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ORGANIC AGRICULTURE FOR SOCIAL AND ECOLOGICAL SECURITY

In last few decades, awareness about social and environmental issues has increased. Organic agriculture (OA) is one of the agriculture production systems that is not only supportive to the environment but is also sensitive to the social issues like employment, health, migration etc. Definitions given by two international organizations also verify this concept.

These definitions are: -

1. Organic agriculture is a holistic management system, which enhances agro-ecosystem health, utilizing both traditional & scientific knowledge. Organic agriculture system relies on ecosystem management rather than external agricultural inputs. (IFOAM, 2006)
2. Organic agriculture is an environmentally and socially sensitive food supply system. The primary goal of organic agriculture is to optimize the health and productivity of independent communities of soil life, plants, animals and people. (FAO, 2002)

Although OA seems to be just the exclusion of synthetic external inputs but it is the ideological differences with conventional farming that makes OA friendly to society and environment.

Table 1. Ideological differences between organic and conventional agriculture

| Organic Agriculture (OA) | Conventional (chemical) Agriculture |
|---|---|
| Holistic approach | Reductionist approach. |
| Decentralize production | Centralize production |
| Harmony with NATURE (Harness the benefit) | Domination on NATURE (Exploit for profit) |
| Diversity | Specialization |

Essential components of the organic system:

Three major components create core environment for organic production system. There may be some minor location specific components also.

These three major components are-

1. Maintaining agro-diversity through cropping system, integration of animals and other beneficial flora and fauna.
2. Conservation and efficient utilization of local resources with least dependency on external inputs.
3. Fairness in production and utilization so that every stakeholder of the system gets his due share.

OA provides social and economic security, which encompass other aspects including employment generation and potential for mitigating adverse effects of climate change.

A. Social Security

1. Health: Organic production system prohibits the use of synthetic chemicals thus field workers/ farmers gets good environment and the consumers also gets chemical free food. This minimizes health problems due to avoidance of exposure to chemicals.

2. Employment: Since, organic farming promotes the use of local recourses and decentralized input supply therefore, there is ample scope of employment generation in input preparation, soil and water conservation work etc. Many State government agencies are utilizing this opportunity for employment under rural development schemes like MNREGA, RLP/SGSY etc.



Photo 1. Decentralized input (vermi-compost) preparation

3. Economic stability: In OA, cost of production is reduced to a great extent as the use of external inputs is minimized. Further, due to quality production organic produce may also get 10-15% premium price. Thus, farmer's economic conditions are likely to improve on account of these two factors. This has been proved by a survey of organic farms all over the India, done by Indian Institute of Soil Science, Bhopal. (Ramesh et.al. 2010).

4. Fairness: OA ensures fairness and equality to all the stakeholders coming in production to consumption chain. Fairness means those involved in OA should conduct human relationship in a manner that ensures fairness at all level and to all parties-farmers, workers, processors, distributors and consumers. Natural and environmental resources that are used for production and consumption should be managed in a way that is socially and ecologically just and should be held in trust for future generation.

B. Ecological Security

OA helps in ecological security in following ways: -

1. Conservation of biodiversity: OA avoids monoculture and promotes production system that follows crop rotation and integrated use of flora and fauna useful for production. This maintains ecological balance. Further, management of nutrition and protection of crops through natural sources helps in maintaining food chain and ecological balance.

2. Mitigating effect of climate change: Worldwide 90 million tons of mineral oil or natural gas are processed to get nitrogenous fertilizers every year. This generates 250 million tons of CO₂ emission. On the contrary, organic farms return 575 to 700 kg CO₂ to the soil. OA thus reduces CO₂ emission by eliminating synthetic fertilizers, and at the same time restricts rise in atmospheric CO₂, a win-win situation (Niggli, 2008). Further, soils with higher humus content can adapt to the adverse effect of climate change. Organic matter in soil act a sponge and enhances rainwater retention therefore, maintain productivity in the event of drought, irregular rainfall events, floods and rising temperature.

