

Supply and value chains of organic and niche crops in spate ecologies

16



Consultation paper Spate Irrigation



Spate Irrigation
Network

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EXECUTIVE SUMMARY

Sparte farmers' relishes low inputs cost, integrated farming system and no application of pesticides and chemical fertilizer and hence crops are grown free from chemicals and majority of crops are grown as organic crops. Due to no use of pesticides and chemical fertilizer, the environment is saved from adverse effects and the whole system represents pure organic farming or "organic by default".

The produce of these areas is recognized for its good quality and better taste. But due to remoteness of the spate areas, the market for the quality organic produce is consumed locally. The low or no application of chemical fertilizer can be translated into an opportunity to generate higher prices for the organic produce of the spate areas. But the market for organic products is not well developed yet to the extent as in some other countries. Organic farming is currently a niche market as compared to traditional farming.

The organic products are sold at either double or more than double price than the traditional ones in international markets. Connection of link between consumer and producer is established at local level but there is a need to broaden this base to the other parts of the country especially the urban segment of the society along with exploring the export potential. The connection of organic consumer to producer is bridged through number of stake holders which involve traders, retailers, wholesalers, processors etc. Together they form the value chain of certain product.

Being a staple crop, wheat is eaten daily by almost every Pakistani and is mostly consumed with the indigenous level value addition by converting it into wheat flour to make chapattis and nan. In addition porridge, breads, biscuits, burgers and different type of sweets are value added products from wheat. Being a main food security crop wheat is always focus of policy maker and all the stakeholders involved in the production, marketing and distribution system. Around half of area is acquired by the wheat crop, in both the selected areas; major kharif crop of the DI Khan is sugarcane and cotton in the DG Khan.

Pulses were reported in DI Khan however less area was reported in DG Khan. Thus wheat acquires the central position both in term of food security and feed. Wheat is consumed at local level for as grain for flour and its straw is used as fodder for the livestock in that area. Surplus wheat is marketed at village level either to consumer at village level, or village shops where grain are traded some of grains are purchased by the middle man who collects the wheat from the farmer at farm gate level some of the farmer also sell their produce to grain markets.

Interactions and linkages of different actors in production and marketing systems make better supply chain and flow of product and information at every stage so that it create the value addition and better supply management system. Farmer is the producer who is sowing the crop, harvesting, storing and after storing t sell the produce on the market. On the market, there are actors like middlemen, shopkeepers, wholesale buyer who serve as actors in purchasing the output. From here it moves to the processor. For value addition like flour, there is no any specified processing company or actor. The grains are taken to local miller who serve as processor and grind the grains into flour. Finally it comes to the retailer or wholesaler and the consumer for consumption.

Gram is the second most important crop of Rabi season. Beside its production decline at national level, it is still a popular crop in the spate areas, because it is drought tolerant and grown on both rain fed and irrigated conditions. The supply chain shows that most of gram is consumed at local level. Farmer produce is sold at local level either through middle man or direct on the grain market. There are no processors or any value addition exists in gram.

Sorghum and millet are important grain in spate area of Pakistan. The share of these crops is low in DG Khan as compared to DI Khan. People use it especially for domestic household as well as for fodder. A small portion of land is allocated to these grains with very low yields and production. There is no supply chain system of these grains in the area. People sell their produce to fellow farmers at village level. No processing or any value addition process was reported for sorghum and millet grains in that area. Consumer survey reveals that consumers also prefer to buy the organic produce. However the organic produce is not enough to fulfill the demand for the whole year.

Farmer and some of the traders consider that the marketing system of organic produce is not so efficient because of low production and poor infrastructure. However there exist the possibility to tag and proper packaging. There is no company or any agency who specifically deal with organic produce. The general dealer buys and sales the purchase. If marketing and tagging is done, there exist the potential for better supply chain.

Individual farmers, institutions and NGOs had initiated different promotional activities of organic farming, but these activities are not coordinated and documented properly. One organization is unaware of other's initiatives and achievements. At the same district, different institutions are working on this sector on their own way. Organic products produced by the private vendors need to meet the standards of the local market at one hand and on the other hand competing with the international market is too hard. Another issue is competition of local products with imported product on markets of Pakistan which is also a matter of great concern. Because of the complicated certification process, marketing of organic product within our own country is not much effective and competing with the international market is even harder. Due to the lack of accredited laboratory facility, certified products can't be produced. And products do not get recognition as organic products. Although the organic value chains are not well developed yet, there is prevalence of small models of organic value chains which are running successfully in different regions of the country. Most of them are in the big cities like Lahore and Karachi.

The awareness about truffles in Pakistan is limited to a few individuals. So commercialization is having distant prospects locally. Even the farmers who have them on their fields are not aware about its precious delicacy. The commercialization or creating demand locally seems to be a slow process in Pakistan. However, it has very bright prospects for export to the international market. Market for the truffles is not yet developed locally. The potential is high on the international market. There is a need to create linkages with the commercial traders in the foreign countries where the markets are already developed. Pakistani truffles are not well known and the identification of available specie has not yet taken place. The samples can be sent to the foreign dealers for the identification. For the truffle market to grow beyond the small niche group of individuals, promotion will be essential. Building interest and credibility through a familiar media source is an excellent way to facilitate market growth. The most important and fundamental step for establishing a value chain is to start the research program under which different activities must be started for creating awareness, identification, preservation and managing competitive advantage , technical research, quality assurance, traceability, food Safety, labeling and export documentation. Truffle availability in the Spate irrigated areas of Pakistan shows that the conditions are best suited for truffles and their growth. However there is a need to conduct the research on the environmental data for truffles.

Medicinal plant trade in Pakistan in general is largely in the unorganized private sector with very little state control. In Pakistan medicinal plants has immense potential, but unfortunately trade has not yet been standardized, nor has any attempt been made to investigate the conservation status of the species involved in trade. All the medicinal plants are available for local consumption. In Pakistan there are companies which produce the herbal medicines and are successfully doing their businesses. The problems in the medicinal plants can be addressed by improving the knowledge of those at the start of the supply chain, improving linkages among all steps in the chain, and developing sustainable harvesting practices. It is important to note that in Pakistan the foreign trade through unconventional routes, including cross border exchanges, is often unmonitored and is part of the undocumented economy of the country.

1. INTRODUCTION

1.1 THE CONTEXT

In spate irrigated areas use of pesticides and chemical fertilizer is not proficient and somehow not possible. Spate irrigation helps the poor farmers in the entire area by integrating the whole system in a natural environment. Spate farmers relishes it as inputs are low cost, farming system is integrated and they don't need to apply pesticides and chemical fertilizer and hence crops are grown free from chemicals and majority of crops are grown as organic crops¹. Local seeds and native crops are grown which have better taste and part of local food habits.

Farmers prefer to use local cultivars varieties like Pirsabak-85, Daman-98. Those have been developed in the past and got extra ordinary popularity not only in Pakistan but in the neighboring countries like Iran and Afghanistan. They are as well adapted to the local agro-climatic conditions. There is minimal use of chemical and organic fertilizers as most farmers believe that their soils are naturally fertilized by the fine sediments that are deposited after irrigation. Factors which halts farmers from applying chemicals are more economical i.e. due to high cost the application of pesticides and chemical fertilizer is rare. Moreover limited availability and risk aversion are other factors that have limited the use of agro-chemicals.

Most spate-irrigating farmers cannot take the risk of losing their entire crop in a dry year by switching to higher yielding varieties that are less tolerant to drought and require fertilizers and other agro-chemicals.

Mixed cropping patterns help for the production of food and fiber both for humans and animals. Local farmers consider that it helps to preserve the fertility of soil, because silt is deposited every year due to floods and leguminous crops contribute in increasing nutrients into soil.

The use of pesticides and chemical fertilizer is almost absent thus saving the environment from adverse effects and the whole system represents pure organic farming or "Organic by default".

The produce of these areas is recognized for its good quality and better taste. But due to remoteness of the spate areas, the market for the

quality organic produce is consumed locally. The low or no application of chemical fertilizer can be translated into an opportunity to generate higher prices for the organic produce of the spate areas. But the market for organic products in is not well developed yet to the extent as in some other countries. It is a niche market and gradually developing.

Being an agricultural country has comparative advantage to grow organic crops more efficiently in some parts of country especially in all the spate areas as it has a single largest area under spate irrigation i.e. 9% of total irrigated area. These areas include whole tribal belt, DI Khan, Tank, Laki Marwat, Bannu Karak in KPK, DG Khan, Rajanpur in Punjab (West of Indus and Tribal Area of DG Khan), Dadu, Larkana, Jamshoro, Shahdad Kot, Thatta, in Sindh and entire Balochistan i.e. Kacchi, Sibi, Jal Magsi, Kharan, Dera Bugti, Kohlo, Qila Saifullah, Musakhel, Barkhan, Loralai, Las Bela, Mekran, Chaghi, Pishin, Chaman, Quetta, Kalat, Mastung, Khuzdar (PARC and Meta Meta research 2008). In these areas people still rely on biological farming methods and they use bio organic fertilizer. Under spate irrigation all crops are grown organic. Use of pesticides and chemical fertilizer is not practiced and even not possible (Gop 2003).

Organic farming is currently a niche market as compared to traditional farming. Keeping in mind the characteristics of a niche market, the opportunities can be exploited. For instance the customers in a niche have a distinct set of needs. Greater profit margins due to premium price can gain certain economies through specialization. Niche has size, profit and growth potential, not likely to attract competitors.

Organic consumers need environment friendly products free of chemicals and hazardous materials. The organic products are sold at either double or more than double price than the traditional ones in international markets.

This market has been growing. Keeping in mind the needs of organic customers, it can be linked with the organic producers/farmers of spate areas. Although this connection is already established at local level, there is a need to broaden this base to the other parts of the country especially the urban segment of the society along with exploring the export potential.

1) As defined by FAO (1999): "Organic farming is environmental friendly ecosystems management in which, use of all kinds of synthetic inputs is eliminated". The area delineated for "organic farming" forbids use of synthetic fertilizers, pesticides, veterinary drugs, hormones, Genetically Modified Seeds (GM seeds) and breeds, additives, preservatives etc.

The connection of organic consumer to producer is bridged through number of stake holders which involve traders, retailers, wholesalers, processors etc. and together they form the value chain of certain product. This study is an effort to document the value and supply chain of the organic produce of the spate irrigated ecologies.

Out of the population of the spate ecologies, areas of D.I. Khan and D.G. Khan are selected for the conduct of this study. Crops selected for this study are wheat, gram and sorghum. Other niche products which are also the part of this study, are truffles and medicinal plants.

1.2 ROD KOHI SYSTEM

According to Gandapur (1989), Rod Kohi irrigation system is a unique irrigation system prevalent in many areas of Pakistan. It has its own peculiarities and abnormalities, its own oddities and unconventionalities, its own whimsical moods and temperaments, its own style and romance and its own problems and limitations. But the irony of the fate is that government and other stakeholders realize its importance and they are yet to deliver efforts for its development.

Rod Kohi system of irrigation is the least known and the most unattended among the irrigation systems in Pakistan, and therefore, remains undeveloped. The major reasons include poor resources of Rod Kohi farmers, ignorance of farmers to advanced irrigation practices, excessively high flows, nonexistence of control structures, lack of scientific investigations about the farmer's irrigation practices and performance evaluation.

Agriculture in these areas totally depends on hill torrent flows that are un-predictable in terms of timing and magnitude making scheduled irrigations impossible. Although, the production level of these areas cannot be brought at par with those in irrigated areas, it can certainly be increased if suitable cultivars, appropriate technologies of soil and water conservation, best suited to the agro-climatic conditions, are evolved and developed for adoption by the farmers.

Each structure should be designed based on careful research of site-specific conditions and field experiences in construction, operation and maintenance. The flood control structures have to work during high floods and thus are to be durable against extreme conditions (Nawaz and Han 2007; Nawaz and Qazi 2003).

The climate of the Rod-Kohi areas in KPK, Punjab and Sindh provinces is arid to semi-arid with precipitation ranging from less than 100 - 300 mm in South West and North West. In Kharif season, rain is received in the months of July and August and in 'Rabi' season in the months of March and April. June is the hottest month with a mean maximum temperature of 44°C while January is the coldest month with a minimum temperature of 4°C.

In Baluchistan, however, the climatic conditions differ from the rest of hill torrent areas in the country. Its climate is arid to semi-arid in winter and arid to hyper-arid in summer. Rainfall is erratic and is received in monsoon as well as in winter. Due to wide variability of temperature regime, the climate of the province varies from cool temperate to tropical allowing an amazing variety of crops to grow economically. The soils are laminated to weakly structure with medium to fine textures in hill torrent areas (Nawaz and Han 2007).

1.3 SCOPE OF THE STUDY

In Pakistan, great possibilities of organic farming exist, because many places are still organic in nature and yet not reached the modern technologies and chemical fertilizers. These traditional practices in which farmer do not use inorganic fertilizer and pesticides, and other chemicals such farming are very close to the organic practices.

In Pakistan traditional farming knowledge and skills have the potential for stimulation of organic agriculture. Farmers in hills and mountains are practicing biological farming which is comparable with organic farming e.g. the agriculture being practiced in the spate irrigated areas of Pakistan.

Promoting organic farming in hilly and mountain region are easier than other regions. With the simple modification in the practices of farmers it will be practical to make the produce organic. Even without modification the produce is purely organic and need to be acknowledged as organic produce as no chemical fertilizer and pesticides are applied in these regions. Organic produce are not uniform in size and shape as inorganic. Resource poor farmers of spate area knowingly or unknowingly practicing organic agriculture and have invented various techniques making their produce as organic produce by replacing agro-chemicals.

Limited or no availability and risk aversion are main factors that have limited the use of agro-chemicals. Most spate-irrigating farmers cannot take the risk of losing their entire crop in a dry year by switching to higher yielding varieties that are less tolerant to drought and require fertilizers and other agro-chemicals. Therefore local cultivars are used which is attuned to local climate.

Unfortunately their farming is not acknowledged and declared as organic farming which is a contribution to the emerging niche in organic agriculture in Pakistan. Despite of its peculiarities, abnormalities, and unconventionalities the importance of agriculture in spate irrigated areas is realized by government, development agencies and other stakeholders of the society still much of the potential of these areas is unexploited and organic agriculture is one of them. Due to lack of guidelines there are no proper definitions to declare the farming organic.

Lack of certification hindered the recognition of organic produce. Hence organic movement in Pakistan is slow. Moreover there is no clear vision of the government and information is scattered and distorted. Neither organizations nor farmers are clear about the importance of this sector. The initiative of organic farming is at developmental stage and activities are limited at very small scale with some private organizations or at a project scale in government sector. However there is an increasing realization in the society about health associated benefits of organic agricultural produce especially in consumers.

This document stresses the need to recognize the contribution of spate farmers towards organic agriculture by replacing polluting agricultural practices with approaches that are close to nature at one hand. On the other hand, it emphasizes that the produce of the spate areas be tagged and acknowledged as organic produce. This acknowledgement could be a source of to promote market based incentives to compensate farmers for their efforts, thus maintaining their economic viability through poverty alleviation.

1.4 PURPOSE AND OBJECTIVES OF THE STUDY

General objective of the study

The main objective of the study is to generate information and knowledge for the policy support by intonating the need to recognize the contribution of spate farmers for environmentally sound organic agricultural production methods. Moreover, it provides a source of information on the latest market developments and trends of organic produce in the country that can be useful for a number of individuals and organizations, including traders, processors, wholesalers, retailers, and consumers of urban sector.

Following are the specific objectives:

- a. To study the route of the value chain of the selected organic crops (wheat, chick pea and sorghum) in the selected spate irrigated area (D.I. Khan and D.G. Khan);
- b. To study the supply chain of the spontaneous niche crops i.e. truffles and medicinal plants and pattern of their consumption and trade if any in selected ecologies;
- c. To analyze the current market trends of the organic produce and strategize the implements for bridging the gap between organic producer and consumer;
- d. To propose a strategy for generating demand of organically produced crops of spate irrigated areas for the premium price;
- e. To propose the strategy and action plan for the processing and export of truffles.

1.5 SUMMARY OF RECOMMENDATIONS

Organic Agriculture for Spate Areas

1. An extensive soil survey for promotion of organic agriculture under the command of spate areas could be a first step to delineate the potential areas as productive and fertile area fit for organic farming.
2. Organic farming can compete economically with conventional farming when specific attention is given to optimum approaches while conversion.
Such programs can be launch aiming to convince the producer to spate farmers to follow guidelines and procedures of organic farming along with crop and animal husbandry for huge income returns
3. Such programs can be launch aiming to convince the producer to spate farmers to follow guidelines and procedures of organic farming along with crop and animal husbandry for huge income returns
4. For promotion of organic farming government may facilitate by creating a think tank comprising of lawyers, economists, academics, relevant experts such as agriculturists, horticulturists, etc. and key stakeholders such as farmers, exporters, etc. this group may guide on issues like legislative instruments to commensurate with WTO rules and regulations, maintenance of quality of organic produce, minimizing the role of intermediaries to the possible extent etc.
5. The policy and program should emphasize the organic food rather than market and business oriented agricultural system
6. In order to get Pakistani farmer compete with the farmers of the other developing countries and other international market government must provide support to the organic farmers groups, cooperatives in order to minimize the cost and mass production. Subsidy must be provided based upon the volume of production in order to motivate the farmers for easy marketing of the products.
7. On the production side, there is need to encourage and promote use of organic inputs like bio-fertilizers, bio-pesticides and organic manure and even farm practices like integrated pest management and biological control.
8. There is need of packaged program so that a farmer could be self-equipped and prepared for the process of certification. Organic certification is important for the exportable organic product but, small farmers couldn't afford the additional cost, time consuming certification process.
9. Targeting institutional market i.e. hotels, hospitals, airlines and railways, to begin with, is an important strategy for promotion of market for the organic produce in the domestic market. NGOs can also be roped in for market creation as they have credibility for such products. Further, home delivery can prove effective tool in high end segment of the market. Tying up of the organic products with other environmental friendly products can also help.
10. Arrangement of the subsidy in price and insurance of the production will be a biggest incentive for the farmers and help in its sustainability. There should be separate and interrelated networking of training, research and technology development, verification and extension of organic agriculture for its development.
11. There is need to document the innovations from the local level to national level. Research and studies can generate certain findings and evidence based knowledge which can be shared with the likeminded working agencies and directly to the farmers. The publications and media can play important role in bringing its agenda into village and then household's levels.
12. Incorporation of courses related to organic production is necessary in the agricultural programs in universities and training institutions for developing professionals in this field
13. Scientific validation of traditional farming practices that could increase land productivity and resource sustainability, identify location specific technology for various locations/regions, selection of suitable crops for organic farming and include it as one of the major components of farming system.
14. There is need to establish incentives/penalties system for better/poor quality of organic produce meant for, export in particular, and domestic market in general.
15. Better vertical co-ordination mechanisms like contract farming, cooperative-corporate alignment is the need of the hour to achieve competitiveness even in organic produce markets.
16. NGOs and farmers' organizations can play an important role. In the times of competitive international trade, the processing and marketing links in the supply chain, especially super markets, can play an important role as they will increasingly convey and fashion the changes needed in the supply chains due to their own selfish interest in organics in terms of ethical trade image, differentiation from competitors, new market segments, and attracting consumer loyalty. The super markets have the purchasing power, drive, dynamism, adequate logistics, omnipresence, efficiency, quality management, and communication power though they also have their own agenda and practices like ethical trade inertia, dumping, and technical barriers which may not be in tune with that of the organic producers and other players.
17. The processing/marketing firms should go the organic way proactively. This will be similar to agricultural input firms moving from chemical to organic inputs instead of perceiving organic as a threat. The agribusiness firms should look at organic farming and trade as an opportunity which is in accordance with the larger developmental goal of sustainability. This is one more historic opportunity for the industry to contribute to human progress substantially as they are best placed to tailor the chain organically. They should implement and promote good Farm/Agricultural Practices.

