Concept on Organic Vegetable Production

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Introduction

“A hungry man is an angry man”, M.S. Swaminathan (2003) and, “if the hungry man happens to a young man, then we have a potential terrorist amongst us”, Chhonkar (2003).

If we are arguing about the food and nutritional security how can we ignore the vegetables which play an important role in Indian agriculture. During the last 50 years India has achieved substantial growth in vegetable production which made it to stand for the second rank next to China. No doubt, we have a good amount of land under vegetable production but still we are lagging behind many countries in terms of food security and nutritional safety. Mere producing tones of vegetables from the unit piece of land by applying tons of chemicals in to the soil is not going to put a milestone in Indian agriculture system. According to The International Food Policy Research Institute (IFPRI), Washington there is an urgent need to produce nutritious food in a sustainable manner and to improve farm family income in order to ensure household food security while at the same time protecting the natural ecosystem and conserving the natural resource base.

Production of vegetable through organic farming is generally recognized by practitioners as a method of production that uses, practices or substances which are biologically enhancing to the soil, plant life, animal and human consumers, and growers. The principles of organic agriculture include: replenishing and maintaining long-term fertility by providing optimal conditions for biological activity; producing viable quantities of high quality, nutritious food and feed; reducing the use of fossil fuels in agriculture and pollution that may result from farming; encouraging “closed cycle” farming systems that use local resources and recycled nutrients; enhancing ecological cycles within the food production system; maintaining genetic diversity of the agricultural system and its surroundings, including protection of plant and wildlife habitats; ensuring decent and nonexploitative treatment of farm workers; creating conditions for farm livestock that ensures them a life free of undue stress, pain, and suffering; maximizing the farmers’ return and satisfaction for their work; sustaining the land in a healthy condition for future generations; and optimizing multiple use capacity of the land.

Why to go for organic vegetable production?

Over 900 million people experience the hardship that hunger imposes, a figure which continues to rise even amidst the riches of the 21st century. As world food prices scale new peaks, food insecurity and famine once again dominate
humanitarian headlines, barely three years since the last crisis. Engulfed within a vortex of population growth, economic instability and climate change, food security and nutritional security present a formidable challenge for national and global governance.

The vegetable crops have been well advocated in solving the problem of food security. They are rich source of minerals, vitamins, fibre and contain a fair amount of protein as well as carbohydrates. In addition to local market demand vegetables have the potential for both domestic and export market. The productivity of different vegetables in our country is comparatively lower than the world’s average productivity. Again the per capita availability of vegetable (210g/head/day) is still behind the recommended quantity (300g/head/day). Thus, keeping an eye towards the population explosion and to feed the future generation we should develop a holistic approach to produce more vegetables from less land, less water with less pesticides and with less detrimental effect to soil and environment as well. Organic vegetable cultivation offers one of the most sustainable farming systems with recurring benefits not only to long-term soil health but also provides a lasting stability in production by making it resistance to all kind of stress.

Managing an organic system can require close attention to detail, and possibly more time and effort monitoring different indicators of the systems’ balance. To optimise management effectiveness, organic growers adopt a holistic approach when evaluating and predicting the consequences of any decision, especially with respect to pest, disease, weed and nutrient management.

Growers may find that setting aside a small area for developing organic production is a practical way to minimise commercial risk during the transitional phase, while gaining experience and confidence in an organic management system.

Motivation and commitment to the principles of organic farming, beyond the essential financial and market perspective, are regarded as key requirements for success.

In developing an organic system, the cropping rotation is likely to require production of a range of different vegetables grown using organic methods. The selection of other crops to be grown in rotation can have important management implications. In addition, these other rotational crops must also have reliable organic markets if returns from developing an organic system are to be optimised.

