

## **Sustainability through Organic Agro- Biotechnology with special reference to Jammu & Kashmir scenario**

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### **Abstract**

Growing awareness about health and environmental issues are paving way for increasing demand of organically produced agriproducts across the world. This is making organic farming a growing business. Farming systems based on synergism with nature, opens the door to immense possibilities for improving the soil health and overall environment and providing sustainable livelihoods , by updating these age-old systems with modern research and techniques. Given diverse agro climatic conditions coupled with presence of by default organic production ,the state of Jammu and Kashmir has a vast scope for development of the organic agriculture .The use of modern day biotechnological approach towards achieving the goal of promoting organic practices and ultimately creating markets for organic produce both regionally and globally. The paper reviews the status ,scope, strategies, specific benefits and challenges of biotechnology based organic farming and explores the possibility for application in the state of Jammu and Kashmir.

**Keywords** – organoagriproducts ,opportunities, organic farming

### **1. Introduction**

Organic farming is not new to [Indian](#) farming community. Several forms of organic farming are being successfully practiced in diverse climate, particularly in rainfed, tribal, mountains and hill areas of the country. Much of the forest produce of economic importance like herbs, medicinal plants, etc., by default come under this category. Renewed interest in organic farming among farmers, entrepreneurs, policy makers and agricultural scientists is due to reasons such as it minimizes the dependence on chemical inputs (fertilizers; pesticides; herbicides and other agro-

chemicals) thus safeguards/improves quality of resources, and environment. It is labour intensive and provides an opportunity to increase rural employment and achieve long term improvements in the quality of resource base. Exports also played a role but perhaps lesser than in other countries .

Modern organic production systems are based on specific standards precisely formulated for food production and aim at achieving agro ecosystems, which are socially and ecologically sustainable. The four pillars of modern organic farming are- Organic standards, Certification/Regulatory mechanism, Technology packages and Market network.

As per a report of International Federation of Organic [Agriculture](#) Movements (FiBL-IFOAM, 2012) the total organically managed area is more than 37 million hectares world-wide. Organic farming is practiced in approximately 160 countries of the world and the area under organic management is continually growing. Although production of organic crops is increasing across the globe, sales are concentrated in the industrialized parts of the world. World wide there are 1.6 million producers .India ranks number one in organic producers with 400,551 followed by Uganda (188,625) and Mexico (128,826).Organic market has increased to 70.1billion dollars and per capita organic consumption to 8.6 US dollars with the highest in Switzerland (213USD). Organically produced agricultural products have received global attention in the last four years especially due to their being a multi billion trade. Of the total 135 products in organic products portfolio,India exports 86 products worth over 100 million dollars to the global market of 60 billion dollars which is growing by 5 billion dollars annually. The global market for organically produced foods is likely to increase to USD 102 billion by 2020. Currently, India ranks 10th among the top ten countries in terms of cultivable land under organic certification. The certified area includes 10% cultivable area with 0.50 million Hectare and rest 90% (4.71 million Hectare) is forest and wild area for collection of minor forest produces. The total area under organic certification is 5.21 million Hectare (2012-13).In the last decade , an increasing number of companies, NGOs, farmer organizations, and government agencies have been promoting organic agriculture in India. The growth in organic production has been driven mainly by the increasing international demand, but the domestic market is also strengthening due to a large population, awareness and increasing wealth in the middle class society.

## **2. Organo- Agri Biotechnology**

The present level of agricultural production has not reached the optimal stage because of series of hurdles. Major bottlenecks among them, are lack of resources such as water nutrient and good quality planting material, improper management of pests and diseases and poor harvest management of the produce. Biotechnology have acted as a major pillar in the development and modernization of agriculture. With natural bio-based organic agriculture now gaining momentum , biotechnology has a lot to offer in this field also. For crops where fertiliser application is very low, bio-fertilizers can fix atmospheric nitrogen and provide micro-nutrients useful to

plant growth. Use of blue-green algae has also been beneficial to rice crop. Microbes such as mycorrhizae have been helpful to overcome the stress from drought and diseases. Biotechnology also has tremendous scope in plant protection. Biotechnological application has a maximum role for the Organic Input providers. It includes the products ranging from those used in maintaining and increasing soil fertility, in pest management, veterinary feed additives or supplements and nutraceutical products .