18. Making every place and area organic is rather impossible and therefore focus should be given to specific crops and specific location especially in spate and mountainous areas.
19. Legumes inter cropping with cereals are best option and had never tried in the spate region. Cultivation of mung and mash with sorghum/millet or lentils with wheat and barley might have better opportunities to increase farm income and production through natural process of nitrogen fixation. Also Introduction of new crops vegetables, cucurbits, pulses, oilseeds must be spread to the area.
20. Enhancing the productivity of livestock would include improved access to animal feed, watering points and veterinary services, as well as the processing and marketing of livestock products with value additions and innovations.

Truffles

1. First step for establishing a value chain for truffles is to start the research program under which different activities must be started for creating awareness, identification, preservation and managing competitive advantage, technical research, quality assurance, traceability, Food Safety, labeling and export documentation. There is a need to conduct the research on the environmental data for truffles.
2. Educating Pakistani consumers about truffles and establishing the Pakistani Truffle Industry for the establishment of value chain. Foreign consumer need to make aware about the Pakistani truffles through marketing effectively.
3. There is a need for learning of skills that can be made available to the farmers in Spate areas. So that their produce of natural truffles can be brought on forefront in the international market. The benefits of obtaining these skills will better equip more growers in creating sustainable and profitable businesses for the rural poor of the area. Skill deficiencies address future needs. Skill shortages replicate the immediate needs. The skills and expertise can be acquired from external sources in order to build the in house capacity
4. Capacity building of stakeholders involved in truffles value chain seems an important aspect of truffles program penetration. Natural owners of the truffles must be given the education for proper harvesting of the truffles so that they do not get wasted and their value doesn't decrease due to improper harvesting methods. Moreover taking the opportunity of suitable conditions training and education of local community is made for artificial production of truffles for the purpose of exports in the international market.
5. Analysis for the composition, structure, pH and water holding capacity of soils of the Spate areas where truffles grow naturally, the historical regional weather data such as temperature variations and rainfall averages, nuances in seasonal yields relative to particular local weather phenomena and natural distribution of both host species/competitors should be carried out. Therefore understanding the environmental conditions found in the natural ecosystems supporting truffle production is required.
6. Conducting analysis of the controllable environmental conditions in managed truffleries in other countries and compare with the environmental data of areas where presence of the truffles is certain. For managed truffleries soil amendments, irrigation regimes, tree density rates and host species along with topography, weather and other related aspect should be investigated. Following that experiment can be done in the suitable sites in spate ecologies.
7. In order to learn techniques from the organizations involved in the truffle production professionals of related fields could be sent for trainings to learn the data collection techniques, and tree propagation and production of truffles relating to specific maintenance and irrigation operations carried out on a season-by-season basis. Through observation and face to-face interviews learn techniques and processes associated with food value adding operations. Determine methods of truffle infusion and incorporation into compatible and complimentary foods according to Pakistani taste and oil products. After trainings and launching the truffles products participate in local market and dedicate seasonal festival activities. Observe and apply grading, quality, handling and storage techniques used in other countries. Conduct interviews with industry agents about marketing, quality control and the expectations of international markets. Also learn and determine packaging and shipping methods. Moreover Shelf-life extension technologies and further processing may include blast freezing, vacuum packaging and high pressure processing and applications of new technologies.
8. Government organization must participate in the promotion of value chain of truffles present in spate area by contacting the truffles growers association operating in different countries. Private organization may lack access to technical and research resources. Government can also extend support in research and development of truffles propagation along with support to collaborate with International supply & distribution chains and for labeling, packaging and quality standards.

Medicinal plants

1. Uprooting of the endangered species should be banned to check the irreversible loss of these species.
2. Establish links with support services (government & private)
3. Introduction of selected medicinal plants as minor crops will not only reduce the pressure on the natural vegetation but will also improve the Socio economic conditions of the farmers.
4. The plant collectors are needed to be trained in proper harvesting methods.
5. Rotational or controlled grazing pattern should be used to ensure sustainability of medicinal plants.
6. Correct identification of medicinal Plants is essential and for this purpose collaboration among the taxonomists and the local Herbalists is vital.
7. The collectors should be educated for pre and post harvesting methods e.g. identification of plants, their proper time of collection and preservation.
8. The price and quality of medicinal plants in the market is not uniform, so necessary measures should be taken in this regard for the uniformity.
9. Recommended Processing techniques should be adopted that can be done through Proper storage Facilities established.
10. Focus on high value species and segregation of species could be one of the good measures to be taken.

2. SITUATIONAL ANALYSIS OF STUDY AREA – D.I. KHAN AND D.G. KHAN

2.1 DI KHAN

Dera Ismail Khan is divided in four agro-ecological zones i.e. canal irrigated; Rod Kohi, kacha (river Belt) and rain fed (IC 2010). Upper portion of Dera Ismail Khan (DI Khan), Tank and Kullachi Tehsil are the three districts of KPK where spate irrigation is still prevailing. The total area of the districts is about 9 million ha, out of which the cultivated land is 700,000 ha and area covered by spate irrigation is nearly 250,000 ha. In KPK, minor spate flows occur in spring and the major floods come in summer as a result of monsoon rainfall on the Suleman range and Lakai-Marwat hills during July and August (Hamilton and Muhammad, 1995; Nawaz and Han 2007).

The total area of two districts DI Khan and Tank is 22.15 million acres. Out of which 1.7 million is irrigated. Among irrigated area approximately 0.63 million acres is cultivated through spate irrigation every year (GoP 2003). Dera Ismail Khan is a Southern most Division of KPK and comprises of two districts namely D.I. Khan and Tank. District D.I. Khan spread over an area of 9,005 square km and it has a height of 225 m from sea level. There are three Tehsils in D.I. Khan i.e. D.I. Khan, Paharpur and Kullachi. Tank was once the part of D.I. Khan but now is a separate district.

A major Part of D.I. Khan is level plain. It has its boundaries with Bannu District on north; Punjab on east and south and tribal areas on west. Indus River is situated on the eastern side that delineates Punjab and KPK. The area is dry and productivity is low. Inefficient and suboptimal use of rain water happens to be the limiting factor for the smaller farmers that intercept hill torrents

HH type	Nos
All Households	124.395
Non Agri. Households	30.062
All Agri. Households	94.333
Livestock Holders	24.621
Farm Households - Total	69.712
Owner Operator	55.029
Owner - Cum- Tenant	9.013
Tenant	5.669

Table 1: Residential Houses by Type of Occupancy and Structure and By Tenure (Source: Agriculture Census (2010))

during monsoon which bring down water along with silt particles under a Rod Kohi system.

These hill torrents are usually uncontrolled and mostly unpredictable, causing huge losses to human, property, crops and livestock if they are left unmanaged. Male is the dominant farming staff for sowing, irrigation and harvesting of crops in almost all the villages of the area. Females are mostly engaged in weeding, cleaning and grain storage of the farm produce (Akmal and Habib 2002; GOP 2003).

Chick pea is a major pulse crop in of D I Khan in sandy-loam soil under barani conditions. Average yield was 708 Kgs/ha during 1988-89. Agriculture production in D I Khan is low due to several factors and there is very little research done to improve the agriculture of the area. Farming practices are defective and traditional and followed irrespective of the climatic conditions. Cropping intensities are low. Farming communities are not well equipped with the new and innovative technologies (PARC 1989). Table 1 shows the situation of households relative to their holdings. It explains the occupancy status of farmer as most about 70 percent of the people are involved in agriculture and most them are owner of that land.

2.1.1 LAND HOLDINGS AND FARM SIZE

According to Akmal and Habib 2002, majority of the farmers in Darband Zam in D.I. Khan were found landowners irrespective of land fertility and productivity. Majority of the farmers have 10-40 ha land in the region in lower and middle stream of the area. On the basis of total land 6.6% household have less than five ha of land, 18.7 percent household have five to ten ha, 43.3% household ten to twenty ha, 17.7 % Household have twenty to forty ha and 13.7% household have greater than forty ha land in whole of Darban Zam DI Khan. According to recent census majority of farmers lie in the categories of 7.5 to 12.5 and few no of large farmers who have land greater than 200 acres.

2.1.2 LAND UTILIZATION AND CROPPING PATTERN

There are 12 soil series in this area and are further divided into three soil groups, i.e. clayey soils, loamy soils and sandy soils. In D.I. Khan major cultivation is of grain crops in almost all streams i.e. lower, middle and upper streams in Darban Zam. There is no vegetable cultivation in all streams. Perennial trees, bushes and weeds are the additional sources of the feed and fodder for the animals.

DI Khan			
Area in acres	No of Farms	Farm Area in acres	
All Farms		69.310	848.798
Under 1.0		6.760	1.992
1.0 under 2.5		9.632	15.446
2.5 under 5.0		10.877	38.859
5.0 under 7.5		10.870	63.020
7.5 under 12.5		11.992	116.987
12.5 under 25.0		10.992	190.433
25.0 under 50.0		5.834	189.716
50.0 under 100.0		1.723	105.138
100 under 150		345	39.129
200 and above		287	88.076

Table 2: Farm size (Source: Agriculture Census (2010))

Mono cropping pattern is in practice and usually farmers prefer to cultivate their lands once a year either Rabi or Kharif. The major reason for not cultivation was drought and absence of water from hill torrents.

90 % of the land was reported uncultivated during the drought period. Intensity of drought increased from 1996 till 2001. Mixed cropping pattern helps for production of food and fiber item for human and animal population.

Wheat is the main crop of the area followed by gram. Rapeseed/mustard is cultivated solely or mostly they are mixed with wheat and gram. During favorable climate melon is the main crop of interest for the farmer as it brings plenty of cash. Millet is mixed with sorghum but harvesting is carried out separately at maturity. The traditional subsistence system of farming lack market information. Mustard and guar is also one of the main interests of the farmer.

Due to the limitation of the soil moisture or insufficient fodder for the animal, mix and sole cropping is carried out in whole region. Wheat, gram and to some extent mustard are the main winter crops which are planted sole as well mixed pattern. Gram – mustard, Gram – Barley, Mustard – Guar, and gram – wheat is mostly adopted as inter cropping in winter season. Melon – Sorghum, Melon - Millet, and melon with sorghum and millet both are cropped in the summer season if water is available. Moreover Oilseeds/gram – melon are also used in combinations. Guar is least priority as fodder for those household having livestock (Akmal and Habib 2002; GOP 2003; PARC 1989).

2.1.3 IRRIGATION

In this region main sources of water are either rain fall which is almost equally distributed in the whole region and floods from the hill torrents. However upper streams have the maximum chance to utilize the flood water provided the quantity and duration of water supply is limited. If there is surplus water then middle stream farmer has a chance to irrigate their lands. And lower stream farmer hardly get chance to irrigate unless the surplus is left for them.

Fields in Rod kohi areas are usually flat and bigger in size unlike other regions. Monsoon rains are the major source of water which usually occurs in June and July every year. Floodwater from hill torrents and Kala Pani (perennial water streams) originated from springs are the additional sources of water. Rainfall, hill torrent, spring and flood water is available from January to March which is usually not sufficient to raise crops and thereafter from June to September water is sufficiently available. There is no or low water availability from April to May (Akmal and Habib 2002). According to survey and test made of water quality from 21 Nullahs, five were unfit for irrigation. This is due to high salinity and sodicity. Similar is the case of soils characteristics in all spate-irrigated areas. Around 20 to 25 % spate flow in D.I. Khan and Tank districts is utilized and rest is drained into Indus River (GoP 2003). However for understanding the functioning of system several factors require importance i.e.:

DI Khan		
Area in acres	Total cropped area	Irrigated area (acres)
All Farms	1,106,535	923,888
Under 1.0	3,263	3,085
1.0 under 2.5	24,866	21,351
2.5 under 5.0	57,718	42,892
5.0 under 7.5	89,885	69,185
7.5 under 12.5	170,257	136,263
12.5 under 25.0	263,329	219,762
25.0 under 50.0	240,394	202,985
50.0 under 100.0	134,033	121,470
100 under 150	52,285	43,060
200 and above	70,503	63,384

Table 3: Irrigation Status of Cropped Area by Size of Farm (Source: Agriculture Census 2010)

- Time/season of spate flow**
 Time/season of spate flow is an important factor to decide the irrigation amount and depth of water that depends upon early floods and late floods. In case of early spate flow which may occur during June and early July then water is filled in the fields keeping in view the sorghum crop requirement.
- Type of soil**
 It effects the decision of applying water amount. In case upstream fields have loamy and or sandy soils then millet and chickpeas are preferred which can be lately cultivated. In this situation up stream farmers may allow water to go down partially.
- Size of flow**
 Size of flow is another important factor influencing decision of water application. Usually in this situation rules are set apart and maximum utilization is allowed keeping in view the erosion effects. There are other principals also in practice under spate system. First that spate flow must pass to the main bed in original manners (GOP 2003).

2.1.4 FERTILIZER USAGE

Farmers do not apply any kind of fertilizer neither in Rabi nor in Khareif. According to Akmal and Habib 2002, farmers of this area are quite unaware about the types of fertilizer as they have never applied during their life time. Farmers of the area are of the view that their fields produce bumper crops provided with irrigation water and are very rich in terms of soil nutrients as the hill torrent water brings lot of silt which is fully loaded with nutrients and highly beneficial for crop growth. Livestock dung is dried, stored and used as fuel by 90 % of families in the Draban Zam. Fresh dung is the only source of supplying nutrients to the fields.

Most of the stored farm yard manure is stored and applied on the important crops like melon and wheat (GOP 2003).

2.1.5 YIELD

There is a wide variation in the yield of different crops among different villages for different reasons i.e. unmanaged land preparation, use of substandard seed, seed viability and purity along with unpredictable droughts. Wheat yield is reported to range from 1000 to 1600 kg/ha. Melon is an intermediate crop and it is always planted on chance if water is available in the season as it is of high return crop. Dry matter of the melon is used as fuel. Guar is a least priority crop it is planted if no other option is left. Its yield varies from 1000 to 1500 kg/ha. Reported yield of gram ranges from 300 to 600 kg/ha in the entire region.

There is a mixed trend for the consumption of gram. Around 28 % household of the region reported self-consumption while 48 % partly sold and partly consumed their gram produce. Low yield of gram is due to the blight disease in gram. Mustard seed yield ranges from 300 to 600 kg/ha. Mustard dry matter is used as fuel and as a material for temporary roofs. Aphids are the only insect causing considerable losses to mustard production. Sorghum and millet is the only successful crop and is produced by almost the entire farmer of the area. The yield of sorghum/millet ranges from 600 to 1200 kg/ha. Open air field dry matter of sorghum/millet ranged from 3000 to 5000 kg/ha (Akmal and Habib 2002 and GOP 2003).

Crops	Varieties
Wheat	Pirsabak-85, Daman-98, Zam Pirsabak-2005, Tatara, NIFA, Shahkar-2013, Lalma-2013
Gram	CM-68
Millet	DB-II
Sunflower	SF-100
Sorghum	Ghiza-3, DS-2003, DS-97

Table 4: Crop wise varieties used for cultivation

2.1.6 MAJOR CROP WISE VARIETIES USED IN AREA

Wheat is major food security crop of DI Khan sown both on irrigated and rain fed area major varieties are Pirsabak, NIFA, like wise sorghum and gram are also grown after wheat major varieties area Ghiza, DS, 97 and 2003 and CM 68.

2.1.7 MACHINERY USE IN CULTIVATION, HARVESTING THRESHING

Farming system is very traditional operating at subsistence level and complex. Due to severe drought conditions in the area production is made at a subsistence level despite of larger land holdings. Land remains fallow throughout the year and plantation is carried out during sufficient water season i.e. rainfall or flood. A machinery table shows that there are 6.265 no of tractors, 171 Combines and 3.058 Thresher.

Machinery	Nos
All farms owned	69.310
Tractor	6.265
Tube well	1.768
Pump	3.058
Thresher	3.058
Sheller	41
Combined harvester	171
Reaper / Harvester	83
Drill	3.077
Spray Machine	2.784

Table 5: Farms Reporting Use of Important Owned Agricultural Machinery in DI Khan

Species	Population
Cattle	411.342
Buffaloes	205.634
Sheep	248.491
Goats	583.923
Camels	12.930
Horses	4.998
Mules	519
Asses	43.254
Poultry	1.280.079

Table 6: Livestock population by species in DI Khan. (Source: Livestock Census 2006)

2.1.8 POST-HARVEST PRACTICES

For the purpose of threshing tractors are used in all the three streams of Daraban Zam area by about 55-86 % farmers. Some farmers also use animals for wheat threshing. Based on the study conducted by Akmal and Habib 2002, it is reported that around 10-14 % farmers get the opportunity to sell their wheat grains. Wheat straw is sold by 4-6% farmers of the area. Gram seed selling is reported by 54% farmers of the area.