As with conventional production, maintaining a reliable supply of product that consistently conforms to buyer quality criteria is essential for developing and retaining markets. Producing a product with superior flavour, and other eating qualities, can be very valuable in distinguishing the organic product from others in the market and reinforces consumer perceptions that organic products should taste better. Incorporating a quality assurance system, as part of the organic operation, may be important to ensure product quality is maintained in every consignment.
The basic principles behind Organic production are:

A whole system approach

Production of one specific vegetable crop must be considered as only one component of an integrated whole farm system. Organic vegetable production will typically comprise of a rotations that involves crops from unrelated botanical families, as well as soil regenerating pasture or green manure phases and the use of other plants species that assist in pest, disease or weed control. The whole system is designed and managed to optimise benefits to future crops arising from previous crops and treatments. The layout of cropped areas may change towards more mixed cropping as a way of breaking up large areas of a single crop, thereby increasing biodiversity and assisting pest or disease management.

Enterprises aim to become closed systems

Organic farms aim to operate as closed systems, using renewable resources wherever possible, maximise recycling, minimize waste, and reduced reliance on outside (off-farm) inputs as far as practical. Management strategies based on an understanding of biological cycles and other interactions are the main tools that replace reliance on synthetic chemical inputs. Organic farms can be managerially more complex, but should be less dependent on the use of external inputs.

Sustainable cropping rotations

The intensive nature of vegetable production, in terms of landuse, requires mixed and diverse cropping regimes and rotations in order to maintain and develop soil structure, to optimise the use of soil nutrient pools, and to minimise pests, diseases and weeds. Within the rotation, no crop of the same or similar species, family or characteristic should be planted more than twice within a 5 crop rotation. Continuous cropping with the same or related crop, or short rotations with another crop, is unlikely to be acceptable as a sustainable organic farming system.

The crop rotation should include a green manure crop, leguminous crop or a pasture ley phase to regenerate soil fertility and maintain soil organic matter and humus levels. An exception to this requirement is where soil fertility and structural characteristics are entirely met by importation of composted manures. However the application of such inputs can be limited to 20 t/ha/year.

In addition, there is a preference to include the use of livestock in the rotation cycle, for soil conditioning during fallow periods and for the supply of manures.

Plant health stems from soil health

The underlying principle of organic crop production is that: ‘healthy plants grow from healthy soil’. Well balanced, biologically enhanced soil - measured by adequate organic matter, humus level, crumb structure and feeder root development - forms the basis of organic vegetable production. Plants are nourished through a soil ecosystem built over time, and not primarily through fast-acting, soluble fertilisers added to the soil.

Synthetic fertilisers and chemical pesticides and herbicides are not permitted and can be detrimental to biologically active healthy soil. Conservation and recycling of nutrients is a major feature of any organic farming system. Mineral fertilizers should be used as a supplement to recycling, not as a replacement.

Biological processes are important

Organic systems are primarily biological systems, both above and below the soil. Pest, disease, and weed control must, in the first
instance, encourage and maintain natural biological processes so as to balance disease and pest problems. Enhancement and manipulation of these biological processes form the basis of organic management. Other control measures can include:

- choice of species and varieties of crops,
- appropriate rotational programme,
- mixed cropping regimes,
- mechanical cultivation,
- mulching and mowing,
- flame weeding,
- biological control and maintenance of beneficial predator habitats,
- mechanical controls such as traps, barriers, light, sound and pheromones.

Where available, the grower should use open-pollinated (nonhybrid) organically grown plant varieties, using seed not treated with synthetic fungicide.

Co-existence with, and protection of the environment

Maintaining biological diversity on and around the farm, is an important feature of organic systems. Avoiding monocultures by encouraging biological diversity tends to allow ecological balance or equilibrium to establish, resulting in a more stable system with less dramatic biological fluctuations - both on the farm and in the surrounding natural environment.

Areas of remnant vegetation should be protected. Shelter belts and areas of remnant vegetation can be important habitat for natural predators of insect pests, which when kept naturally in check reduce harm to crops and reduce the need for control measures.

Organic farms should also ensure that pollution and other forms of degradation resulting from agricultural practices are avoided. The use of non-renewable resources should also be minimized to help extend availability of these limited resources.

Irrigation management

Irrigation methods must be adequately managed, scheduled and monitored to reduce problems with water table, leaching of nutrients and salinity inducement. Irrigation management must minimise disturbance to the environment and natural ecosystems, including wetlands, river flow regimes and wildlife habitat.