### **3. Approach for Organic farming in India and its scope in Jammu and Kashmir**

For promotion of organic farming identification of potential areas and crop is crucial. As regards crops, the Government of India's priority is for fruits, vegetables, spices, medicinal plants, oilseeds, pulses, cotton, wheat and basmati rice. Priority zones have been identified as potential areas. One of these zones include the areas where fertilizers and other agrochemicals consumption is very low. These areas are in Assam and other north-eastern states, Jharkhand, Odisha , J & K, Himachal Pradesh, Karnataka, Madhya Pradesh, Chhatisgarh and Rajasthan. Organic farming needs to be started with low volume high value crops like spices and medicinal aromatic plants .A holistic approach involving integrated nutrient management ,integrated pest management enhanced input use efficiency and adoption of region specific promising cropping systems would be the best farming strategy for India. The above approaches of potential area and priority crops are well suited to the state of Jammu and Kashmir,with default organic agriculture already at a promising rate in the state.

### **4. Jammu and Kashmir scenario**

With over 80% of the state's population engaged in agribusiness sector and a remarkable 60% of the State's revenue being earned by this sector only, agribusiness therefore is a serious business when it comes to Jammu and Kashmir. The state is basically a mono-cropped and rain fed economy with 40% area in Jammu division and 60% in Kashmir division. The major crops include rice, maize and wheat. Recently the farmers have also started cropping cash crops and oil seeds .However horticulture alone earns INR 1500 Crores with 75 % of the temperate fruits of India coming from Jammu and Kashmir .The Horticulture business employs over 250,000 people in the state. A massive export potential is seen with fruits ,vegetables, flowers, juices, and pulps markets especially in the Middle-east ,Europe, China and Australia. But with enhancing trade in SAARC countries, we may have more opportunities of expansion in domestic Asian markets. Production and export of fruits like apples, pears, cherries, plums, grapes, pomegranate ( for the famous *anardana* from Doda – Udampur district.),mulberry, peaches, apricot, walnut and almonds is common in the state. Over 20% of the total cultivated area is under horticulture crop.

## 5. Organic Advantage : Jammu and Kashmir

As such the state falls in the zone where the fertilizer and other agrochemical consumption is very low. The present fertilizer consumption in J&K is 38.3 kg/ha as compared to 170 kg/ha in Punjab. In contrast the estimated quantity of nutrients mined by crops in Kashmir is 48 kg/ha. Thus we have better options for boosting organic production in J&K especially in the horticultural products, floriculture, honey, basmati rice, aromatic and medicinal plants. Other advantages are listed below-

1. Varied Agro-Climatic Zones expressing in a wide variety of agricultural and horticultural produce, some of which are unique to the State.
2. Jammu, home to high quality basmati rice could find a good market in Middle-East for organically grown rice.
3. Kashmir, home to high quality Saffron, Zeera, fresh and dry temperate fruits and commercial floriculture.
4. Ladakh, home to high quality apricots and sea-buck thorn berry.
5. Potential for Bio-Diversification due to agro-climatic and soil conditions.
6. Himalayan zone rich in medicinal and aromatic plants.
7. Large forest cover area –beneficial for organic honey.

## 6. Organic Prospects and Potential : Jammu and Kashmir

1. Off-season vegetable development- Broccoli and other cole crops.
2. Conducive Agro-climatic conditions for development of commercial floriculture, aromatic & medicinal plants in the Valley and olive, kiwi fruit and pecan-nut in Jammu.
3. Wide range of flora available to boost bee keeping
4. Conducive flora and environment for sericulture and tasar culture. Market available in EU and USA for both silk carpets and organic garments.
5. Conducive soil and environmental conditions for the production of virus free quality seeds for flowers and and vegetables
6. Agricultural graduates and other educated youths willing to take up organo-agripreneurship.

### 6.1 Horticulture and Organic prospects

The horticulture sector of J&K state is most vibrant sector for economic development. Area under horticultural crops have increased from mere 12 thousand hectares in 1953-54 to 5.58 lakh hectares. The major contributor to Gross domestic product of J&K is horticulture (Wani, 2007, Wani, 2008, a,b,c). With the Jammu and Kashmir being the principal state as horticultural products exporter of India, it came contribute much to the lagging behind organic exports of India. Organically grown and processed Apples, Walnuts, Cherries, Pear, Peach, Plum, Apricot, Strawberries, Almond, Pecan, Hazelnut etc can be explored in Middle East and European organic market.

Organically grown commercial crops like mushroom, honey, floriculture have an tremendous potential for the development through export. The aquatic and forest vegetable along with naturally grown medicinal bushes and herbs have a tremendous

market and economic viability. The bee keeping as polinizers and even around Dal ,Wular and other lakes have a tremendous potential of producing iodine rich organic honey which can fetch exorbitant prices in the world market and can be used by the thyroid deficiency and gout patients. A varieties of local vegetables which grow of their own on the denuded forest and other bunds and nomams kand called nunar is rich in iron. Many other self grown weeds use as best and nutritive vegetables can be the best soil binders and providers of organic, rainfed vegetative cover to the denuded and eroded lands. There are a number of the local genotype which grow of their own in the dry ,wet and marshy lands of Kashmir .A sequential DNA mapping is needed to know their potential and nutritive value. There cultivation and propagation shall give a ready made organic , sustainable and low input base and food security.