2.1.9 LIVESTOCK AND SPECIES DISTRIBUTION

Livestock population in Rod Kohi areas comprise of cattle and goats. Very few households keep buffalos but it is not a general trend due to high feed and water requirements along with high temperatures in summer. Ratio of goats is greater than sheep and is mostly preferred by farmer of the area due to number of reasons.

Goats happen to be better browser of grazing lands and main sources of their feed are trees and bushes moreover they are more profitable as a main source of milk, kid crop, and hair while sheep only used for lambs and wool and is not used for the purpose of milk in the area. Donkeys, horses and camels are used for transportation of on farm agricultural produce i.e. forages and crop residues. Camels are used to transport wood over long distance.

Small amount of poultry birds are also there in the area for household consumption of eggs and meat but malicious diseases are the main reason for the expansion of poultry in the area. Livestock density is higher in the lower stream than the higher stream and it shows the less cropping intensity due to shortage of water is replaced with dependency on livestock as an alternate source of income (Akmal and Habib 2002; GOP 2003).

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Table 7: Seasonal calendar for fodder

2.1.10 FEED RESOURCES

In Rod Kohi areas main feed sources are grazing, crop residues, and fodder. However, all spate areas have considerable number of livestock mostly depending upon fodder, residuals, stalks, trees, bushes and shrubs naturally grown after flooding in this area. Local feed sources are insufficient for the large livestock population which is evident from their health.

Farmers migrate seasonally to irrigated area in order to fill the feed gap (Akmal & Habib 2002; GOP 2003). Seasonality calendar shows that fodder is sufficient in the months of June to October due to surplus rain. However, from November to January the availability is there but relatively average availability. From February to May there is shortage of fodder in the area.

2.2. DERA GHAZI KHAN

The mid country city of Pakistan located at the junction of four provinces is Dera Ghazi Khan abbreviated as D G Khan. The word "Dera" is derived from the Saraiki word dera which means "encampment" (Anonymous, 2013). Dera Ghazi Khan is located at 300030 N and 700380 E. Dera Ghazi Khan thus means the settlement or city of Ghazi Khan. According to Punjab Development Statistics 2008, the total population of Dera Ghazi Khan district is 2,128 thousands persons out of which 1,107 thousands are males and 1,021 thousands are females. Density of population in the district is 178 persons per square kilometre.

The winter is relatively cold and the climate is hot during the remaining part of the year, but it is very hot in summer. The temperature during summer is usually about 115°F (46°C), while

HH type	Nos
All Households	694.983
All Agri. Households	616.704
Livestock Holders	78.279
Farm Households - Total	192.828
Owner Operator	171.213
Owner - Cum- Tenant	18.480
Tenant	3.136

Table 8: Type of Occupancy and Structure and By Tenure (Source: Agriculture Census 2010)

Total cropped area of DG Khan		1.655.222 Acres
Name of Crop	Percentage shared in cropped area (%)	
Wheat	47	
Rice	9	
Jawar	1	
Cotton	27	
Sugarcane	2	
Tobacco	1	
Fodder	9	

Table 9: Major Crops and their areas (Source: Agriculture Census, 2010)

during winter season the temperature is as low as 40°F (4°C). The city is also vulnerable to floods from the Indus River in the East and from the Rod Koh coming from Suleman Mountains in the West.

The Natural resources of the city includes iron, gypsum, marble, limestone, cement, precious stones, and uranium, coal and petroleum and gas reserves in the district. The Koh-e-Suleman constitutes a major part of this area, and is full of natural deposits. Rural people of DG Khan are mostly dependent on agriculture the occupancy status is mentioned below.

2.2.1 MAJOR CROPS OF AREA

Sugarcane, cotton, wheat and rice are the main crops grown in the district. Besides, guar seed, sunflower, tobacco, jawar, bajra, moong, mash, masoor, maize, oil seed such as rape / mustard and sun flower are also grown in minor quantities in the district. Wheat is the major Rabi crop while cotton and rice are the major Kharif Crops.

Crop	Varieties
Wheat	AAS-2011, Sehar-2006, Shafaq-2006, AS-2002, Ufaq-2002, VBhakar-2002
Rice	IRRI-6, IRRI-9, Sohrab, DR-83
Cotton	CIM-109, CIM-435, NIAB-78, NIAB-Krishma SLS-1
Sugarcane	SPF 234 and CP 77-400

Table 10: Major Varieties of Area (Source: GoP, 2011)

Species	Population
Cattle	492.714
Buffaloes	218.753
Sheep	645.053
Goats	858.437
Camels	11.745
Horses	4.700
Mules	568
Asses	33.327
Poultry	1.048.648

Table 11: Livestock population by species (Source: Livestock Census 2006)

2.2.2 CROPPING PATTERN

Dera Ghazi Khan is located in rich agricultural land with cotton, wheat, sugarcane, rice, tobacco being the major crops grown. The major cropping pattern is Wheat-Cotton-Wheat and Wheat-Rice-Wheat in irrigated plains. Dera Ghazi Khan is also well known for its dates. The main fruits crops include mangoes, dates, citrus and pomegranate where minor quantities of dates, jaman, pears, phalsa and bananas are also grown in the district. The main vegetables grown are onions, carrots, cauliflower and peas with minor quantities ladyfinger, turnips, tomatoes, potatoes, garlic and chilies.

An area of 100,864 acres is forested in the district, Trees that are mostly grown in the area are kikar, shisham, millbury and eucalyptus .D. G. Khan is the leading district in Pakistan in fish farming. About 15000 acres of land are under fish farming. Mainly Indian Major Carps are cultured. Now some progressive farmers are turning to Tilapia farming as well.

2.2.3 LIVESTOCK POPULATION BY SPECIES IN DG KHAN

The cultivation and livestock breeding are the main pursuits and the means of the livelihood of the rural and urban population. Table 11 shows the livestock species in DG Khan . The most famous cattle breed is Rojhan (Afzal, M, 2004) .

2.2.4 LAND HOLDINGS AND FARM SIZE

According to Household survey 2010, average land size is 2.6 ha and as per percentage land type low lands are 3 % and medium are 97% and as per tenure percentage owned lands are 83 % and rented in are 17% (IRRI GSR project, 2010), Total cultivated land is 446 ha out of which 413 ha are irrigated lands (Punjab Development Statistics, 2005). The below mentioned table explains the type of occupancy and the no and farm size of the DG Khan by categories.

2.2.5 IRRIGATION

In Pakistan 95% of agricultural income comes from the irrigated areas Out of which 73% is added by the irrigated areas of the Punjab, of this irrigated areas of D.G. Khan contribute just 13.05% (Government of Pakistan, 2000). As per irrigation type for kharif crops 23% of the area is rain fed and 34% of the area is irrigated by means of rivers and tube wells. For Rabi crops the percentage rain fed area remains the same whereas the area irrigated by means of tube wells and rivers increases to 78%.

Spate communities rely solely on spate irrigated staple crops such as sorghum, chick peas, pulses, wheat, barley, melon and vegetables for their livelihood. A significant area under spate agriculture i.e. more than 200 small to large

DI Khan			
Area in acres	No of Farms	Farm Area in acres	
All Farms	192.828	1.017.341	
Under 1.0	32.067	13.183	
1.0 under 2.5	56.038	87.574	
2.5 under 5.0	32.831	113.423	
5.0 under 7.5	30.964	175.921	
7.5 under 12.5	26.499	259.242	
12.5 under 25.0	10.570	174.961	
25.0 under 50.0	2.812	97.757	
50.0 under 100.0	650	41.209	
100 under 150	305	35.139	
200 and above	93	18.929	

Table 12: Number and Area of Farms by Size of Farm In D.G Khan (Source: Agriculture Census, 2010)

Sources	Acres	Percentage
Irrigated by Canals	720837	
Perennial Canals	430066	60
Non Perennial Canals	290771	40

Table 13: Area irrigated By canals (Source: Agriculture Census, 2010)

spate irrigation systems - prevail here. The land area coverage of the systems ranges from 20 to 30,000 ha depending on the discharge, available command area and water rights. Some of the spate rivers discharge more than 100,000 cusecs during a single flood (Wang, 2012; IRRI GSR project, 2010).

2.2.6 MACHINERY USE IN CULTIVATION, HARVESTING THRESHING

In Pakistan, farm mechanization started in early fifties to operate private tubewells for irrigation purposes with the help of mechanical power. At the time of creation of Pakistan, there were about 500 tractors in the West Pakistan (Ansari and Raza, 1984).

In Pakistan, selective farm mechanization is being practiced and only those farm operations and activities have been mechanized for which there were constraints of labor or power or combination of both. However, slow and selective farm mechanization not only increased farm income and labor productivity but also generated off-farm employment in manufacturing, supply of agricultural inputs and post-harvest handling of increased agricultural production. Also the introduction of improved crop varieties and the modification of tillage practices have been identified as potential on-farm practices that could increase the agricultural productivity (Khan et al., 1995).

Machinery	Nos
All farms owned	192.828
Tractor	15.958
Tube well Pump	30.532
Thresher	10.923
Sheller	158
Combined harvester	444
Reaper / Harvester	1.942
Drill	8.897
Spray Machine	66.455

Table 14: Farms Use of Agricultural Machinery in D.G. Khan (Source: Agriculture Census, 2010)

Indicator	Response
Type of land	Loamy, clay, slopes are also calcareous
Average rainfall	400-650

Table 15: Soil types and Characteristics

2.2.7 SOIL TYPES AND CHARACTERISTICS

The area is undulating topographically ridges consist of deep calcareous sandy loam; slopes are also calcareous; but the soil varies from sandy loam to loam. The slope sub-soil has more moisture than the ridges. The flat areas are made up of heavy clayey soils with little sub-soil moisture (Syal and Hameed 1984). Water penetration is more on the ridges and slopes compared to flat areas. The coarser soil structure of the ridges and slopes prevents upward capillary water movement. Therefore, more subsoil water is retained on ridges and slopes than on the flats (Javed and Atta Ullah, 1988). Soils in spate areas are largely built up from sedimentation in the early years of development of a spate system. They are further affected by the continuing sedimentation that is inherent in spate irrigation.

A relatively flat stony area can be developed over a few years by irrigating it with sediment-laden spate flows. In most spate-irrigated areas, there is minimal use of chemical fertilizers (Halcrow, 1993b; Michael, 2000a; and Tesfai and Stroosnijder, 2001), or organic fertilizers such as manure (Halcrow, 1998; Michael, 2000a; and Tesfai and Stroosnijder, 2001). Farmyard manure is used in some areas of Balochistan (Pakistan) where soils are sandy and recognized as being relatively infertile (MacDonald, 1987b). Incorporating crop residues in the soil is also generally not practiced, as they are often used as fodder. It is usually taken for granted that yields could be increased with greater investment in fertilizers, combined with improved cultural practices and adequate irrigation (Khan, 1990; and Shah, 1990). Most spate farmers believe that their soils are naturally fertilized by the fine sediments that are deposited during flood irrigation.

Floods often carry around 10 percent in weight of fine silts that are deposited on the fields. Gilani (1990) reported that the floodwater in DI Khan in Pakistan contain up to 35–40 percent silt. Silts are usually rich in plant nutrients and possibly nitrate (Shah, 1990; Tesfai, 2001). Mu'Allem (1987) reported that a 1 m depth of irrigation with heavily silted water spread over 1 ha, contains 0.92 kg nitrogen, 0.01 kg phosphate and 11.02 kg potash. However, the origin of floodwater affects its nutrient value.

3. STUDY METHODOLOGY

This study covers the supply chain analysis of the traditional crops wheat, gram and sorghum, and value chain analysis of niche crops truffles and medicinal plants for the spate irrigated areas of Pakistan. Multiple sources were employed to generate information on the spate irrigated practices, organic agriculture status in Pakistan, value and supply chain for conceptual clarity. The purpose of the documents review was to adequately comprehend the status of organic produce market in Pakistan including past, present and planned initiatives related to organic sector development, role of public and private sector institutions, nature and type of support services, policy and regulatory environment, development incentives, etc. Secondary Data sources used are:

- Pakistan Bauru of statistics
- Agriculture statistics of Pakistan
- Pakistan Agriculture census
- Economic Survey of Pakistan

After reviewing the secondary information, the main actors for value chain were identified. After identification of actors, questionnaires were prepared for primary data collection. For all identified actors questionnaires were designed. The key players were interviewed through a combination of questionnaires, telephone interviews and face-to-face discussions. Key players include farmers, market operators, retailers, wholesaler, traders and consumers.

Different approaches were used to collect the information and data at different stages. For the purpose of primary analysis of supply chain of the traditional crops of the selected areas different stakeholders were identified from producer to end consumer. These stakeholders include farmers, traders, processors, wholesaler/retailer, and end consumer. Similarly for supply chain of truffles and medicinal plants stakeholder were identified. The identification of stakeholders is discussed in more detail in proceeding sections.

In order to conduct a study for value chain development of truffle of spate irrigated areas of Pakistan, a survey was conducted to analyze the trade and marketing system in the area. A questionnaire was developed in order to get feedback of the community about the general awareness regarding the truffles, their value in the international market, host plants of the truffles, consumption pattern, appearance hunting methods etc.

The questionnaire also included questions related to trade or supply options if available in the area. It also covered the demand factors of truffles. Different departments were contacted for the support in conducting survey in the target communities. An enumerator was especially engaged for data collection from different spate farmers who were aware about truffles.

This being the first experience of its kind, the quality of information gathered largely varied in both the districts. The data collected was supplemented by the information collected through focus group discussions. Apart from the information collected through focus group meetings and other sources, primary data on the required information was collected from personal interviews of the farmers' representative sample by applying targeted sampling technique.

Primary data was collected from the spate irrigated areas of D I Khan and D G Khan. The reason for the selection of these two districts was the prior knowledge about the occurrence of truffles in these areas.

62 respondents were interviewed through targeted sampling technique. Those respondents were selected on their awareness about truffles.

The questionnaires were converted into local language for the convenience of the enumerator. Field enumerators were well versed with the subject and the area, and also understood local language and social set up.

The data collected using structured questionnaires was supplemented with the information collected through FGDs. Data entry was made in MS Excel and random checks were made to ensure accuracy. Information was further decoded by using SPSS and was analyzed accordingly.

Surveyed villages in DG Khan	Surveyed villages in DI Khan
Basti Barwali Kanwa	Gandi Umar Khan
Basti Harwani	Draban Kalan
Kanwa Taunsa	Gara Remzi,
Thobi Wali	Mochiwal,
Kot qaiserani	Dholka.
Kanwa	Gara Khan
Basti Bar Wali	Gara Sheikh
Lehthra	Gandi Ashiq
Hawa	
Sanghar.	

Table 16: Surveyed Villages in spate areas

Data Collection tools included:

- Questionnaire
- Focused Group Discussions
- Semi-structured Interviews
- Personal Interviews

Spate irrigated areas selected for the analysis are D.I. Khan and D.G. Khan. Questionnaires were designed for actors of the value chain. The identified stakeholders/actors are Farmers, traders, processors, wholesalers/retailers, and end consumers. A group of consumers from rural and urban markets are covered. Market survey for value chain is conducted by contacting stakeholders of market chain. Market survey has been aimed at generating the information on supply chain of traditional crops e.g. chickpea, wheat and sorghum, market margins and costs along with focus on preferred traits of local cultivars.

The primary data on type of crop, price margins, tagging of the produce as organic, inputs, agricultural produce, consumption, and marketing was collected through pretested structured questionnaires. General information about spate farmers was collected from the stakeholders including relevant governmental and private sector institutions and individuals and other secondary sources. The data so collected was supplemented by the information collected through focus group discussions. Data collected was supplemented by random checks to ensure accuracy.

The report is organized in three different sections. Section four describes the supply chain of organic produce of crops e.g. wheat, gram and Sorghum. Moreover it also explains the market analysis of organic produce in the country along with the proposed strategy based on the review of current state of organic produce in the country. Section five describes the truffles, market development and value chain promotion in the spate irrigated area of Pakistan. Section six describes the value chain of the medicinal plants, trade, marketing channels and prevailing situation and based on the review recommendations are formulated.

4. TRADITIONAL CROPS OF SPATE AREAS – SUPPLY CHAIN, AND MARKET ANALYSIS

This section describes the supply chain of organic produce of traditional crops grown in the area of D.I. Khan and D.G. Khan. For the purpose of analysis wheat, gram and sorghum are selected

covering pulses and coarse grain. The market for organic produce in Pakistan is currently underdeveloped. It is evolving with the passage of time. This section also covers the market analysis of organic produce in the country along with the proposed strategy based on the review of current state of organic produce in the country.

4.1 SUPPLY CHAIN ANALYSIS OF TRADITIONAL CROPS OF THE SPATE IRRIGATION AREAS

Supply chain refers to the entire chain of activities – from production on the farm, through processing, distribution, and retailing to the consumer. The supply chain is the mechanism for transmitting signals from consumers to food manufactures, as well as delivering products from the farm to the consumer's table (Baloyi, 2010).

A food supply chain comprises description of the systematic movement of the food from the farm to the customer. This includes various intermediate processes of production, processing, distribution and consumption (Singh, 2011). Supply-chain consists of production, distribution, and marketing processes by which a consumer is supplied with a desired product. It is widely known that even a very good product is not going to capture consumers' market if it is not properly distributed. Consumers need to be able to get the product easily and it should be at its highest quality (Folkerts & Koehorst, 1998). A supply chain consists of all parties involved, directly or indirectly in fulfilling a customer request. The supply chain not only includes the manufacturer and suppliers, but also transporters, warehouses, retailers, and customers themselves as presented in figure 1.

With the increasing commercialization of agriculture and food systems worldwide, the food industry is increasingly dominated by large agribusiness firms whilst the influence of farmers is declining (Reardon & Berdegue, 2002). International experience has shown that smallholder farmers produce low-value commodities, which face declining real prices and increasing competition from medium- to large-scale producers, and they are excluded from high-value markets (Baloyi, 2010). As mentioned above, small-scale farmers find it difficult to make the transition to a more commercial food system because they struggle to meet the private standards set by food processors, etc. and are also constrained by limited government support (Bienabe et al., 2004 & Baloyi, 2010).