OA: Suitable to Society and Ecology of Arid Zone

1. Diversified farming system: Farming systems in this region are highly diversified in nature with crops, trees, animals, grasses etc. These systems are scientifically efficient in nutrient recycling and restoration of soil fertility. In these systems 10-30 trees/ha are available and 2-5 animals are reared by a farm family. These integrated farming systems minimize pest incidence as well as favors OA and in the long run controls desertification.

2. Rich traditional wisdom: Rich traditional wisdom in these areas for restoration of soil fertility and for pest control further strengthens and provide strong infrastructure for organic system.

3. Natural Availability of inputs: Plants like neem, calotropis etc. are good sources of biopesticides and are

abundantly available in these areas. Minerals like rock phosphate, gypsum and lime are also available in large quantity. Further, the farming systems are dominated by animals. Waste and product of huge animal population can be a best source of balanced nutrient supply. All of them are good soil ameliorator as well as good nutrients supplier and can thus be strong motivator for adoption of OA in arid zone.

4. Employment opportunities: Migration of human resources during drought imbalances the development of the region. Human resources can be reallocated through NGO and governmental organization during drought period also to prevent exodus.

5. Soil improvement: Soils are poor in water holding capacity and deficient in most of the essential nutrients. Addition of organic matter not only improves the water holding capacity but also make the soil to supply nutrients in balanced manner. This trend in soil properties improvement has been observed in an all India survey of organic farms.

6. Monopoly high value crops: Arid western Rajasthan have four major export oriented crops namely clusterbean (as guar gum), sesame, cumin and psyllium (isabgol). Total export of these crops is around Rs 2000 crore (\$400 million)/year. In view of present trend and competitive market, enhancing export of mainly organic produce is a distinct possibility in future.

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

Model Organic Farm (MOF) At CAZRI

Considering the possibilities and to provide scientific footing through experimentation, a model organic farm has been established in 2008, within the central research farm of CAZRI, Jodhpur. The farm was declared "Certified Organic Farm" in the year 2011. Following supporting facilities have been created at the MOF to self-sufficiency for development of OA.

- ♦ Two rainwater-harvesting tanks of 5000 liters capacity (each) were constructed in the model organic farm. This water is being utilized for raising low volume-high value crop e.g. cumin, psyllium etc.



Photo 2. Rainwater harvesting tank

- ◆ Agro-diversity is being maintained by following crop rotation on both temporal and spatial basis (Photo 3).



Photo 3. Agro-diversity at MOF, CAZRI

- ◆ Biodiversity plantation was done in the model organic farm of 12 fruits and flowering plants, native of the area. Besides, naturally grown about 30 plants of *P. cineraria* (khejri, an MPTS) were also protected. This plantation ensures nectar supply and shelter to the beneficial fauna.

Outcome of Experiment at MOF

1. Contribution of legume: Legumes contributed 25-30% higher yield in the subsequent crop. During the Rabi season, crops of cumin and psyllium were grown in rotation with sesame and cluster bean. Cumin yield of 566-kg/ha and psyllium yield of 808 kg were obtained in the treatments of organic inputs+cluster bean in rotation.

2. Crop yield comparison: There is general apprehension that an organic system is a poor yielder. However, findings at CAZRI shows that at the initial developmental stage of organic system there may be low yield by only 20-30% but after 2-3 year once the system is developed the yield levels were comparable to the conventional system. By the third year, yield of 886-kg/ha sesame, 630-kg/ha clusterbean, 516-kg/ha cumin and 808-kg/ha psyllium was recorded. This was comparable to the average yield in conventional system.

3. Pest Management: Pest incidence remained below economic threshold level with the integrated use of following eco- technologies: -

1. Soil application of neem seed powder
2. Use of well prepared compost
3. Use of healthy seed (also free from weed seeds)
4. Hand weeding and mulching
5. Prophylactic spray of neem seed kernel extract solution at regular interval

Further, availability of shelter as well as nectar due to diverse flora and water, increased the population of beneficial insects e.g. pollinator, predator etc. (Photo 4&5). A successful biological control of aphids in cumin and psyllium by ladybird beetle was also observed at MOF (Photo 6). Additionally, predatory birds and wasps controlled several types pest larvae in green gram, cluster bean and sesame.