Post harvest, storage and processed products

To prevent contamination of vegetables on farm, organic product must be kept in a dedicated storage area separate from conventional product. Post harvest treatments and packaging materials must comply with organic standards. Where growers intend to value add or process vegetables, compliance with organic processing standards is required if the final product is to be labelled as certified “Organic”.

How to establish an organic farm:

Organic vegetable systems are often complex, including many vegetable varieties with plus rotations of fallow and cover crops to build the soil and reduce disease incidence. A good farm plan takes into consideration many factors:

- Soil type
- Current state of soil
- Expectations from the crop
- Rotations to deter the pests but also to build and balance the soil
- Climate
- Environment
- Market expectations
• Market(s) availability
• Resources availability
• Personal experiences and those of fellow farmers
• Most importantly: include skills and abilities

**When to start an organic vegetable farm:**

• Allow for at least a year to plan
• Speak to those with experience
• Read to educate
• Attend educational sessions
• Sharing ideas with fellow farmers
• Listen to responses
• Incorporate ideas into a farm plan

**Organic vegetable production method**

A well designed whole farm plan should devote special attention to the conversion phase – the first three years of transition from conventional to organic management - when markets for ‘in conversion’ product may be uncertain and while practical experience is being developed. Such a plan can enable an organic system to be easily integrated with all farm activities. Financial risk can be managed and adoption of each new operational component can improve management and enterprise effectiveness.

Certification is an important prerequisite for the acceptability of organic products or foods as organic by Government Regulatory Authorities, exporters, importers, as well as consumers across the world. To satisfy their requirement, a sound system of certification and labeling of the produce by a competent agency is highly essential.

The Certification Agency has to adopt very reliable methods such as soil tests, water tests, food quality tests, and other natural quantitative indicators so as to ensure credibility of the system in order to prevent fraudulent labeling of the products. It is necessary to keep the records of all management practices and materials used in organic production for five years. The crops must be grown on the land, which has been free of prohibited substances for three years prior to harvest. Crops grown on land in transition to organic (during the last three years after switching from conventional farming) cannot be labeled as ORGANIC. Once the produce is certified as ORGANIC, the producer or the processors are entitled the symbol.

For Organic Certification Agency, International Federation of Organic Agriculture Movements (IFOAM), Germany has established the IFOAM Accreditations Programme. In India, IOAM (Indian Organic Agriculture Movement), a member of IFOAM, adopted the IFOAM International Standards, the basic production standards applicable under Indian condition were prepared, and farmers growing crops as per IOAM Standards are eligible to get the Certificate and the organic label. The farmers can sale the organic produce in the local as well as International markets on the basis of IOAM label.

The National Standard Committee has drafted both the concept and principles of basic standards of Organic Agriculture in 1996 in order to improve the socio economic condition of the farmers and also boost the International Trade.

At present in India, the following six authorized accreditation agencies have been approved by the Ministry of Commerce, Government of India. They are:

• APEDA (Agricultural & Processed Food Product Export Development Authority)
• Coffee Board
• Spices Board
Tea Board  
Coconut Development Board  
Cocoa & Cashewnut Board

In addition there are four Certification Agencies accredited by APEDA such as

- IMO Control Pvt. Ltd., Bangalore (Institute for Market ecology, Switzerland)
- Skal International (The Netherlands), India, Bangalore
- SGS (Societe Generale de Surveillance, Switzerland) India Pvt. Ltd., Gurgaon
- ESCOCERT (Ecological Certification, France) International, Germany

APEDA (Agricultural & Processed Food Product Export Development Authority) is an export promotion organization, involved in publicizing Indian Organic logo globally. Expo-Import Bank in association with APEDA is engaged in promotion of organic agriculture products by creating awareness through active participation in International Conferences. It has also engaged to identify exclusive Agri Export Zone (AEZ) for organic produce in some parts of country, such as organic pine apple in Tripura, where use of chemical fertilizers and pesticides is negligible.