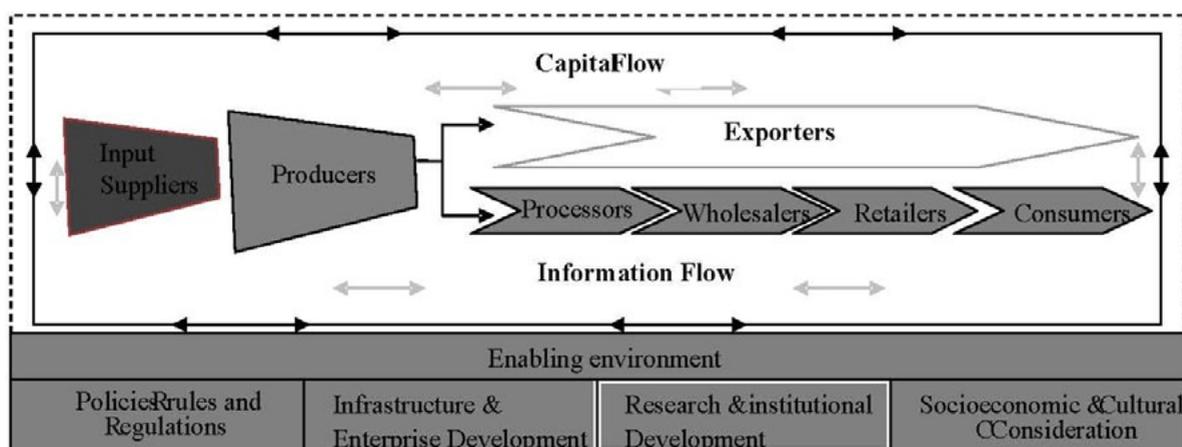


Figure 1: Value / supply chain analysis model (Source: Adopted from Asean Foundation and Asia DHRRA 2008)

Smallholder producers who gain access to supply chains find themselves in a steep learning curve, because the lead firms tend to be too demanding in terms of cost reduction, raised quality standards, and increased delivery speed. However, these firms do transmit best practices and provide expert advice.

Consequently, highly governed chains are normally characterized by such challenges for smallholders (Humphrey & Schmitz, 2002). Hendriks and Lyne (2003) contended that for smallholder farmers to participate successfully in the value chain, they should pool their small individual surpluses and market them collectively. They emphasized that smallholder farmers must co-ordinate horizontally in order to link vertically with intermediaries in preferred supply chains.

4.1.1 CROPS SITUATION PRODUCTION IN PAKISTAN

The agriculture sector is an integrated system of crops, livestock, fisheries and forestry sub-sectors having their own impact on the economy of Pakistan separately (Abbas, 2000). The agriculture sector accounts for 21.0 percent of GDP and 43.7 percent of employment, the sector has strong backward and forward linkages. (Gop, 2013-14). Important crops account for 25.24 percent of agricultural value addition.

This sub-sector has recorded a growth of 3.74 percent compared to a growth of 1.19 percent last year. The important crops includes all major crops like wheat, maize, rice, sugarcane and cotton which registered growth at 4.44 percent, 7.27 percent, 22.79 percent, 4.27 percent and (-) 2.00 percent respectively.

Wheat is major cereal and food security crop in Pakistan, wheat production increased to 25,286 thousand tons in 2013-14, as compared to

24,211 thousand tons in 2012-13, showing an increase of 4.4 percent. Decline in the minor crops was observed the decline in growth of minor crops is mainly due to 36.8 percent lower production in gram (Gop, 2013-14). In minor crops Pulses play an important role in developing countries agriculture due to their ability to grow on marginal and rain fed lands (Ali et. al., 2005). however in Pakistan Production of pulses show decline in last year's.

4.2 SUPPLY CHAIN OF SELECTED CROPS

The chapter is divided in two main segments first segment elaborates supply chain of selected crops and second segment covers the general perception of farmer and consumer about the organic produce of wheat, pulses and gram. Coarse grains (Sorghum and Millet) are selected in spate area of Pakistan. There exist a supply chain and proper marketing process of wheat as it is main staple food of Pakistan. In spate systems, other crops like pulses and coarse grain - due to less production - have not significant market and supply channels.

4.2.1 EXISTING SUPPLY CHAIN OF WHEAT IN PAKISTAN

Being a staple crop, wheat is eaten daily by almost every Pakistani and is mostly consumed with the indigenous level value addition by converting it into wheat flour to make chapattis and nan. In addition porridge, breads, biscuits, burgers and different type of sweets are value added products from wheat (Rehman et al., 2007).

The wheat supply and marketing system of Pakistan includes procurement, storage, processing and distribution for consumption and import/export, etc. which involves a large number of market participants and transactions. Salam 2008 reported that in the whole country about 30 to

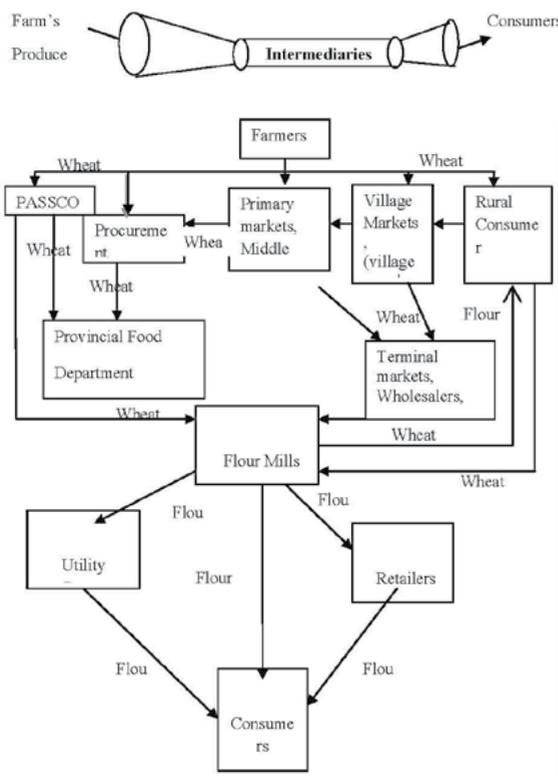


Figure 2: Wheat Supply Chain Flow Chart (Source: Kurusaki, (1996); Govt. of Punjab, Agriculture Marketing Department (2002-a); Lohano et al., (1998)

40 percent of total wheat production is retained by the farmers for payment of harvesting and threshing and for their own consumption. The rest of the produce is sold to public or private sector through different marketing channels.

The public sector is supposed to procure wheat directly from the producers through PASSCO and privately farmer sell the wheat to middle man, at village level. Grain markets and the farmers, however, prefer to sell their commodities to the

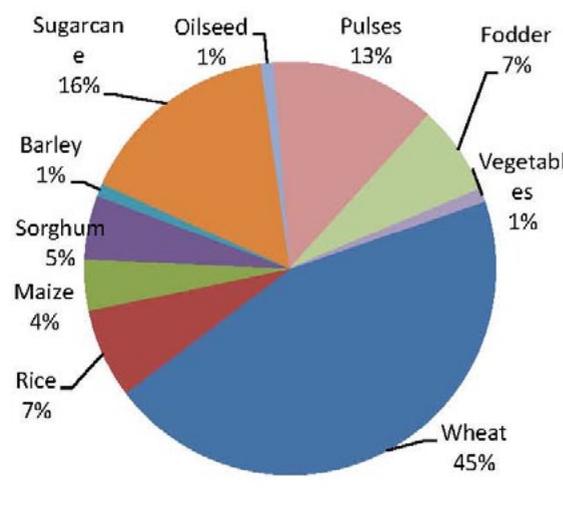


Figure 3: Different cultivated crops in D.I. Khan (Source: Agriculture census of Pakistan, 2010)

private sector through different intermediaries in their matching markets. Market channels used for wheat disposal are shown in Figure 2.

Being a main food security crop wheat is always focus of policy maker and all the stakeholders involved in the production, marketing and distribution system.

4.2.2 SUPPLY CHAIN OF WHEAT IN SPATE AREAS

Spate-irrigated areas are characterized with minimal use of chemical or organic fertilizers, low crop yield and high risk of crop. The high risk of crop failure associated with spate irrigation and consequent risk mitigation strategies adopted by farmers do not leave much space for the classical improvements in agricultural practices that are justified in intensive agriculture.

As the use of pesticides and chemical fertilizer is almost absent thus saving the environment from adverse effects and the whole system represents pure organic farming. The produce of these areas is recognized for its good quality and better taste. But due to remoteness's of the spate areas the market for the quality organic produce is consumed locally. The low or no application of chemical fertilizer can be translated into an opportunity to generate higher prices for the organic produce of the spate areas.

Normally there are two growing season in Pakistan and in spate area namely Rabi and Kharif. Major crops of the Rabi are wheat and Gram, while in Kharif sugarcane, sorghum, millet the two selected districts are D.I. Khan and D.G Khan. The percentage distribution of area is presented in Figure 3 and 4 respectively.

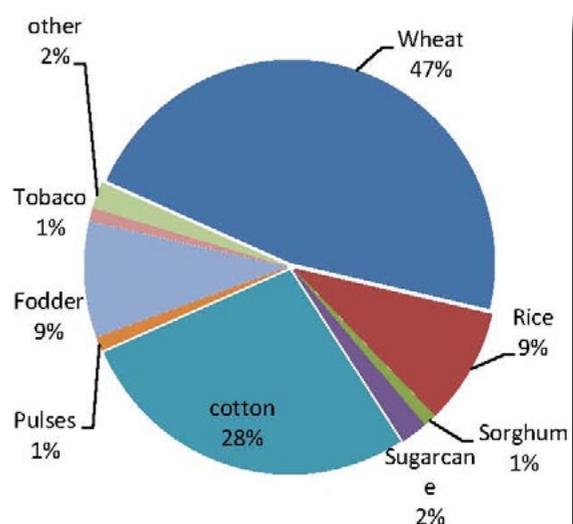


Figure 4: Different cultivated crops in D.G Khan (Source: Agriculture census of Pakistan, 2010)

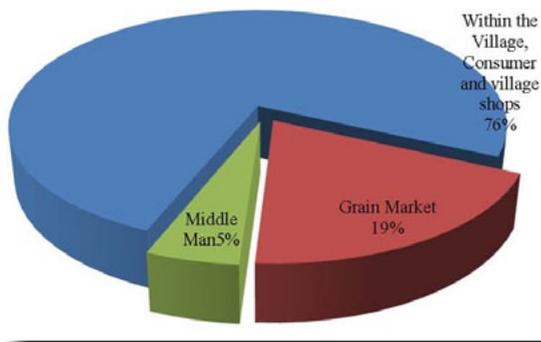


Figure 5: Main buying agencies for organic wheat. (Source: Field Survey Results 2014)

The figures show that near to half of area is acquired by the wheat crop. The major kharif crop of D.I. Khan is sugarcane. In D.G. Kan, this is cotton. Pulses were reported in D.I. Khan. However less area was reported in D.G. Khan. Thus wheat acquires the central position both in term of food security and feed.

Wheat is consumed at local level as grain for flour and its straw is used as fodder for the livestock. Surplus wheat is marketed at village level either to consumer at village level, or village shops where grain are traded. Some of the grains are purchased by the middle man who collects the wheat from the farmer at farm gate level. Some of the farmer also sell their produce on grain markets as shown in figure 5.

Supply chain refers to systematic movement of the food from the farm to the customer. This includes various intermediate processes of production, processing, distribution and consumption. Supply chain refers to all the steps involved from the conception to final good for consumption. In the supply chain there are several process taking place. Furthermore there are several actors involved at each level. This is shown in figure 6. Interactions and linkages of different actors in production and marketing systems make better supply chain and flow of product and information at every stage. This create an value addition and better supply management system.

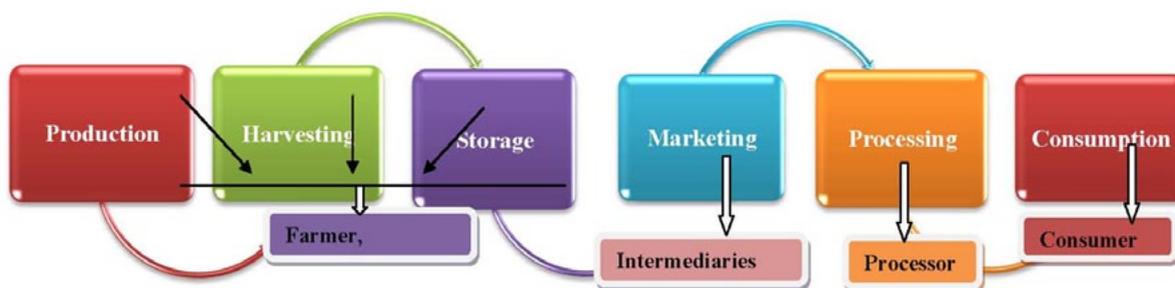


Figure 6: Steps involved in the supply chain of Organic Produce

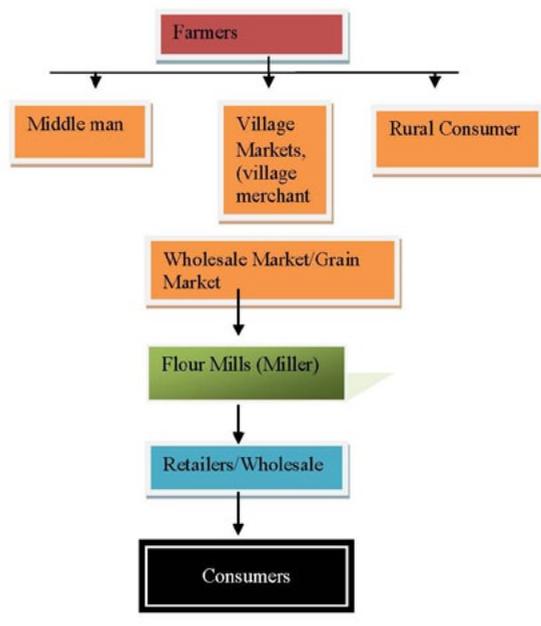


Figure 7: Supply Chain of wheat in Spate Areas

Figure 7 explains how crop move from the farmer to the consumer. The farmer is the producer who is sowing the crop, harvesting, storing and after storing sell the produce on the market. On the market, there are actors like middlemen, shopkeepers , wholesale buyer who serve as actors in purchasing the output. From there it moves to the processor for value addition like flour. there is no any specified processing company or actor in that area .

The grains are taken to local miller who serve as processor and grind the grains covert into flour. Finally it comes to the retailer or wholesaler and the consumer for the consumption.

4.2.3 PRODUCTION OF GRAM IN PAKISTAN

Pulses are the important source of protein in Pakistan. They are cultivated on 5% of the total cropped area. Their use ranges from baby food to delicacies of the rich and the poor (PARC, 2012).

Gram occupies 70 percent of the total pulses area. Gram is an important Rabi crop. Due to

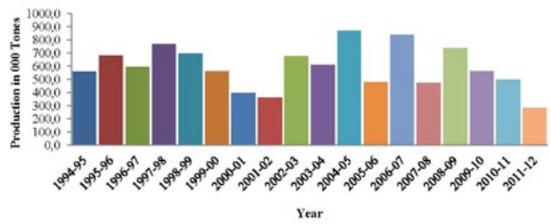


Figure 8: Gram production in Pakistan

low production of pulses, Pakistan imports large quantities of pulses to meet the ever increasing gap between the domestic production and requirements. Considerably a large acreage estimated to be over 7 percent of the total cropped area is occupied by pulses (Chaudhry et al. 2002). The country imported 628.508 tons of pulses during the fiscal year 2010-11 as compared to the import of the commodity of 444.976 tons during the fiscal year 2009-10, showing a rise of 183.532 tons or 41.25 percent (Khan, 2012).

Gram is used both in the fresh and ripened form. It is usually collected and concentrated at local level and farmer. It has less area, because most of farmers prefer to grow the wheat. However gram also takes a significant share in the cropped area.

The supply chain of gram is presented in figure 9. Gram is the second most important crop in the rabi season. Besides its production decline at national level, it is still a popular crop in spate areas. It is drought tolerant and grows on both rainfed and irrigated conditions. The supply chain shows that most of gram is produced, sold and consumed at local level. Marketing is done either through middle men or directly sold on the grain market. There are no processors and no value addition exists for gram. The supply chain shows a series of actors and their activities at each level, there is required integration and proper linkages for efficient supply chain management.

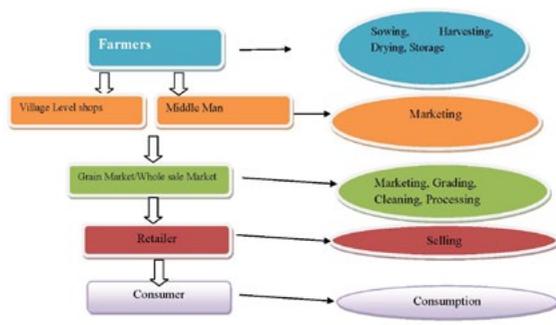


Figure 9: Supply chain of Gram (Kala Channa) (Source: Survey field Data, 2014)

4.2.4 COARSE GRAIN

Sorghum and millet are important grain in spate area of Pakistan share of these crops is low in DG Khan as compared to DI Khan People consume it for domestic household as well as for fodder. A small portion of land is allocated to these grains with very low yields and production. There is no supply chain system of these grains in that area because people sell their production to fellow farmer at village level. No processing or any value addition process was reported for grains in that area .

4.2.5 AWARENESS AND PERCEPTIONS ABOUT THE ORGANIC PRODUCE

In most spate-irrigated areas, there is minimal use of chemical or organic fertilizers such as manure. They use the traditional cultivars which are disease and tolerant. According to farmers, it is important to note that the traditional cultivars used in most schemes do not always respond well to increased use of fertilizers. Farmers of the spate area are aware about the organic produce value and their importance. On the international markets about 72 percent of the farmers were found aware about the organic produce. Consumers survey reveals that spate consumers prefer to buy local organic produce. However the quantity of organic produce is not enough to fulfill the demand whole the year.