Apple is an important principal crop of J&K State. The state contributes 57% of national production of apples, while as Himachal Pradesh contributes 24% .Like the apple farmers of Himachal Pradesh who have taken up organic farming in a big way to make an impact in the global market, Jammu and Kashmir needs to follow. However the Indian apple is not able to compete with the best in the international market as their quality is far behind the fruit grown by the organic methods , particularly in countries like Switzerland. China ,the world's largest producer of apples has already started producing the fruit with the help of organic farming in a big way as it is more in demand in the international market and so must India.

As regards walnut, it may be stated that it is an important nut crop grown in the state of J&K. The state produces 86263 tonnes of walnut from an area of 61723 hectares with the productivity of 1.39 tonnes/ha and has monopoly in the export to many countries of the world. This monopoly can be exploited for organically grown walnuts and related value added products .Walnut cultivation is common in Badarwah, Poonch, Kupwara, Baramulla, Bandipora, Ganderbal, Budgam, Srinagar, Anantnag and other hilly areas of J&K.

Total area under cultivation in the state for commercial floriculture is 168 ha (appr) with main flowers being Lilium, Carnations ,Tulips ,Marigold, Gladiolus. A number of aromatic oil extraction plants are also set up for distillation of the essential oils. This area can be exploited for organic cultivation and processing as the major produce is exported.

## **7. Organic Strategies: Jammu and Kashmir**

1. Adoption of recommended packages of practices developed by R & D Institutions
2. Promotion of PPP involving NGOs, FIGs, commercial organizations and corporate.
3. Encouragement for setting up of small scale organic input production units and popularization of consumption of organic inputs.
4. Promotion of site specific nutrient and integrated pest management.

5. Establishment of Mandis within and outside the State to facilitate elimination of middlemanship.
6. Introduction of Capital Venture Assistance Scheme to boost Agri-Clinic and Organo Agri Business activities by the unemployed Agriculture Graduates.
7. The new market options for organic fruits produced in J&K need prioritization and certification under WTO regulation. International bio safety measures, Grading and packaging of available fruits, initiatives for development of new varieties of fruits like kiwi fruit, wild apricot, black cherry, broccoli and mushroom are the suggested ways to development of this sector.
8. The options for air transport, cargo from Leh, Srinagar and Jammu to centers of consumption like Delhi, Chandigarh & Mumbai need exploration.
9. Research and promotional strategies are required in the following areas-
  - ✓ Development of package of practices for organic farming situations for all crops especially the ones having export value viz. Basmati/scented rice, horticultural crops etc.
  - ✓ Role of crop rotation in sustaining soil fertility and productivity
  - ✓ Yield organic matter relationships
  - ✓ Rainfed agricultural production in relation to less use of inorganics and more of organics
  - ✓ Use of appropriate farm machinery and cultivation techniques which reduces non-removable resources consumption and enhances crop stocks in soil.
  - ✓ Decomposition and nutrient release characteristics of organic resources and study of the nature of soil organic carbon.
  - ✓ Testing of soil water, organics inputs and organic produce for pollutants like heavy metals and pesticides residues.
  - ✓ Establishment of an organic resource data-base
10. Marketing Strategies - In the case of organic food produced by a large number of farmers, marketing has to be arranged at village or taluk level. New crop zones that have been created during the last few years (e.g. RS Pura, Jammu for basmati rice) may boost such exports, because export has advantages over local/retail marketing .
11. Government supports farming for all crops grown under organic agriculture and biotechnological opportunities are foreseen because of maintenance of soil health, avoidance of environmental pollution, no risk of chemical residues in food and fodder, opportunities for rural employment, etc. These parameters lead to sustainable agriculture.
12. This system will augment the farmer's income; help in the conservation of natural resources, and will have positive effects on the socio-economic aspects of the farming communities (e.g. generation of rural employment, improved household nutrition, assured local food security, reduced independence on external farm inputs, etc.).
13. Promotion and popularization of hybrid technology in vegetables and establishment of tissue culture laboratories and green houses for mass multiplication of disease free planting material, tubers/ corms and seeds.

