and nutritional security, conservation and improved access to natural resources, pasture and wasteland development.

In related development, Mahatma Gandhi National Rural Employment Act (MGNREGA) has included Nadep composting, vermi-composting, Liquid Bio-Manures (*Sanjeevak* or *AmritPaani*) in the list of works that can be taken up in an individual's home under the scheme.

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<sup>8</sup>[http://www.apeda.gov.in/apedawebsite/organic/Organic\\_Products.htm](http://www.apeda.gov.in/apedawebsite/organic/Organic_Products.htm)

<sup>9</sup>[http://www.mpkrishi.org/krishinet/hindisite/pdfs/Javikneeti\\_Eng.pdf](http://www.mpkrishi.org/krishinet/hindisite/pdfs/Javikneeti_Eng.pdf)

<sup>10</sup>[http://www.apeda.gov.in/apedawebsite/organic/Organic\\_Products.htm](http://www.apeda.gov.in/apedawebsite/organic/Organic_Products.htm)

<sup>11</sup><http://ncof.dacnet.nic.in/areaandproduction.html>

**Indian States, their Organic policies and implementation**

Agriculture in India is a state subject and food security is the subject of the federal government. While this provides the individual states freedom to enact and adhere to their own agriculture policies, the central government controls the major funding through its different programmes on food security and supply to the nation. Many state governments have made several strides in the direction of organic farming. Each state government has a different approach to organic farming based on local conditions. To the best of our knowledge the following states have an intention to, or have mentioned becoming organic: Sikkim, Karnataka, Kerala, Uttarakhand, Madhya Pradesh and Manipur. Some of the states have created organic policy documents. The table below gives a quick comparison of their

A Quick Comparison of State Agricultural Policies						
What does the Organic Farming Policy contain?		Sikkim	Madhya Pradesh	Karnataka	Kerala	Uttarakhand
Is the main thrust on	a) livelihoods and improving net returns of farmers	Yes	Yes	Yes	Yes	Yes
	b) is it about export and niche markets?	Yes	No	Yes	No	Yes
Does the policy emphasise on	a) 'internalisation' of farm inputs	Yes	Yes	Yes	Yes	Yes
	b) providing opportunities to the organic industry, where farmers will buy things from various input factories/entities/outfits?	Yes	No	No	No	Not Clear
Have farmers' institutions and empowerment been emphasised upon, for sustainability of the effort?		Yes	Yes	Yes	Yes	Yes
Is there convergence between various departments envisaged?		Yes	Yes	Yes	Yes	Not Clear
Have forward linkages as well as backward linkages been thought of, and planned for?		Yes	Yes	Yes	Yes	Yes
Is the policy ambitious in its approach or not?		Yes	Yes	Yes	Yes	Yes
How is the implementation against the objectives? Are the goalposts being moved or being adhered to?		Yes	Yes	Not Clear	Yes	Not Clear
Does the policy address	equity concerns	No	No	No	Yes	No
	fragile eco-zones	No	No	Yes	Yes	No
	women farmers	No	No	Yes	Yes	Yes
	smallholders	Yes	Yes	Yes	Yes	Yes
	tribal and dalit farmers	No	Yes	Yes	Yes	Yes
	rain fed farmers	Yes	Yes	Yes	Yes	Yes
Are subsidies being recast clearly to promote organic?		No	Yes	Yes	No	Not Clear
Do main subsidies continue in a chemical farming paradigm, vitiating any plans for organic right at the beginning		No	No	Not Clear	Yes	Not Clear
Is a farming systems approach being taken - livestock integration, agro-forestry etc		Not Clear	Yes	Yes	Yes	Yes
Note: These responses based on study of documents and field visits and interactions. Since the policies on the ground are uneven and based on responses to specific situations, they have limited validity. There is however a clear need to study the policies further and to create a template to address concerns of the state and citizens.						

approach. A detailed note on some of the states is given below.