Farmer perception about the organic produce regarding the tag and packaging is presented in figure 11. Farmers and some of the traders consider that the marketing system of organic produce is not so efficient because of low production and poor infrastructure. However there exist possibility to tag and proper packaging. There is no company or any agency who specifically deal with organic produce. If marketing and tagging is done there exist potential for better supply chain.

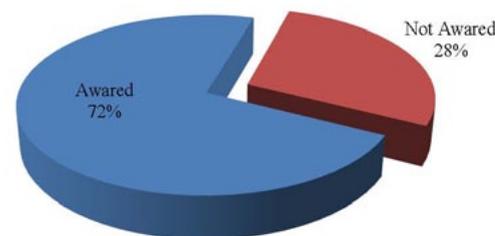


Figure 10: Awareness of Farmer about the high value of Organic Produce.

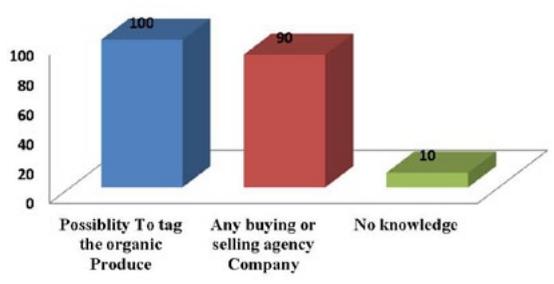


Figure 11: Farmers' Perception about Organic Produce

4.2.6 FUNCTIONARIES IN THE SUPPLY CHAIN

The crops supply chain consists of various components along the chain. This section gives the brief description of these components. Pakistan is a land of small farms with an average size same situation exist in spate areas most of farmer having the small landholdings. Farmers are one of the most important components in the supply chain. A farmer undertakes various action and operation in the supply chain.

Wheat is a preferred crop for the farmers because it is main food security crop in all the areas of Pakistan. The returns to these small holders and their ability to access markets will be critical towards ensuring an efficient supply chain. Various function of all the supply chain actors is presented in table 17.

4.2.7 STRATEGY OF IMPROVING SUPPLY CHAIN PERFORMANCE

Supply chain should need to improve in order to flow the commodities in an efficient way. At producer level there is grim need of improving product quality and reducing losses, better access to information, specific skills and inputs. In the existing supply chain systems, the growers are relatively less skilled and agronomic practices are not efficient. They would benefit from skills development, as well as through-chain commercial alliances and coordination with exporters and other actors. Others chain actors like whole seller, retailer, middleman, traders and processors need

to equip with technical, and marketing information There is high need for government investment in infrastructure and capacity building of supply chain actors to improve supply chain performance. Supply chain should also focus on the following:

- **Product Quality Systems:** Improving product quality and reducing quality-related losses in the chain has been identified as the highest order priority. Achieving such an improvement will require a multi-faceted strategy focused on the determinants of product quality at each stage of the chain from grower to retailer. It will be impossible to improve commercial linkages in the chain without improving quality.
- **Value creation and appropriation:** In general, there don't exist the proper value chain and product value creation method especially in agriculture crops. Value stream need to ensure that value of produce along with quality. An equitable share of value provides the motivation for members of the supply chain to remain committed to making the changes necessary to improve overall performance and to produce and act more efficiently.
- **Information systems:** In many developing countries, farmers determine fertilizer usage, with retailers (input sellers) typically playing an important role. Lack of appropriate knowledge and other reasons often turn results to increased production costs as well as harm to human health and the environment. In supply chain system. Flow of information should move both in forward and backward for wider dissemination. Research has shown that large farmers' information exposure is most likely to be an important factor influencing their adoption behavior. Of course, greater exposure is likely to enhance awareness about the latest recommendations and to lead to farmers putting these recommendations into practice in a precise manner (Muhammad & Garforth, 1995).

Actors	Activities	Description	Constraints
Farmer (producer)	<ul style="list-style-type: none"> Inputs Seed Fertilizer Sowing Harvesting Threshing Storage Marketing 	<ul style="list-style-type: none"> Farmers are basically the producers who are the primary actor in the supply chain Farmers do the operation at farm level including input purchase like seed, fertilizer. Farmer are involved in land preparation, sowing, harvesting, threshing, storing and sale the produce on the market 	<ul style="list-style-type: none"> High yield cultivars are not available Low yield /crop failure Unavailability of irrigation water.
Traders	<ul style="list-style-type: none"> Marketing Storing Grading 	<ul style="list-style-type: none"> Traders are the intermediate actors who include the middle men, village shopkeepers and wholesale buyers who collect/purchase the farm produce from the farmer in bulk amount, store it and later on either sell to the processor, miller or sell it to the retailer by themselves. 	<ul style="list-style-type: none"> Inefficient market system Less supply of organic produce
Processor	<ul style="list-style-type: none"> Processing Value addition 	<ul style="list-style-type: none"> Processor is the actor who convert the raw material into some consumable commodity like flour from grain Processor do value addition and then supply it to retailer and whole seller 	<ul style="list-style-type: none"> Local processing no proper packaging
Retailer	<ul style="list-style-type: none"> Retailing Selling 	<ul style="list-style-type: none"> Retailer purchase the output from the wholesaler, commission agents, millers etc. 	<ul style="list-style-type: none"> license and capital inefficient supply
Consumer	<ul style="list-style-type: none"> Consumption 	<ul style="list-style-type: none"> Consumers are the end users of commodity. 	<ul style="list-style-type: none"> High prices Low quality No proper packing

Table 17: Operation and Activities of different actors in the value chain process

4.3 MARKET ANALYSIS FOR ORGANIC PRODUCE

4.3.1 NICHE MARKET

Niche marketing is the splitting of conventional markets into smaller segments and then devising separate marketing programs for each of these smaller segments or niches (Linneman & Stanton, 1992). Establishing a niche market provides an opportunity to an organization to sell products and services to a group that has been overlooked by other businesses. In general, niche markets have a few important characteristics that make their prices behave differently than in larger markets.

Niche marketing has been used synonymously with market segmentation, target marketing, micromarketing, and regional marketing, focused marketing and concentrated marketing (Dalgic & Leeuw, 1994, Kara & Kaynak, 1997). In niche marketing strategy, all the organizational efforts are used to satisfy the targeted customers, at substantial profits. And niche marketing strategy, being more focused and targeted to customers, can be utilized to market the organic products. By growing organic products, farmers can exploit the opportunities offered by this niche market. To achieve this goal; in addition to hard work and biological farming methods, which they already are following, they need awareness, marketing and proper guidance.

There is a slight difference between market segmentation and niche marketing. Market segmentation is the process in which large markets are broken down in to smaller and more manageable market segments. A niche market starts from the needs of a few customers and then gradually builds up in to large markets or customer base (Shani & Chalasani, 1992).

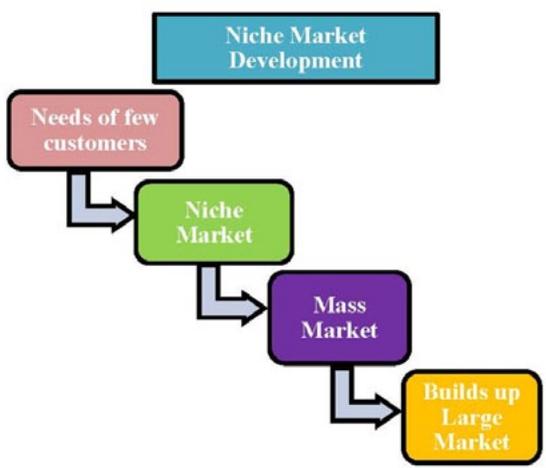


Figure 12: Market Development

Niche marketing is one-step ahead of market segmentation because it creates a discrete group of customers (Kara & Kaynak, 1997). In niche marketing the customer has separate needs, and then the whole company's efforts are to satisfy those needs at higher profit margins as compared to mass market. Niche marketers often progress to mass marketers and mass marketers go back to niche marketers. Most of the organizations start out as niche marketers and evolve in to mass marketers, when the saturation starts and product reaches at maturity, innovation occurs and former mass markets are inclined to come back to niche markets (Dalgic & Leeuw, 1994).

4.4 MARKET ANALYSIS OF ORGANIC PRODUCE

The fabrication of organic products is a niche market in Pakistan and can accelerate the economic growth vigorously. There is an opportunity for the organic producer to earn higher profit margins from the niche market (Baffes, 2004). Organic farming has bright prospects for number of reasons in Pakistan:

- Organic farming encourages the use of labor, which is surplus and cheap in Pakistan. Organic value added products has profusion due to cheap labor in the country and value chain processes are also labor dependent. As Graph shows that about 45 percent labor is employed in agriculture so there is potential to engage the labor.
- The conversion from traditional farming to organic farming in many areas of Pakistan is easier because farmers are using less fertilizer, pesticides, herbicides and genetically modified seed due to their high prices and low availability in many areas in general and spate irrigated areas in particular. So another option for spate farmers and exporters is to exploit the niche market opportunities available in this sector.

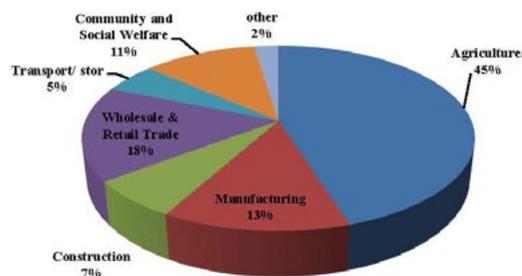


Figure 13: Labour distribution (Source: Labor Force Survey 2011)

- Due to less dependence on chemicals and fertilizers for the production of agricultural production Pakistani farmer need only little adjustments in their current production practices. In this way they can easily qualify as certified organic producers.

This can only be achieved through specialization; product differentiation and exploiting the new market opportunities, like niche markets having size, profit, and growth potential. As customers are now more knowledgeable and aware than ever before, about the impacts of business on society and environment, so this is the time for transition to organic methods and eco-friendly products. Organic farming is a new opportunity to increase the farm earnings in the developing countries.

4.5 WHY ORGANIC IS IMPORTANT FOR PAKISTAN

Organic farming is an environmental friendly ecosystem management in which, use of all kinds of synthetic inputs are eliminated (FAO,1999). As the demand for pesticide-free fruits and vegetables has spiked in Pakistan over the last few years, organic farmers have seen a boom in interest. In organic farming, vegetables and fruit (and wheat, rice etc.) are grown without the use of synthetic chemicals.

Organic farmers rely instead on crop rotation, integrated pest management, crop residues and animal manure to maintain soil productivity and to control pests and weeds. The stated aim of organic farming is to “sustain and enhance the health of ecosystems and organisms from the smallest in the soil to human beings.”

Modern agricultural farming practices, along with irrational use of chemical inputs over the past decades have resulted in not only loss of natural habitat balance and soil health but have also caused many hazards like soil erosion, decreased groundwater level, soil salinization, pollution due to fertilizers and pesticides, genetic erosion, ill effects on environment, reduced food quality and increased the cost of cultivation, rendering the farmer poorer year by year (Ram, 2003). Ultimately farmers’ local indigenous farm techniques wiped out and replaced by the modern techniques, resulting in unviable and unsustainable farm enterprise.

Organic farming is considered productive and sustainable due to lot of factors. It is in this context that alternative farm techniques and strategies

for growing crops ought to be found in the larger interest. The principle of organic cultivation is attracting farmers’ world over due to its various advantages over modern agricultural practices. Organic agriculture is productive and sustainable (Tamang et. al.2011; Reganold et al., 1993; Mader et al., 2002).

Organic food tends to have higher levels of all 21 nutrients compared with conventional produce including vitamin C (27% more), Mg (29% more), Fe (21% more) and 14% more Phosphorus. It uses environmental friendly inputs and therefore generates environmental friendly foods and services. Such farming, therefore, positively contributes to marked reduction in air, soil and ground water pollution. Moreover, it is a solution to the problem created by nitrate pollution, improves soil structure, fertility and soil fauna. It saves environment from harmful effects of the use of synthetic inputs especially fertilizers and pesticides, hormones etc. Pesticides and fertilizers release harmful toxic chemical in water and soil.

In order to follow strict code of ‘organic farming’ the system will engage large unskilled / semi-skilled and skilled labor force requiring specific tasks to be performed All pursuits of farming such as planting, rearing, sowing, cultivating, after-care, maintenance, harvesting, washing, cleaning, grading, labeling, bar coding, packing, transporting and marketing generating more employment opportunities (Farooqi 2006; FAO 2004).

The most popularly accepted definition of organic farming is: ‘Organic agriculture is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional



Figure 14: Economic Benefits of Organic production

conditions require locally adapted systems. This is accomplished by using wherever possible, agronomic, biological and mechanical methods, as opposed to using synthetic materials, to fulfill any specific function within the system' (FAO, 1999).

4.6 THE GLOBAL STATUS OF ORGANIC FARMING

Although the modern farming has some immediate benefits in terms of yield enhancements, but its pollution potentials are fatal and long lasting. The late realization of negative impacts on ecosystems, both aquatic and terrestrial, had ultimately forced stakeholders to again switch over to natural or organic farming. Global organic agriculture has increased by at least five times in terms of acreage during the last five years. The farming system of global organic land is equivalent to 10 million hectares.

Almost half of the global turnover with organic products is in Europe and stands at 12 billion euros with a growth rate of 10 per cent. Similarly, organic sector in Canada is booming with one billion dollars a year in retail sales and a 25 per cent annual growth rate. An organized organic activity started in USA towards end of the previous century.

The legislations and essential ingredients of the system are now very well defined and are put into practice. Health experts say that organic food is chemical-free. It isn't grown from genetically-modified seeds (that cannot reproduce), nor is it drenched in chemical fertilizers and pesticides. They claim that consuming organic food protects us from the array of diseases and health conditions that are caused by eating contaminated food that accounts for much of what we eat today (Pakistan today 2011).

Organic agriculture is developing rapidly around the globe and today at least 141 countries produce organic food commercially. As per the estimates in the year 2007, organic food is produced in about 32.2 million hectares (Mha) globally, managed by more than 1.2 million producers, including smallholders. In addition to agricultural land, there is 0.4 M ha of certified organic aquaculture. Among the countries involved in organic farming, about 65 per cent are developing countries. The regions with the largest areas of organically managed agricultural land include Oceania, Europe and Latin America, Australia, Argentina and Brazil. About one-third of the world's organically managed land which is almost 11 mha is located in the Developing

countries. Most of this land is in Latin American countries, while Asia and Africa take the second and third places, respectively (Reddy 2010).

On a global level, in the year 2008, organic land area increased by almost 1.5 M ha compared to the data for the year 2006. About 28 per cent (or 1.4 Mha) more land under organic management was reported for Latin America (including 0.9 M.ha of in-conversion land in Brazil for which no data was available previously). In Europe, organically managed land increased by 0.33 mha (+ 4%) and by 0.18 mha (+27%) in Africa (Willer and Klicher, 2009).

Austria has the highest percentage (8.40%) of area under organic farming, followed by Switzerland, UK and Germany. In India and Pakistan, only 0.03 and 0.08 per cent of the area is under organic farming respectively, though there is huge scope for bringing more land under organic farming (Reddy 2010). China has 5.7 million acres under certified organic farms and India 5660 certified and uncertified farms (Farooqi 2006).

The organic movement achieved up to the year 2012, 1.9 million certified organic farmers in 164 countries on 37.5 million hectares and a global market for organic food of 63.8 billion US dollars. The global trend remains positive, but the ambitions of the organic movement go far beyond the present uptake (FIBL and IFOM 2014).

Country	Percentage under organic farming
USA	0.23
UK	4.22
Germany	4.10
Argentina	1.70
Austria	8.40
Australia	2.20
Japan	0.10
Switzerland	7.94
South Africa	0.05
Italy	3.70
Pakistan	0.08
Sri Lanka	0.05
India	0.03

Table 18: Percentage of area under organic farming in the total cultivated area of different countries in 2004.

4.7 INTERNATIONAL STANDARDS OF ORGANIC PRODUCTS

The US Department of Agriculture (USDA) has established an organic certification program since 2002 that requires all organic foods to meet strict government standards. These standards regulate how such foods are grown, handled and processed. The identification system called organic labeling has three main categories comprising:

- “100% organic”, “Organic” and “Made with organic ingredients”. The labeling system introduces a recognized, easy and authentic identification method for consumers. Foods that are labeled as “100% Organic” must contain all organically grown ingredients except for added water and salt.
- Foods that are labeled as “Organic” need to contain at least 95 per cent of organic ingredients, except for added water and salt, plus they must not contain sulfites added as a preservative. Sulfites have been known to provoke allergies and asthma in some people. Up to five per cent of the ingredients may be non-organically produced.
- Labels that claim the product to be “Made with Organic Ingredients” need to contain at least 70 percent organic ingredients, except for added water and salt. They must not contain added sulfites, and up to 30 per cent of the ingredients may be non-organically produced. Food products made with less than 70 per cent organic ingredients may state which ingredients are organic, but they cannot claim to be organic food products. The food item displays the USDA certified symbol which depicts that it has been produced and processed according to USDA standards. The seal is voluntary, but many organic producers use it.

It is essential to clarify here that “natural” and “organic” are not interchangeable terms. “Natural” and other terms such as “all natural,” “free-range” or “hormone-free” on food labels are not synonymous. These descriptions must be truthful, but are not to be confused with the term “organic.” Only foods that are grown and processed according to USDA organic standards can be labeled as organic.

International Federation of Organic Agricultural Movement (IFOAM) sets five strategic pillars for organic production which are:

4.7.1 The Organic Umbrella

This pillar keeps on informing members and organize debates including events e.g. publications, the website and Organic Info Hub, public relations and brand marketing.

4.7.2 Advocacy

Advocate for agricultural policies at international level. They are actively lobbying for food and agriculture related international policy processes to mainstream organic agriculture into the current agriculture practice systems.

4.7.3 Value Chain

The Organic Value Chain pillar represents support to organic standards and verification systems, including Organic Guarantee System (OGS), promotion, Harmonization and Equivalence among organic standards and regulations, third party certification, Promotion of best practices in the organic value chain.

4.7.4 Programs

Organic movement to facilitate organic development, taking up capacity building initiatives for various actors of the supply chain to make the transition to organic agriculture, promoting local organic solutions, collecting and disseminating best practices.