14. Promotion and livelihood options for organically grown medicinal and aromatic plants.
15. Establishment of quality control laboratory and certification knowledge and to bring technological awareness of the farmer.
16. There need to popularize Vermi-Compost units and use of organic manure/bio-fertilizer in a big way in the state of J&K.
17. Involvement of Print and Electronic Media, Brochures and pamphlets for mass awareness.
18. Promotion of contract organic farming. The purchasing companies helps farmer identify proper land for contract farming with organic cultivation ,plan crop production ,arrange timely supply of quality inputs ,provide technical guidance throughout the crop growth and harvesting ,assures purchasing and provide opportunities to add value to the farm produce .
19. Exploring the domestic market of the metros. Emphasis needs to be laid on creation of awareness, organizing producer – consumer meeting, organization of organic bazar/hat/mela, changing the mindset with utilisation of spiritual group, health care group etc.
20. Value addition for food process- must in the agribusiness
  - ✓ Use of additive and flavors
  - ✓ Fortification with vitamin, amino acid
  - ✓ Nutrient supplementation
  - ✓ Protective and biodegradable packaging
  - ✓ Raising food safety by detoxification (removal of Alfa toxin, Glucocinolate)
  - ✓ Reduction of anti nutritional factors (trypsin inhibitors, tannins etc.)
  - ✓ Use of natural antioxidant
  - ✓ Imparting desirable taste

## **8. Organic Jammu and Kashmir : current status**

The state of Jammu and Kashmir presently has a organically certified area of 22,316 ha.( Odisha having the maximum area with 26,300ha) .Given the diverse agro climatic conditions coupled with the presence of by default organic production ,the state has vast scope for development of the organic agriculture. So far 1180 hec area has been identified for adoption of organic farming in the state.(300hec for vegetable under urban cluster scheme ,380 hec under horticulture mission and 500 hec under Krishi vikas Yogna).Areas where organic farming has started are – Gurez, Kishtwar,Ramban for Rajmash and potato ,RS Pura for Basmati ,Machil for potato and maize ,Karnah for red rice and sorghum .Badgam, Noorbagh Takenwari ,Guzerbaland Bangidhara district have been identified for vegetable production.The first organic crop of red rice ,Rajmash ,potato ,maize is expected to be in the market in 2014 and organic vegetables by 2015.Around 3409 farmers from the state have been trained for organic farming.

According to a study ('Organic Jammu and Kashmir: Avenues of Job Creation & Capital Formation, Assocham,2013) promotion of [organic farming](#) can lead to wealth accumulation worth over Rs 10,600 crore and generate exports worth Rs 600

crore in Jammu and [Kashmir](#) in next five years. Besides, organic farming also has the potential to generate over 80 lakh jobs in J&K during the aforesaid period comprising of over 60 lakh jobs in the state apart from additional about 20 lakh jobs in on-farm storing, processing, value addition, packaging and marketing facilities. Adoption of organic farming can increase net per capita income of a farmer in the state by a whopping 250 per cent to over Rs 17,625 in next five years from a current of Rs 7,050.

There are 35,000 hectares of land under basmati production in RS Pura region, of which the cultivation of organic paddy in 200 hectares. After Jammu and Kashmir lifted the ban on export of basmati in 2010, about 630 quintals of the rice was exported from the Jammu region during 2010-11 to the US and Middle East, which increased to 1,350 quintals in 2011-12. The prospects of manifold increase in exports can be expected once the organic basmati of Jammu hits national and international markets.

### **9. Organic Disadvantages and Challenges : Jammu and Kashmir**

Most farmers in the state have small and fragmented land holdings and are poor. These have very little credit facilities in the region and the farmers cannot afford or find all the necessary inputs. They are also not directly connected to markets to buy or sell food. Other disadvantages/challenges include-

1. Closed corner location, remoteness and isolation from major markets.
2. Lack of market infrastructure
3. Lack of cold storage facilities and other post harvest infrastructure(very important for fruits and vegetables).
4. The hilly terrain limits the use of mechanized farming and transportation. It also limits irrigability of cultivated land
5. Infrastructure bottlenecks: roads, power, air transport, ICD.
6. Quality and food safety issues – compliance to international food standards
7. Lack of adequate power facilities for processing units
8. High costs of raw material procurement –dispersed settlements, fragmented holdings...
9. Distant markets for export outside the state.
10. Unstructured and underdeveloped domestic market
11. Certification cost for organic produce is comparatively high and needs to be reduced drastically.
12. Facilities for storing and verification of quality of agricultural commodities at village level are lacking.
13. Inadequacy of agro –processing facilities
14. Fragile soil in hilly areas susceptible to soil erosion

### **Conclusion**

Since the organic farming has just started in India, we need to address the production as well as marketing problems simultaneously. Also India's domestic market is quite



big and if genuineness and quality is guaranteed there is no dearth of buyers; the demand for organic foods in the metros is on the increase. Jammu and Kashmir can be regarded as a promising state for organic production. Organo-Agri-units set up with the technological support of biotechnology for domestic as well as global market holds tremendous scope. The extension programme targeted at the rural farm women in the state can prove to be beneficial.

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