Photo 4 & Photo 5. Beneficial fauna at MOF



Photo 6. Aphid control in cumin by ladybird beetle

Maintenance of biological control of insect pests and sufficient population of beneficial fauna can thus be achieved.

Suggestion for promotion of OA in arid zone

- ◆ Priority to OA in ongoing rural development programs e.g. watershed, SGSY, MNREGA. food security mission, horticulture mission etc.
- ◆ Dissemination of OA may be in holistic manner by all the technical and funding agencies
- ◆ Sustainability issues related to OA need to be emphasized rather than certification as the latter shall be meaningful only in economically viable crops.
- ◆ Intensification of awareness and capacity building programs.
- ◆ Encouragement of decentralized input supply for quality, saving cost and efficient utilization of local resources.
- ◆ Financial support for adoption of improved methods of composting as it is one of the major factor that improves nutrient availability

Conclusion

Organic farming is a holistic production system run with the efficient use and recycling of locally available resources. Due to scarcity of water and sandy to sandy-loam soils are best suitable. Some monopoly high value crops of this region like seed spices are having great international demand if produce organically. Organic production in arid areas will not only boosts the economy of this region but shall also sustain the productivity of natural resources.

Arun K.Sharma

FORTHCOMING CONFERENCES AND EVENTS

2nd International Conference on Environment Science and Engineering (ICESE 2012) from 7 to 8 April 2012 at Bangkok, Thailand. Contact: <http://www.icest.org/>

The Role of Biobanks for Research and Protection of Forest Biodiversity from 19 to 21 April 2012 at Viterbo, Lazio, Italy. Contact: <http://www.medna-bank.eu/index.php/events/36-confviterbo>

IWA World Conference on Water, Climate and Energy from 13 to 18 May 2012 at Dublin, Ireland. Contact: <http://www.iwa-wcedublin.org>

7th Annual International Symposium on Environment from 14 to 17 May 2012 at Athens, Greece. Contact: <http://www.atiner.gr>

Mountain Resource Management in a Changing Environment from 29 to 31 May, 2012 at Kathmandu,

Nepal. Contact : <http://www.himunet.com/downloads/international-symposium-may-2012.pdf>

World Climate 2012 World Conference on Climate Change and Humanity from 14 to 15 June, 2012 at Vienna, Austria. Contact : <http://www.vienna-conference.com/worldclimate/index.html>

1st International Conference on Environmental and Economic Impact on Sustainable Development from 2 to 4 July, 2012 at New Forest, Hampshire, United Kingdom. Contact : <http://www.wessex.ac.uk/12-conferences/environmental-impact-2012.html>

1st Regional Conference on Agrobiodiversity Conservation and Sustainable Utilization 2012 (RAC-1) from 25 to 27 September, 2012 at Langkawi, Kedah, Malaysia. Contact : <http://racl.mardi.gov.my>

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Visit Abroad

Dr. M. M. Roy, Aleppo (Syria), from 21.5.2011 to 26.5.2011 for discussing the "Center of Excellence for Dry Land Production System" at ICARDA Hqrs.

Dr. M.M. Roy, Nairobi (Kenya), from 26.6.2011 to 30.6.2011 to attend Dry Land Systems Regional Design Working meeting at World Agro Forestry Center (ICRAF).

Dr. R.K.Bhatt, Rome (Italy), from 24.10.2011 to 26.10.2011 for attending the Geo-Carbon Conference: "Carbon in a changing world" at FAO Hqrs.

Dr. T.K. Bhati, Bobo Dioulasso, Burkina Faso, from 14.12.2011 to 19.12.2011 for participation in 9th International workshop of "Sustainable Management of Marginal Dry Lands Phase-2 (SUMAMAD 2)".

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