4.7.5 Academy

The Training Manuals and the Programs Pillar for training and capacity building tailored services to a growing organic sector.



Figure 15: Organic promotion internationally

4.8 CURRENT SCENARIO OF ORGANIC PRODUCE IN PAKISTAN

Pakistan is endowed with various types of naturally viable organic form of nutrients across different regions which are helpful in organic cultivation of crops. Pakistan traditional farmers possess a rich body of wisdom, based on long observation and practice, concerning soil fertility and pest control management and can be used to strengthen organic systems.

According to Farooqi 2006, Pakistan is bequeathed with exceptional and diverse crop/ animal husbandry growing conditions containing the very basics of organic farming. The organic produce has the capacity to increase the farm income threefold depending on quality and adoption of strict discipline standards for quality. Therefore Pakistan must opt for organic farming having a comparative advantage of suitable ecologies where chemicals have never been used. It creates employment opportunities and alleviates the rural poverty by capturing the niche market and diversifying rural economy.

There is a need of strong support for the evolution of the organic farming in Pakistan in the form of subsidies, agricultural extension services and research. As long as the product development of organic food is concerned it is taking place in bits and pieces. Individual farmers, institutions and NGOs had initiated different promotional activities of organic farming but these activities are not coordinated and documented properly. One organization is unaware of other's initiatives and achievements. At the same district, different institutions are working on this sector on their own way.

Organic products produced by the private vendors need to meet the standards of the local market at one hand and on the other hand competing with the international market is too hard. Another issue is competition of local products with imported product in markets of Pakistan which is also a matter of great concern. Because of the complicated certification process, marketing of organic product within our own country is not much effective competing with the international market is even harder. Due to the lack of accredited laboratory facility, certified products can't be produced. And products do not get recognition as organic products.

There are limited and scattered researches on organic farming, which are not properly documented. Organic products are not perfect in shape, size and color in comparison with products produced by the use of chemical fertilizers and pesticides. So farmers are in fear about the consumer preference as they (consumer) prefer by evaluation with their eyes and organic products are hard to compete in the market.

They do not concern about the way of production and nutrient content of the product. They think that organic products are expensive and hard to afford. There is also need to educate consumer about the perfection of imperfect. Lack of clear vision from government sector is one of the serious drawbacks for the slow development of organic farming in Pakistan. The issues and agendas of the organic agriculture are limited on certain people and yet to be reached in the public mass. The campaigners and organizations working in the promotion of organic agriculture seem to be weaker and loosening to the advocacy power as compared to the past years.

Company	Location	Products
Daali Earth Food	Lahore, Karachi, Islamabad and Faisalabad	Stone grinded condiments, organic rice, pulses, flour, and cereals.
Nilofer Saeed	Karachi.	Desi' eggs, pure wheat and olive oil.
Sun gold	Lahore	vegetables like eggplant and broccoli, organic wheat
Roshni Association	Lahore	Panjeeri, organic eggs, whole grain organic bread
Christine Dawood	Lahore	Herbal tea and organic vegetables

Table 19: Organic Companies and Products operating in Pakistan

4.9 MODELS OF ORGANIC VALUE CHAIN IN PAKISTAN

Although the organic value chains are not well developed yet there is prevalence of small models of organic value chains which are running successfully in different regions of the country. Most of them are in the big cities like Lahore and Karachi. Yet other regions also have the prevalence of these chains e.g. Islamabad, shekhupura and Faisalabad etc.

According to Express Tribune 2011, Organic food is becoming popular in Pakistan. This isn't just a fad, but rather a realization that getting closer to nature is in our interest. Increased awareness about impurities in the food on daily basis means that people are consciously switching to healthier options or trying to at least. For Pakistanis, opting for organic food doesn't mean that we are simply being fashionable or following Western fads; it mean that we're going back to the basics.

Organic food is not a new concept in Pakistan. Our forefathers were all organic farmers, using natural fertilizers and natural methods of pest control. In modern times, organic farming entails the use of organically approved pesticides and fertilizers to maintain soil productivity and to control pests. Organic farmers employ methods like crop rotation, green manuring, and use compost that is made by the farmers themselves.

Organic food and healthy living are the new buzzwords. There are people working to bring organic food to tables of consumers as well. In mountainous areas of Pakistan especially Northern Areas pesticides are rarely used and hormones and steroids mostly unheard of, people are eating pure food (hence their longevity and healthy complexions).

The dry fruit from this area is also organic and several companies now export the walnuts, dried apricots, chilghozas, almonds etc. to markets in the Middle-East and Europe. In the West, there is a high demand for these products. It is time that we in Pakistan started valuing organic food and creating a demand for natural products, grown in natural way. Some of the groups' individuals, companies and NGOs which are popular and are working for the promotion of organic agriculture in Pakistan are:

- Daali Earth food owned by Mariam Ibrar. Daali's organic products are available at various departmental stores in Lahore, Karachi, Islamabad and Faisalabad. Mariam Ibrar, the person behind it, took the initiative few years ago when she vowed that she would no longer feed her children with preservative-ridden cereals and adulterated food. Following in her green footsteps, two of her friends came up with their own brands to help promote the idea of adapting to healthier food.
- Nilofer Saeed set the trend in the restaurant industry by offering dishes with purely organic ingredients in Neco's Café and also by setting up the Natural store in Karachi. For those looking for healthy restaurant dining, this café offers an organic menu with hormone-free 'desi' eggs, pure wheat and olive oil.
- Sun gold Organics is another label that ensures the provision of chemical-free and naturally grown vegetables. They produce their own natural fertilizer and have a long list of vegetables like eggplant and broccoli that are in any case hard to find at your local sabzi-walla... and they even deliver to your doorstep! Many of us are familiar with Zoya Aliem Khan's herbal beauty products, which are available across Pakistan, but in recent years she has also started stocking healthy food in some larger stores in Lahore.

- Alexander Kuhne came all the way from Germany with a mission to conserve nature and promote natural living, under the aegis of the Roshni Association. This organization, which aims to help special children, also has gardens where organic food is grown for the staff and residents. The surplus eggs, vegetables and fruits are stocked at the local store Panjeeri in Lahore's mini market. Alexander is of the view that system will transform gradually.
- Christine Dawood's herbal tea and organic vegetables farm is located in Raiwind outside Lahore. It is also distributed in Lahore. Christine supplies to big restaurants and large stores like Metro and Makro. Her herbal teas, chamomile, lemon balm, are good for bloating headaches etc.
- Pakistan Organic Farms are certified by Control Union Certifications Zwolle, the Netherlands for organic production methods according to Regulation (EEC) No. 2092/91 and USDA-NOP standards. They grow organic rice, organic sesame seeds, organic cotton, organic wheat and other agricultural commodities, <http://www.pakof.com/ek.htm>.
- Organic food is expensive compared with conventional food. Mariam Abrar confesses that being a small scale entity it is not possible to grow on large scale. However it is possible to export the organic produce if it is taken seriously at the level of state. Growing organic food is knowledge-intensive and it will take time for the farmers to adapt to this type of farming. We also have to take into consideration that we live in a capitalist economy where profits are always the first priority and premium prices may be a great attraction for the producers.

There are several organic farms cropping up in the country and there is burgeoning organic food movement in Pakistan which is growing every day. There are various other options that can be learnt and explored e.g. Compost can also be made at home by utilizing garden and kitchen waste material. (Express Tribune 2011). Few case studies of mentioned value chain models are reported in Box 1, Box 2 and Box 3.

BOX I: CASE STUDY - DALLI EARTH FOODS

Daali Earth Foods is a Lahore based company supplying organic foods to various city of the country. Their farm experiments started in mid-90s and now they distribute to several cities. They follow slow process stone grinding which allows their products to retain the nutrients and benefits that are lost in industrial grinders. For example, their rock salt contains 84 minerals and elements that help build bones, contrary to that commercial salt contains pure sodium, chloride and anti-caking agents. Products are positively different and inspiring. Flavor of Dali honey varies depending on flowers of season, their flours include a sachet of neem, kalonji and bay leaf to naturally protect against insects, and chilli powder is the most vibrant tomato red. Their motto is “Nothing added, nothing removed,” (NewsLine 2009).

Dali distributes its product in various running stores including Islamabad GN store Kohsar Market in F/6, and number of retailers in Faisalabad, Lahore and Karachi. One of the customers reported that not only is the packaging beautiful, but the stuff inside is of high quality (Rizvi 2012). In Pakistan white rice rules supreme but it's basically nutrient poor because it's so processed and refined. Dali supplies brown rice.

Dawn 2014 reported that Dali is operating in Mini Market Lahore and supplying grain-fed, free-range desi eggs - no hormones, no antibiotics, no steroids, no chemical feed, and no animal derived feed”. Literally, “daali” means “the gift of a basketful of seasonal farm produce. Concept behind Daali Earth Foods is that the grains, fruit and vegetables, as well as dairy and poultry products, exist in an optimal nutritional balance in nature. The more they are processed and refined, the further they get from their original state and lose essential nutritional value. There is a wide range of organic products which includes organic whole wheat aata, organic whole wheat bread, 5-grain aata, organic diabetic & diet aata, desi barley porridge spices, rock salt, organic brown rice, organic wild-bee honey, desi sarson oil, hair & body massage oil, organic wild-bee honey, desi sarson oil, hair & body massage oil, gluten-free flours, new organic chickpea, new organic arborio rice, new muesli, new organic daal massar, new handmade pasta, organic whole wheat, new energy bar, 50gm chaat masala, 50gm garam masala. Daali spices are guaranteed whole grain, the oil is 100% pressed seed, and the jams are whole fruit, with only the inedible pit removed.

References:

- Rizvi. Z, 2012, Finding Organic in Pakistan, Aid Source, The Humanitarian Social Network.
- News Line 2009, Don't Panic, it's Organic.
- DAWN.com 2014, Earthly Matters Back to nature



BOX II CASE STUDY: SUN GOLD ORGANIC FARM

Sun Gold organic was started in spring 2009; it has its specialty in organically produced vegetables, which are grown on a six-acre farm in Qasim town Karachi. Strong proponents of sustainable and environmentally friendly living, owners Rabia Khan, a developmental social scientist and husband Muzzamil Niazi, an 'under employed' aeronautical and mechanical engineer, are engaged in creating awareness about the health benefits of organic agriculture along with making this venture a profitable business. Organic produce takes longer time to get ready than that produced with urea but having lower shelf life and nutritional value compared with organic produce. Input costs at Sun Gold are low due to absence of urea and other chemicals. Pesticides used by Sun Gold are made of natural substances e.g. tobacco, garlic, cayenne pepper, plant leaves and flowers.

In 2011 annual sales are about Rs1.4 million at break even with 80-100 households, but the target of Sun Gold Organic is to reach 300 households per week by 2012. Sun Gold didn't conduct market research to determine the commercial viability of this venture, instead, they started supplying produce to people in the neighborhood, and consumers started responding and it grew at a faster pace. Now, Sun Gold Organic has customers in areas like Bath Island, Clifton, Defense, KDA and Gulshan. Customers place orders via e-mail and phone, and they are home delivered the next morning. Their clientele is dominated by women especially the working mothers who want healthy food for their kids in short time. Besides delivery system Sun Gold also supplies to retailers and planning to sell their produce to the supermarket stores but one constraint is that their limited capacity to meet the interested store volumes and they are not ready to replace quantity with quality. It is also supplying to three high end restaurants including: N'ecos cafe, Okra and Cafe Flo.

They never advertised their produce but in 2010 they participated in a stall in a mela organized by Horticultural Society of Pakistan. They also provide free samples of their produce to about ten to twelve households in the area. Sun Gold has employed a number of women as their labor and marketing agents. The venture provides employment to about ten to fifteen people, depending on the season and work load requirements and employees range from supervisors to consultant farmers and drivers. In order to eliminate the high supervision cost owner lives at the farm. In order to gain a competitive edge, Sun Gold has introduced vegetables like Swiss chard which isn't available in conventional supermarkets in a variety of colors, making the vegetable an attractive option for cooks who are keen for the presentation of food. Sun Gold uses biodegradable plastic material for packaging in an environment friendly manner.

One of the biggest challenges is getting people to pay the slight price difference involved in switching to organic produce. People do understand the quality of clean, less contaminated produce, but many are not willing to pay the difference. Sunday Bazaar and *subsi wala* are easily accessible. One KG of organically produced Okra (bhindi) costs Rs80 at Sun Gold. Although Sun Gold intends to export their produce abroad in the future but at the moment they'd rather gain footing in the local market. It will promote Pakistan in the international community, and that will be a worthwhile move. To build a strong presence in the market, will require time and patience. Since it's a new way of living, it will take time (Express Tribune 2011). On a personal communication with Sales and marketing executive Sun Gold 2014, reported that Sun Gold has applied for the certification of organic produce yet they have not completed the process.

4.10 THE DEMAND SUPPLY GAP

Sales of organic food have increased more than six-fold worldwide in the last quarter of a century while organic production has just doubled during the same period. It mirrors that the demand for organically produced food continues to outpace its supply, depicting a widening demand supply gap. Although it is a challenge to cater the increasing needs of organic consumers but fulfilling the demand of these quality consumers can substantially strengthen the stakes of organic food producers in the global food market. This is a window of opportunity to agriculture economies like Pakistan who can earn billions in terms of foreign exchange through the export of organic food (Pakistan Today 2011).

It is an objective fact that organic farming is as old as human civilization. However, the ever increasing population has prompted growers to concentrate on increased production by using synthetic nutrients such as pesticides, chemical treatments and fertilizers which leaves residual effects on the produce resulting in more health risks. Organic foods are described as organic meat, poultry, eggs and dairy products that come from animals that are given no antibiotics or growth hormones. Organic food is produced without using most conventional pesticides, fertilizers made with synthetic ingredients or sewage sludge, bioengineering or ionizing radiation.

Organic foods are more expensive to grow than conventionally grown foods and that cost shows up as higher prices in the grocery store. The choice to add organic foods to your diet may cost a bit more, but for that price, you are buying the reassurance that you're making healthy decisions for your own and your family's health. Higher prices of organic food are due to the fact that organic farmers are getting a lower yield per acre due to non-use of pesticides and fertilizers (Pakistan Today 2011).



Figure 16: Organic supply and Demand gap

4.11 ECONOMIC PROSPECTS OF ORGANIC FOOD IN PAKISTAN

In Pakistan the market for organic agriculture is very bright as long as economic prospects of organic production are concerned. Organic certification has proven to be a market success since its introduction in 2002. Organic farming will transform gradually as it is a knowledge-intensive phenomenon and it will take time for farmers to adapt to it after few modifications. However in many regions of Pakistan organic farming is practiced by default as fertilizers have not in the reach of the resource poor farmer. This is an opportunity in a disguise for the poor farmers and it can be used to alleviate poverty of the poor farming community in the mountains and hills. Commercially speaking, we also have to take into consideration that we live in a capitalist economy where profits are always the first priority.

Premium prices may be a problem if consumer is not aware. However in Pakistan there is a growing awareness about the health benefits of the food produced with the natural fertilizer. A vast majority of rural consumer is consuming mostly the organic produce duly produced at their own farms. However urban consumers tend to purchase the certified products from the market. Elite class consumers demand the certified products.

Awareness about organic food is increasing and many consumers have started differentiating between chemical foods and organic food. Those consumers who have high level of awareness prefer to purchase the imported products than those produced locally. The reason furnished by retailer is that there is lack of certification of local products which lead to consumption of imported goods. Another reason for the preference of organic food over chemically produced food is the health concerns of the consumer. The prices of all organic products are far higher than conventional products. Those consumers are willing to pay higher prices for the imported organic food products that purchase those items from the foreign countries and try to search the same products here in Pakistan. Most of such consumers belong from the higher income group of the society. The supply of these products is regular and depends upon their orders of the retailers. And the ordered quantity is very minimum compared with the conventional products due to low demand. Few companies give the marketing fees to the retailers for the promotion of their products (Essajee 2014).

There are companies in Pakistan who grow food according to prescribed organic method and sell them in the market. Out of them case studies of few companies have been reported in this study. Compost can also be made at home by utilizing garden and kitchen waste material. There are various other options that can be explored.

4.12 EMERGING TREND OF ORGANIC FARMING IN PAKISTAN

In world the total area under organic farming was 31 million hectares and there were total 633891 farms managed organically round the world (FIBL 2007). While in Pakistan at present there are 20'310 hectares under organic farming and 28 farms managed organically (FIBL 2007). The studies show that 30.4 million hectares are currently certified according to organic standards. It is commercially practiced in 120 countries. The global market for organic products reached a value of over 40 billion US Dollars.

The basic standards for organic production are published by the International Federation of Organic Agriculture Movements IFOAM. The IFOAM basic standards define how organic products should be grown produced processed and handled. The organic farmers have to meet these standards. Certification, accreditation and labeling the produce as 'organic' must be made by the certified and registered agencies. In Pakistan most of the Organic Farms are certified by Control Union Certifications Zwolle, the Netherlands for organic production methods and USDA-NOP standards. The mostly grown commodities are organic rice, organic cotton, organic wheat, organic sugar, organic sucrose, Organic Kinno fruit and juice concentrate, and Organic Mango fruit and pulp and seasonal fresh vegetables (Flora Hort 2013)

4.13 PROSPECTS OF ORGANIC AGRICULTURE IN PAKISTAN

There is growing demand of organic food products throughout the world. The researches and developments on national level are strictly needed to be made. The government should provide subsidy, financial and technical support to the farmers for organic crops cultivation. It is needed to shift our agriculture trends towards saving the nature. This will give us safe agricultural products and the power we use to dispose-off our solid wastes. It is right of our next generation that if we can't give them a better environment, we have no right to worsen it any more.

Pakistan has a great potential for organic farming by delineating millions of acres of most fertile and productive land. Progressive farmers' community is destined turning towards organic cultivation. The area under organic farming will increase as public awareness and health consciousness. Organic farming here in Pakistan has many challenges to conduct. Organically produced commodities are relatively more perishable. The reasons for slow progress of organic farming include:

- Lack of awareness among people about its benefits.
- Export of organic produce is at very limited level.
- There is also lack of inspection and certification agencies.
- Government price policies and monopolies on market of agriculture produce, causing low agricultural income.
- Infrastructure and marketing Facilities poor market integration.