India’s first ever local Organic Certification Body, INDOCERT (Indian Organic Certification Agency), was established in March, 2002 with an objective to offer a reliable and affordable organic inspection and certification services to farmers, processors, input suppliers and traders. It is an independent, nationally operating nonprofit trust whose primary aim is in conducting inspections and granting certification for organic production methods. It provides certifications both for domestic as well as export market. INDOCERT also functions as a platform for training, awareness creation, information dissemination, and networking in the field of organic farming.

According to the year of production, INDOCERT label the products as organic as follows:

<table>
<thead>
<tr>
<th>Crops</th>
<th>Year wise label</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st year</td>
</tr>
<tr>
<td>Annual</td>
<td>No label</td>
</tr>
<tr>
<td>Perennials</td>
<td>No label</td>
</tr>
</tbody>
</table>

Needs of Organic Farming of Vegetable crops in India

Most of the vegetable crops are eaten fresh or used for health care; hence any contamination (chemical residue) may lead to various kinds of health hazards

- In India majority of the vegetable growers are poor, small and marginal farmers.
- Decrease in land productivity due to ever increasing use of chemical fertilizers.
- There are not many scientific breakthroughs in improving quality and production of vegetable crops.

- The ever-increasing cost of production in chemical farming including investments in manufacturing fertilizers, pesticides, irrigation etc despite massive government subsidies is a major cause of concern, which is very low in organic farming.

- High environment pollution.

- Due to globalization, there is a need for keen competition in organic farming of vegetable crops.

- Organic Farming of vegetable crops generates income through international exports or by saving production costs.

- Organic Farming will also be able to secure a place of India in international markets by producing high value vegetable crops.

- Excessive use of chemical fertilizers as well as pesticides not only increases the cost of production but also poses threat to the environment quality, ecological stability and sustainability of production. We have gained quantity but at expense of quality.

Results of Organic Vegetable production

- Develop a sustainable agriculture system for guaranteed adequate food production in the foreseeable future.

- Develop self-sufficient agriculture system which would rely as much as possible upon resources from within its own resources.

- Develop an alternative strategy over chemical farming which would be a guideline for the working of biological processes in natural eco-systems.

- Produce food of high nutritional quality in sufficient quantity.

- Encourage biological cycles within farming systems by involving the use of microorganisms, soil flora & fauna, plants and animals.

- Maintain and increase the long term fertility of soil and biodiversity.

- Use renewable resources in locally organized production systems.

- Work with a close system with regard to organic matter and nutrient elements.

- Avoid all forms of pollution that may result from agricultural techniques.

Conflict between conventional farming and Organic farming

Yields relative to comparable conventional systems are directly related to the intensity of farming of the prevailing conventional systems. This is not only the case for comparison between regions, but also between crops within a region, and for individual crops over time. The common claim that large-scale conversion to organic agriculture would result in drastic reduction in world food supplies or large increases in conversion of undisturbed lands to agriculture has not been borne out in modeling studies. Conversion studies showed that domestic food consumption would not suffer, exports would vary depending on crop, but the structure of farming would definitely change with more diversification of agriculture. Widespread conversion to organic agriculture would result in crop yield increase over the current averages as a result of increased investment in research and extension.
Organic farming is often understood as a form of agriculture with use of only organic inputs for the supply of nutrients and management of pests and diseases. In fact, it is a specialized form of diversified agriculture, wherein problems of farming are managed using local resources alone. The term organic does not explicitly mean the type of inputs used; rather it refers to the concept of farm as an organism. We all know about the socio-economic conditions prevailing among farmers. How can they be able to get the costly inorganic fertilizers, pesticides, chemicals to control diseases? How they will be able to achieve the food security? But organic vegetable production may be an answer to them. If they will agree to cultivate the vegetables by using their local resources in the small piece of land which is with them, then also they will be able to grow up with respect to the urban people.