The organic food market is growing rapidly in the entire world. Various alternative organic standards are also emerging. Some are also implementing new approaches to defining and buying food. Farmers have to reap market premium for certified production. The organic commodities will have high prices in domestic as well as in super markets. Hence the economy will grow with a potential to alleviate poverty.

Organic food is also often linked with the fair trade movement, based on the principle that social and environmental sustainability are inextricably interdependent. Initiatives should be taken to organize marketing of organic food through creation of awareness and establishment of markets. Pakistan has large area which has used minimal pesticides and chemicals, where potential for conversion exists. It is envisaged that a reasonable percentage of production shall be organic in coming five years. The major organic food markets for Pakistan are Europe, the USA, Japan and Middle East. There is bright future which indicates impressive opportunities of different organic food products by Pakistan to export.

Organic farming is also compulsory in order to withstand WTO standards to increase export of our agricultural produce. Future prospects show proper utilization of recourses and profitable use of farm wastes. Soil water and air pollution would be reduced. Organic farming will provide an avocation to the land less laborers.

BOX III CASE STUDY - ROSHNI ORGANIC BAKERY AND ORGANIC FARMS OF ROSHNI ASSOCIATION: Society for the Welfare of Special Persons.

The Roshni Organic Bakery is operating in Gulberg Lahore. This NGO was set up by Shahida Parveen Hannesen and her German husband, Hamid Helmut Hannesen. Hamid met Shahida in Germany and supported her idea of a social welfare in Pakistan and came back to Lahore. Hamid is a converted Muslim. In 2001, Shahida and her husband, along with teachers Lars Jamke and Graham Simpson, moved from Germany to Lahore to build a community for adults with special needs. They started with a daycare center, And then they have now set up a Roshni village, which houses 40 developmentally challenged residents. The Roshni Association offers vocational training and a handful of village residents are currently working in Roshni's organic bakery, where they are involved in all stages of the production process, including milling grain into flour, preparing dough, baking bread and the final packaging. Roshni's Motto is "Having a meaningful occupation makes them feel an important part of society.

This boosts their confidence and enhances their abilities to live more independently." Roshni breads are baked according to traditional German recipes. These recipes were entrusted to Roshni by Mr. Moeller, a master baker from Germany. He also trained the staff to ensure constant quality. Whole meal flour contains all parts of the grain and is therefore much richer in vitamins and fiber than usual white flour. The breads are considered to be beneficial for the digestive and immune system and good for diabetics. It is also very tasty. It is guaranteed free of preservatives and artificial additives, Roshni's ingredients are provided by carefully selected farmers living in rain-fed areas, whose farming practices excludes the use of pesticides and chemical fertilisers.

The concept of organic farming is not new to Pakistan, in fact, the Northern Areas and rain-fed and Rod Kohi (spate irrigated) regions of Pakistan all traditionally grow organic agricultural products. Now the idea of organic farming is catching on with the modern farmers of the Punjab and NWFP. "Some people are now offering to grow organic wheat and cereals for us. As Roshni is becoming well known, so farmers are approaching them. The Hannesens' shop, however, is only an outlet for their products; they are not interested in setting up a chain of organic stores. Hannesens and Shahida like to spark a movement towards more natural living in Pakistan. Their objective is to "work with nature for nature to ensure a pollution free environment". The Roshni Gardens play an important role in community life. Students as well as volunteers are involved in the maintenance of the gardens. It is the specific method of planting that makes the gardens at Roshni so inviting.

Roshni village is located at Ledhar village, near Bedian road Lahore in a peaceful environment surrounded by lush green fields. Giving a glimpse of development in urban area, the red bricked building covered nearly 3 acres of land approx. The village provides living to the people with special needs. The 300 trees were planted by Shahida Hellmut. All types of seasonal vegetables are being grown organically. They make their own organic bread and pancakes and even sell them in the market. The living system is entirely sustainable because they use their land grown vegetables and crops to cook. The poultry farm chicken and buffaloes are also being raised to get eggs and milk.

The land is fertilized by their own compost being made by using animal dung, kitchen waste and organic waste. The biodynamic method of gardening uses no chemical fertilizers or pesticides. By substituting these chemicals with compost and other natural fertilizers, the health of both the earth in which the plants grow, as well as the fruits and vegetables that they produce is increased. This sustainable way of farming ensures that a high quality array of produce is grown: rice, wheat, potatoes, carrots, chillies, okra, herbs, pumpkins, and a number of fruits make up the basic nutrition for the community.

The high quality of organic produce is grown at Roshni has also become attractive to conscious customers in the surrounding area. For years now, Lahoris have been feasting on Roshni bread, the

delicious and healthy wholegrain bread, made by the Roshni Organic Bakery. The various kinds of Roshni bread (linseed, rye flake, plain, toast) are sold in different outlets throughout Lahore and are made from natural ingredients grown by organic farmers. The small and simply decorated Roshni shop now offers these breads along with other bakery items like quiches, cupcakes and pastries. The shop also offers other organic food items like fresh vegetables, dry fruit, herbal teas, natural oils, sugar, rice and cereals. It is a treat for all those who are concerned about their health and the environment. There are number of other small individuals and organizations who are supplying organic products at Roshni some of them are:

- Daali Earth Foods has been growing organic wheat and cereals for several years now. Their products, including brown rice, whole wheat flour, porridge, mustard oil and whole fruit jams and marmalades are all available at Roshni's new shop. Her organic wild bee honey, which is particularly popular, tastes delicious and contains non-allergenic properties and essential vitamins and minerals.
- The shop also stocks organic rice, dried apricots, apricot oil, shelled walnuts and brown sugar imported from Hunza, in Pakistan's Northern Areas. The company that supplies these food products is Hunza Organics, run by Zahid Durrani in Lahore, and it has been certified by the Control Union in the Netherlands.
- Christine Dawood's herbal teas and organic vegetables are also being stocked at Roshni. She grows her products in her herbal garden in Lahore's Cantonment area. The special lemon balm tea gets rid of bloating immediately and has antibacterial properties. Moreover mixed green salad boxes, which are so much in demand that they are sold out as soon as they arrive at the stores in Lahore.

References:

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2. Pakistan Sustainability Network 2012, PSN Field Trip to Roshni Village.

Its objective are to develop low capital less labor intensive, high yielding, better quality and healthy organic farming. Reducing the cost of production to minimum to achieve self-sufficiency in all inputs. It is recognized as a long-term solution to the problem caused by nitrate pollution. Organic agriculture in the beginnings shows lower yields than conventional cropping but as its input are lower than conventional agriculture and labor in Pakistan is cheap, in long when organic agricultural methods have improved soil characteristics, soil fauna and established worm activity and large production of vermi-casts, the yields will surpass the conventional methods.

4.14 STRATEGY AND ACTION PLAN FOR ORGANIC PRODUCE IN PAKISTAN

This part of the study elucidates the challenges faced for the promotion of the organic products and niche crops e.g. truffles and medicinal plants. Moreover this section formulates the action plan and strategy for the demand generation of the organically produced goods specifically generation of demand of the spate irrigated areas:

Organic Produce

Organic farming is based on the balance of the system e.g. soil, plants, animals, human, and the closed nutrient cycle within the system. No synthetic chemical fertilizers and pesticides, growth regulators and hormones maybe used in organic farming.

Organic farming meets the expectations of the society regarding the environmental protection, production of high quality and safe food with high nutrition value, sustainable management of non-renewable natural resources and adequate concern for animal welfare. Instead, methods based on reasonable and rationale use of natural resources are applied, i.e. crop rotation, cultivation on inter crops with nitrogen fixing legumes, livestock manure, green manure and compost, biotic control of pests, diseases and pest resistant crop species, and other techniques.

Consumers prefer products from recognized environmental regions which they call "ecological" products. It supports the rural development and can contribute to stabilization of ecosystems, preservation of natural resources and development of rural regions. Organic production in Pakistan is still in an early stage

of development. Organic production has a high potential in Pakistan due to traditional agriculture production, mainly in mountainous areas with good environmental conditions suitable for organic production. A large number of farmers are practicing organic agriculture in different areas of Pakistan. Their produce is not being recognized as organic produce and their lands are not delineated as land free from chemicals and fit for organic agriculture.

Currently organic agriculture is practiced in Pakistan yet it is formally not declared as organic produce. Different NGOs and other related departments are working for the dissemination of awareness regarding organic agriculture. However it is taking place in bits and pieces. Individual farmers, institutions and NGOs had initiated different promotional activities of organic farming but these activities are not coordinated and documented properly. One organization is unaware of other's initiatives and achievements. There is lack of synchronization between different organizations. At the same district, different institutions are working on this sector on their own way. Organic products produced by the private vendors need to meet the standards of the local market at one hand and on the other hand competing with the international market is too hard.

This part of the document is an effort to formulate the challenges being faced in the promotion of organic agriculture development. Moreover it will elucidate the challenges faced for the promotion of the organic products and niche crops e.g. truffles and medicinal plants. This section will also formulate the action plan and strategy for the demand generation of the organically produced goods specifically generation of demand of the spate irrigated areas: It is necessary to define a mid-term organic agriculture development strategy following the example of the other countries based on capacities, opportunities and market needs of Pakistan in order to exploit the competitive market.

This section will formulate a strategy for organic agriculture production and generation of local demand and export potential in Pakistan by providing medium-term instruments for recognition and utilization of natural resources appropriate for organic production development and awareness. It will also highlight the need to strengthen cooperation among stakeholders working in the sector, along with increasing the knowledge on organic farming of the producers, and consumers. Moreover it will find out ways to generate the export demand of Pakistani

organic products, medicinal plants and truffles. Before formulating the strategy it is necessary to mention the challenges faced in the promotion of organically produced food items and creating demand for local consumption.

Key Strategic challenges for the generation of organically produced goods

The prospects of organic agriculture in Pakistan are very bright yet there is a need for a serious movement at the state level. Pakistan has a great potential for organic farming by delineating millions of acres of fertile and productive land.

Progressive farmers' community is intending to turn towards organic cultivation. In mountainous areas of Pakistan especially Spate and Northern Areas pesticides are rarely used and hormones and steroids mostly unheard, people are eating pure food. The dry fruit from Northern area is purely organic and several companies now export the walnuts, dried apricots, chilghozas, almonds etc. to markets in the Middle-East and Europe. In the West, there is a high demand for these products. It is time to value organic food in Pakistan and creating a demand for natural products, grown in natural way. Yet there is a need of strong support for the evolution of the organic farming in Pakistan in the form of subsidies, agricultural extension services and research. Organic farming here in Pakistan has many challenges to conduct.

A. Delineation of Land for Organic Farming

The very first step towards the organic agriculture is the land delineation as millions of acres of highly fertile and productive-virgin lands under the command of Rod Kohi along with other areas, can be the potential zones for delineation as 'organic farming' areas. Government of Pakistan need to carry out an extensive nationwide soil survey to delineate the potential areas as productive and fertile area fit for organic farming.

B. Yield during Conversion from conventional to organic farming

According to Reddy 2010, Farmers perceive chemical agriculture to be health hazard; however, personal health is not the only reason to convert to organic farming. There is more scope for minimizing the economic cost and environmental loss, under organic farming system in the long-run (Rajendran, 2002). It is not the premium price of the organic produce but the reduced expenditure on inputs that motivated farmers towards organic farming (Alvares et al., 1999; Sharma, 2005).

During conversion from chemical to organic farming yields in irrigated farms may go down as crop yields are boosted by artificial fertilizers and it takes time for the soil fertility to get boosted. However, after conversion, yields will be equal, may not be higher than the yield during the conventional farming. However the situation is different for rain fed farming, yields are considerably lower and, the difference in yields between the conventional and conversion period is narrow. Yields may decline during the initial conversion phase until the natural fertility is restored. And after that it may stabilize at comparably lower or higher levels depending upon the quality of organic fertilizers.

Organic farming can compete economically with conventional farming when specific attention is given to optimum approaches while conversion (Cacek et. al. 2009; Kasturi, 2007). However the time require to switch from conventional farming to organic farming varies; for annual crops it is 24 months and for perennial crops it is 36 months. The initial low yield during conversion period may deviate farmer from switching from chemical to organic agricultural practices which is quite challenging.

C. Soil Fertility

The green revolution paradigm substituted the use of farm yard manure and other biological inputs which boosted the production of chemical marketable agricultural commodities. Green revolution also made a perception that soil fertility can be produced in factories and yields are measured through marketed commodities. However studies report that the fertility of soil cannot be restored by factory made NPK.

Yet man made technologies cannot substitute the nature's task however in the effort of doing so will disturb the natural ecological balance. Consequences of green revolution resulted in displacement of leguminous crops like pulses and soya bean, crops having high organic matter retuning capacity were rejected as a marginal crop like millet, and biological products used as internal inputs for maintaining soil fertility were totally ignored. However it is possible to develop an organic system with extremely low inputs of fertilizer in soil (Alvares et al., 1999; Shiva 1992; Reddy 2010).

D. Exploiting the comparative advantage of Livestock and other natural resources

Pakistan is bequeathed with exceptional and diverse crop/animal husbandry growing conditions containing the very basics of organic farming.

The organic produce has the capacity to increase the farm income threefold depending on quality and adoption of strict discipline standards for quality.

Therefore Pakistan must opt for organic farming having a comparative advantage of suitable ecologies where chemicals have never been used in many areas e.g. spate irrigated areas. It creates employment opportunities and alleviates the rural poverty by capturing the niche market and diversifying rural economy.

The livestock economy is changing very fast in Pakistan. Livestock plays a key role in nutrient cycles and the maintenance of soil fertility. Livestock has an influence on the sustainability of the agriculture and being an integral part. Livestock render production of manure and organic carbon to soil which enhance soil fertility. Agricultural productivity can be improved by better integrated crop and livestock systems, recycling crop residues, and the careful use of other available nutrients (Reddy 2010; Farooqi 2006). Pakistan has a comparative advantage in the livestock sector which is the basis of organic production. There is a large contingent of organic sources available in the country to be used for improving the organic matter content of our soils. Some of them are discussed here under (Ijaz 2001; Azam et. al. 2001; Ahmad and Rashid 2003; Brady and Weil 2002; Khan 2001). Following options are available in Pakistan:

E. Farmyard manure

Farmyard manure is decomposed mixture of the dung and urine of cattle of other livestock with the straw and litter used as bedding and residues from the fodder fed to them. It has been estimated that about 1.5 million tons of nutrients are available from farmyard manure in Pakistan.

About 50 per cent of the dung in Pakistan remains uncollected. Out of collected animals dung about 50 per cent is used as fuel in the form of dried cake, locally called "Pathi". Whatever is collected for manuring is usually heaped on the ground surface with residues from fodder and other house sweepings.

The nitrogen in the manure is subject to volatilization and leaching losses and the material that finally will be spread on the field may have low nitrogen content. The application of well-decomposed manure is more desirable than using fresh materials.

F. Poultry manure

Poultry manure has a higher nutrient content than livestock manure. According to the estimates the poultry manure available in the country can contribute about 101 thousand tons of nitrogen, 58 thousand tons of phosphorous and 26 thousand tons of potash.

G. Crop residues

Crop residues include straw, husk, leave, vegetable and fruit waste, grass cuttings, weeds, sawdust etc. In Pakistan, most of the crop residues such as wheat straw, sugarcane tops/trash, cotton sticks, rice husk etc. are used as fodder for animals and as a fuel. But other waste materials can be converted into useful compost manures by conserving and subjecting them to a controlled process of decomposition.

H. Green manure

Green manuring refers to the practice of growing crops, preferably legumes and ploughing them when they reach maximum production of green tops. Legumes are preferred as they have the ability to fix atmospheric nitrogen. The amount of N fixed varies from crop to crop and may be about 20-40 kg/ha. In Pakistan Dhancha, Guar and Sun hemp are suitable crops for green manuring.

I. Filter cake and silage

According to an estimate Pakistan sugar industry is producing about 1.2 million tons of filter cake every year, which is a rich source of organic matter, micro and macronutrients. Some sugar mills have molasses based distillery plants, which produce silage containing nutrients specially potassium. In case, all these materials are recycled by composting back to soil, it will also be a good source of essential plant nutrients for crop growth.

J. Slaughter house waste

Slaughter house wastes such as dried blood, meat meal, and hoof and horn meal have a high N content and are essentially concentrated organic manures, fairly quick acting, safe to use and effective on all crops. Slaughter houses are wide spread throughout Pakistan and largely their by-products are left outside, according to Ijaz 2001, 8000 tons blood meal could be produced annually for manorial use containing essential nutrients.

K. Other solid and liquid based materials

The other solid and liquid based materials available include sewage and sludge, fishpond effluent, city refuse and some waste of food

processing industries. All these materials cannot be used directly as source of plant nutrients. However, after proper processing and removal of heavy metals and undesirable materials, these can prove good source of plant nutrients.

L. Compost

Composting is the process of decomposing (through the action of micro-organisms in the soil) plant residues in a heap or pit with a view to converting the nutrients contained in the residue in more readily available form. In rural areas crop residues, stubbles, weeds, fallen leaves, remnants of fodder and green manure, etc. can be collected and stored in heap or pit. In this way, as the last pit is filled, the compost in the first pit is ready for application. Municipal/industrial wastes comprising mainly town refuse and human excreta can also be composted. The preparation of urban compost on a large scale is being done in many countries. Some plants are also installed in Pakistan.

M. Biogas Slurry

This is a process by which organic material are biologically decomposed to yield energy in the form of combustible gases. The residual material provides valuable manure. Cattle dung which should be used for improving soil productivity is generally burnt as fuel. Biogas technology reconciles both these objectives: anaerobic decomposition of the cattle dung yield both fuel (biogas) and organic fertilizer (sludge). Biogas, popularly known as "gobar gas", is composed mainly of methane (CH₄), about 60 percent; thus 1000 cubic feet biogas is equivalent to 600 cubic feet of natural gas, 5.2 gallons of gasoline and 4.6 gallons of diesel oil. A small family of four would require 150 cubic feet of biogas per day, for cooking and lighting an amount which can be generated from the family's night soil and the dung of three cows (Ijaz 2001).

N. Certification

Resource poor farmers of spate areas are unable to get the premium prices for their organic produce and farming community remains marginalized. The main hurdle in switching from inorganic to organic produce is the financial constraints of certification.