<table>
<thead>
<tr>
<th>Material</th>
<th>N</th>
<th>P$_2$O$_5$</th>
<th>K$_2$O</th>
<th>relative availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfa alfa pellets</td>
<td>3</td>
<td>0.5</td>
<td>3</td>
<td>slow</td>
</tr>
<tr>
<td>Dried blood</td>
<td>13</td>
<td>2</td>
<td>0.5</td>
<td>medium/rapid</td>
</tr>
<tr>
<td>Bone meal (Raw)</td>
<td>2-6</td>
<td>5-27</td>
<td>0</td>
<td>slow</td>
</tr>
<tr>
<td>Bone meal (Steamed)</td>
<td>0.5-4</td>
<td>18-34</td>
<td>0</td>
<td>slow</td>
</tr>
<tr>
<td>Compost</td>
<td>1-3</td>
<td>0.5-1</td>
<td>1-3</td>
<td>slow</td>
</tr>
<tr>
<td>Compost (Fortified blend)</td>
<td>3-5</td>
<td>1-2</td>
<td>1-2</td>
<td>rapid</td>
</tr>
<tr>
<td>Fish emulsion</td>
<td>3-5</td>
<td>1-2</td>
<td>1-2</td>
<td>rapid</td>
</tr>
<tr>
<td>Soyabean meal</td>
<td>6-7</td>
<td>1-2</td>
<td>2</td>
<td>medium</td>
</tr>
<tr>
<td>Wood ashes</td>
<td>0</td>
<td>1-3</td>
<td>3-7</td>
<td>rapid</td>
</tr>
</tbody>
</table>

There are some myths about the organic farming as well as the organic production of vegetables, the following table is about the myth that prevails in the society and the reality:

<table>
<thead>
<tr>
<th>MYTH</th>
<th>REALITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic foods are no healthier than non-organic foods</td>
<td>Food produced organically contains fewer contaminants. Some scientific studies have shown that there are more nutrients in organically produced food.</td>
</tr>
<tr>
<td>Organic farming increases the risk of food poisoning.</td>
<td>Organic farming can actually reduce the risk.</td>
</tr>
<tr>
<td>Organic farming uses pesticides that damage the environment</td>
<td>Organic farming systems rely upon prevention rather than cure, minimizing the need for pesticides.</td>
</tr>
</tbody>
</table>
Consumers are paying too much for organic food

Crop rotations, organic animal feed and welfare standards, the use of good husbandry instead of agro-chemicals, and the preservation of natural habitats all result in organic food costing more to produce. Non-organic food appears to be cheaper but in fact consumers pay for it three times over – first over the counter, second via taxation (to fund agricultural subsidies) and third to remedy the environmental pollution (or disasters like BSE) caused by intensive farming practices.

Organic food cannot feed a hungry world

Intensive farming destroys the fertility of the land and is unsustainable. Organic methods help labour-rich but cash-poor communities to produce food sustainably.

Organic farming is unkind to animals

Far from it: animal welfare and the freedom to behave naturally are central to organic livestock standards.

Conclusion

Vegetables are the crop which has the capability to give high return per unit area and per unit time than the normally grown cereals. Only taking a plate of rice and a bowl of dal will not be able to feed the whole world. Hunger is not caused by lack of food it is caused by lack of money. If we will analyze the cultivation practices required for the production of organic vegetables then we can find that it will cost less than the conventional methods of vegetable production by applying a large amount of inorganic chemical fertilizers to the soil. Food security will only be achieved when all the common people will be able to earn with respect to the changing pattern of the world. A land less farmer can also grow vegetables but not the grains and can be able to earn for his livelihood and by this way he can be able to secure food for him and his family members. Organic vegetable farmers grow a variety of vegetables and maintain livestock in order to optimize use of nutrients and the space between species. This ensures economic advantages through low crop production or yield failure due to biotic and abiotic factors in all of these simultaneously. This can have an important impact on local food security and resilience. It has also been experimented that in rain-fed areas, organic vegetable has demonstrated to out-perform conventional agricultural systems under environmental stress conditions. Under the right circumstances, the market returns from organic vegetable production can potentially contribute to local food security by increasing family income.

References:


Steven McCoy (2001). Organic Vegetable-A guide to production, Bulletin 4517 ISSN 1326-415X


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