The conversion period is time between the start of organic management and the certification of crop or animal husbandry. In this period chemical effects are neutralized. However organic management does not have the uniform strategy. Usually conversion period is more or less 24 months for annual crops and 36 months for perennial crops. However the certification

authority has the right to extend or reduce the duration of conversion period depending upon the ecological conditions of the farm. Organic farming tends to induce labor intensive which may increase wage. Moreover there is an additional cost for information gathering and acquiring certification and labeling from certification agency (Kasturi, 2007).

Following types of certification schemes for developing and transition economies prevail:

- Third party certification for individuals which is internationally recognized certification system.
- The second scheme is third party certification in which small-scale farmers may be certified in groups under an Internal Control System (ICS).
- The third scheme corresponds to the participatory certification called the Participatory Guarantee System (PGS), which targets local or national markets and involves the participation of small farmers, small entrepreneurs, traders and consumers in the certification process. The PGS is an initiative largely coming from the developing world wherein the systems of quality assurance are directly managed and controlled by organic producers. Importantly, there is no universal model for the PGS.

A strong organizational support is a pre-requisite for further penetration of organic agriculture in developing countries. The areas which warrant appropriate institutional support include a low-cost, hassle-free certification process and technical assistance for record keeping and an enabling scenario for small farmers, group certification, and internal control system for certification (Kasturi 2007).

As a first step Government of Pakistan must support the small farmers in the certification process which is quite complicated and finance oriented.

In 2011, around 395 organizations worldwide dealing with the organic certification services. Most certification agencies were in Europe (160) followed by Asia (93) and North America (80). The countries with the most certification bodies are with US, Japan, China and Germany. Many of the certification organizations also operate outside of their home country. 40 percent of the certification bodies are approved by the European Union, 32 percent have ISO 65 accreditation, and 28 percent are accredited under the US National Organic Program (GOM 2011).

O. Market Development and Marketing of Organic Produce in Pakistan

Organic production in Pakistan is still not developed sufficiently in volume and diversity as to be able to implement real marketing activities. In order to be competitive, in the future, the organic producers have to plan jointly and organize better access on domestic and international markets. The mechanics of organic marketing is entirely different from the regular marketing due to the unorganized farmers who are incapable to develop the marketing. The domestic market for organics is thus undeveloped in Pakistan. Lack of domestic marketing channels creates more challenges in switching towards organic methods in agriculture. However market access for small producers depends on:

- Understanding the markets
- Organization of the firm or operations
- Communication and transport links
- An appropriate policy environment

In order to capture the value addition in supply chain there is a dire need to provide technical knowhow to farmer for improved productivity in a cost competitive manner. Moreover in order to avoid exclusion from supply chain scale requirement must be formulated to satisfy the needs of new products.

P. Research

Conventional agriculture researches have neglected the importance of organic research in Pakistan it should set up new specific criteria for funding research in organic programs. Because of the differences in methods and relevance in conventional and organic farming, the proposals for research in organic farming did not match the existing criteria of research funds. That led to an immediate action to include organic farming among the priorities of sectoral and national research programs as a field with specific methodological approach.



Figure 17: Supply chain scale requirement

Q. Education and awareness

The main role of education in organic farming is to increase the level of public awareness, knowledge and information of organic issues among experts, farmers, and other stakeholders in the organic chain. Farmers had low level of knowledge about the organic agriculture, and the consumers' insufficient understanding of the benefits from the organic food.

Non-formal education is a very useful tool in offering a solution of problems in organic agriculture, organic processing and technology transfer to all parties involved in the organic sector. Thus, establishment of educational centers and expert groups within non-formal education are complementary alternatives to formal education.

R. Development of Advisory Service

The advisory services are the key element in the organic farming development in the many countries; the organic sub-sector is in the initial stage of its development with great possibilities to be further developed in Pakistan.

The trainings courses on organic farming, processing, marketing and export must be organized for the all stakeholders of the organic agriculture. These trainings must be delivered to the representatives of:

- Faculty for Agricultural Sciences and Food in agriculture universities
- Research Institutes for Agriculture
- Advisors of National Extension Agency
- Independent advisors
- Representatives of association
- NGOs.

There is a need to develop the advisory service for organic production according to the needs of the producers, exporters, and processors for the improvement in organic farming for producer purposes, plans for production and rotations of crops, soil fertility, usage of seed materials, pests and diseases, etc.

S. Organic Farmers' Associations/ federation

Those trading companies, processing companies' farmers and other stake holders who are intended to do organic production can be brought under one umbrella and regulated legally according to their statuses and registered as organic federation. This federation can perform following functions:

- Help farmers officially to get their land and produce certified from some certification agency.
- Guide and coordinate activities of organic farmers association.
- Compilation of a general, common and unified data base of organic producers and products
- Education and training of own advisors
- Advisory services in organic agriculture
- Advisory services on utilization of agricultural land on economic, ecological and sustainable principles.
- Marketing of organic products on domestic and foreign markets.
- Establishment of distribution links and common purchase of allowed inputs.
- International cooperation with similar organizations.
- Educational and training of other clients.

At the moment in Pakistan small companies are working in the production, processing, and marketing of organic food. Yet they are not working as an association legally. Those companies working actively are Dalli earth food, Roshni welfare association for the special people.

T. Inspection and Certification

There are international certification agencies which use to certify the lands free of chemicals and declare as land fit for organic produce. The local inspection and certification organization can also perform these functions and recommend for certification from international organizations.



Figure 18: Strategy for organic farming and organic demand



Figure 19: Organic stakeholders under one umbrella

4.15 STRATEGY AND ACTION PLAN

The actors and stakeholders of the organic sector and sectors related to organic agriculture must be involved in the development of the organic agriculture. Stakeholders include all individuals, groups or organizations with an interest in organic agriculture on the public as well as on the private sector. The stakeholders commented at all phases of the elaboration of the organic agriculture. The effectiveness and success of the organic agriculture depends on a thorough implementation and continuous adjustment on recent developments. Therefore it is necessary to establish an Advisory Coordination Committee comprising of representatives of the public and private stakeholders to accompany the implementation, monitor and evaluate its effectiveness, and recommend and respectively decide on necessary adjustments.

4.16 EXPORT POTENTIAL

Participation in international trade has become one of the most important factors in increasing the prosperity of countries. Many developing countries focus on the disruptive effects of imports rather than on the opportunities presented by increased access to world markets. Existence of market information gaps is often associated with lack of trade facilitation and development in information on the export performance. Therefore potential of many developing countries remains incomplete.

The creation of a market requires the interaction between supply and demand forces. For the supply-side to be interested in selling a product it must be profitable. This requires that

a potential product moves out of the good idea stage and processes are developed to commercialize the product. Organic products are more perishable and have a shorter shelf-life compared to conventional products-therefore transporting organic products far distances is a difficult task. The Implication is that a market for organic products is geographically constrained. In essence trade is localized, unless suppliers create specialized supply chains.

Pakistan has the largest potential among the developing countries for the production of organic agriculture provided proper planning measures are taken. Following actions can be taken at different levels for making organic agriculture a success in Pakistan (Farooqi 2006; Alam, 2000; Gupta, et. al; Haest, 2003; Tamang et. al. 2011; Steenbergen and Mehari 2009):

Institutional

- Government of Pakistan should work on initiating the soil survey to delineate the potential areas of organic farming e.g. most of the spate area is chemical free since long that include DI Khan, Tank, Laki Marwat, Bannu Karak in KPK, DG Khan, Rajanpur in Punjab (West of Indus and Tribal Area of DG Khan), Dadu, Larkana, Jamshoro, Shahdad Kot, Thatta, in Sindh and entire Balochistan i.e. Kacchi, Sibi, Jal Magsi, Kharan, Dera Bugti, Kohlo, Qila Saifullah, Musakhel, Barkhan, Loralai, Las Bela, Mekran, Chaghi, Pishin, Chaman, Quetta, Kalat, Mastung, Khuzdar. Moreover areas under the command area of five mega dams Akhori, Bhasha-Diamer, Kalabagh, Kuramtangi and Munda to be built by 2016 where millions of acres of highly fertile and productive-virgin lands is laying fellow.
- Different programs can be launched to convince the producer to follow guidelines and procedures of organic farming by pursuing multi-faceted crop and animal husbandry along with the strong education campaign about the huge income returns of organic farming.
- As a starting point Government of Pakistan may offer to bear the initial certification and soil/fertility survey costs to the small farmers provided all stakeholders in the area agree to follow and abide by strict rules by the International Organic Certifying Agency.
- For promotion of organic farming government may facilitate by creating a think tank comprising of lawyers, economists, academics, relevant experts such as agriculturists, horticulturists, etc. and key stakeholders such as farmers, exporters, etc. this group may guide on issues like

- a. Legislative instruments to commensurate with WTO rules and regulations;
 - b. Maintenance of quality;
 - c. Minimizing the role of intermediaries to the extent possible.
- The policy and program should emphasize the organic food rather than market and business oriented agricultural system. If focus will be always given to exportable market, then health certification will be always in question and the promotion of organic will be limited. Once the farmers understand organic agriculture is important for the health instead of cash, then they will in favor of this type of farming.
- In order to get Pakistani farmer compete with the farmers of the other developing countries and other international market Government must provide support to the organic farmers groups, cooperatives in order to minimize the cost and mass production. Subsidy will be provided based upon the volume of production in order to motivate the farmers for easy marketing of the products.

Social

- On the production side, there is need to encourage and promote use of organic inputs like bio-fertilizers, bio-pesticides and organic manure and even farm practices like Integrate pest management and biological control. The predominant dependence of farmers on dealers for advice on pest control took them further away from these inputs and practices. Similarly, very few farmers used bio-fertilizers due to lack of awareness and poor quality of product.
- Organic certification is important for the exportable organic product but, small farmers couldn't afford the additional cost, time consuming certification process. There is need of packaged program so that a farmer could be self-equipped and prepared for the process of certification.

Promotional

- Targeting institutional market i.e. hotels, hospitals, airlines and railways, to begin with, is an important strategy for promotion of market for the organic produce in the domestic market. NGOs can also be roped in for market creation as they have credibility for such products. Further, home delivery can prove effective tool in high end segment of the market. Tying up of the organic products with other environmental friendly products can also help.

- The promoting of simple processing and modification of underexploited and underutilized crops and other local fruit and vegetables; traditional food items increasing their food values will certainly help in the food security.
- Due to the lack of awareness, consumers are not convinced for the premium price of the organic product. Therefore farmers need to compete in the international market. Arrangement of the subsidy in price and insurance of the production will be a biggest incentive for the farmers and help in its sustainability. There should be separate and interrelated networking of training, research and technology development, verification and extension of organic agriculture for its development.
- There is need to document the innovations from the local level to national level. Research and studies can generate certain findings and evidence based knowledge which can be shared with the likeminded working agencies and directly to the farmers. The publications and media can play important role in bringing its agenda into village and then household's levels.
- There are limited awareness and activities on organic farming at different institutions. As the consequences, extension services may face problems of trained professionals on organic agriculture. Thus, incorporation of courses related to organic production is necessary in the agricultural programs in universities and training institutions for developing professionals in this field.
- Scientific validation of traditional farming practices that could increase land productivity and resource sustainability, identify location specific technology for various locations/ regions, selection of suitable crops for organic farming and include it as one of the major components of farming system.

Trade

- There is need to establish incentives/penalties system for better/poor quality of organic produce meant for, export in particular, and domestic market in general.
- Better vertical co-ordination mechanisms like contract farming, cooperative-corporate alignment is the need of the hour to achieve competitiveness even in organic produce markets.
- NGOs and farmers' organizations can play an important role. In the times of competitive international trade, the processing and marketing links in the supply chain, especially

super markets, can play an important role as they will increasingly convey and fashion the changes needed in the supply chains due to their own selfish interest in organics in terms of ethical trade image, differentiation from competitors, new market segments, and attracting consumer loyalty. The super markets have the purchasing power, drive, dynamism, adequate logistics, omnipresence, efficiency, quality management, and communication power though they also have their own agenda and practices like ethical trade inertia, dumping, and technical barriers which may not be in tune with that of the organic producers and other players.

- The processing/marketing firms should go the organic way proactively. This will be similar to agricultural input firms moving from chemical to organic inputs instead of perceiving organic as a threat. The agribusiness firms should look at organic farming and trade as an opportunity which is in accordance with the larger developmental goal of sustainability. This is one more historic opportunity for the industry to contribute to human progress substantially as they are best placed to tailor the chain organically. They should implement and promote good Farm/Agricultural Practices.

General

- Still in hills and mountains regions of Pakistan, the agriculture practice is traditional. Little effort will modify the current farming practices into organic. This will certainly achieve the goals and objective of the organic agriculture. Making every place and area organic is rather impossible and therefore focus should be given to specific crops and specific location especially in spate and mountainous areas.
- Legumes inter cropping with cereals are best option and had never tried in the spate region. Cultivation of mung and mash with sorghum/millet or lentils with wheat and barley might have better opportunities to increase farm income and production through natural process of nitrogen fixation. Also Introduction of new crops vegetables, cucurbits, pulses, oilseeds is spread to the area.
- In most spate areas there is a large variety of wild vegetables, fodder plants and mushrooms (including truffles). Seeds of these are collected from a large catchment and dumped during the floods into the favorable moisture conditions of the spate systems. Making more of wild crops can strengthen the livelihood opportunities for the spate farmers.
- Enhancing the productivity of livestock would include improved access to animal feed,

watering points and veterinary services, as well as the processing and marketing of livestock products with value additions and innovations.

5. TRUFFLES - VALUE CHAIN PROMOTION AND MARKET DEVELOPMENT IN SPATE AREAS OF PAKISTAN

Truffles have been discovered in the spate areas of D I Khan and D G Khan in the recent past. It is a delicacy and highly valued culinary product in the international market but there is negligible local consumption and market is not developed. There is a need to develop the market for the Pakistani truffles as it has well developed market in the foreign countries. This section covers the promotion of value chain of truffles and strategy to develop the market for the niche products.

5.1 VALUE CHAIN OF TRUFFLES AND ITS DEVELOPMENT IN PAKISTAN

Value Chain is process from conception to final value added product. A value chain is a system where a sequence of related activities (functions) from the provision of specific inputs for a particular product to primary production, transformation and marketing, up to the final sale of the particular product to the consumer takes place. The set of enterprises (operators) that perform these functions, i.e. the producers, processors, traders and distributors of a certain product are the value chain actors. Enterprises are linked by a series of business transactions in which the product is passed on from primary producers to end consumers. Value chain actors share an interest in the end product because changes in the end market affect them both collectively and simultaneously. The value chain community and its internal rules thus constitute a natural area of development action. This section covers the promotion of truffles value chain in Pakistan.

5.1.1 VALUE CHAIN PROMOTION CONCEPT

Value chain (VC) promotion harnesses market forces to achieve development goals. It is oriented towards business opportunities, and consciously builds on the existing or emerging economic potential of the poor. Therefore, value chain promotion is essentially a development approach and clearly needs to be distinguished from supply chain management. While value chain promotion takes a public perspective, supply chain management aims at optimizing the logistics of input sourcing and marketing – from the

perspective of a particular business. The latter is a private management instrument and much more limited in scope.

5.1.2 COMBINING VALUE CHAIN PROMOTION WITH NATURAL RESOURCE PROTECTION

Developing value chains for the natural products like truffles is not as straight forward as typical value chains happens to be. Rather it is bit complex to develop and promote the value chain of truffles which are naturally found in the Spate irrigated areas of Pakistan. It does not follow the uniform methodology. However following the approach of natural resource management (NRM) based on the principle of “protecting natural resources by using them economically” can bring the value chain actors under one umbrella. It promotes the idea to protect ecosystems and biodiversity by opening up a market for their natural products.

Biological resources in Spate Areas of Pakistan can be used by fostering the sustainable, economic use of truffles e.g. by harvesting, trade to the potential export markets, processing for value addition etc. The market development for truffles in Spate irrigated areas of Pakistan will raise the consciousness among the local people about their value, provides incentives for their preservation and generates income for the people living in marginal spate areas. These areas have the potential to serve as a source of fresh truffles. However the yields are variable.

Truffles are the rare natural products worldwide survey conducted during this study shows that the Spate community is not aware about the international price and value of the truffles at one hand. On the other hand irony of fate is that they re-cultivate the truffles into their fields and they get destroyed. Promotion of value chain of truffles will not only strengthen the marginal community of spate areas but also strengthen the pro poor aspect of Value chain promotion.

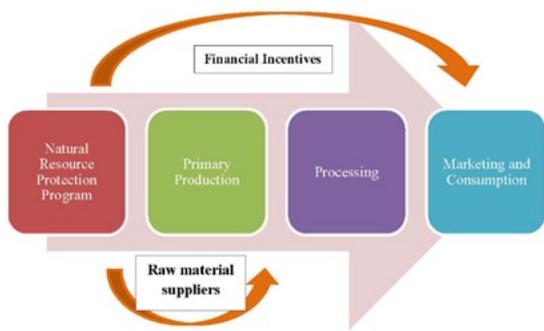


Figure 20: Supply Chain

Moreover it will also be a source of livelihood for the rural population. In order to halt the destruction of the truffles caused due to the unawareness of the local community it has to be given the economic value so that community become aware of its delicacy and price.

The approach will be to protect and propagate the truffles through linking the producer of truffles with the potential markets by assigning financial incentives after necessary processing. This can be initiated by launching natural resource protection programs in Spate areas of Pakistan. Where this program can serve as a mediator to link the potential players in truffle export market and primary natural producers under one umbrella. However suppliers cum producers can serves as a source for raw truffles.

Combination of Protection and propagation of truffles through natural resource management program (NRM) and value chain promotion involves a number of critical considerations. The most important is the difference in perspectives: NRM programs will be supply-driven, while chain development starts from the market demand. Although unlike other biological products truffles have an established market system in the different countries.

For making truffles a commercial venture there is a chance of success if the program is linked with multiple programs in other countries where truffles markets exist in the same time period.

A related critical point is volumes and turnover. The truffles constitute, almost by default, niche product. This means that more effort needs to be invested in market development and it has to be extensive. Therefore, value chain promotion has to take on entire categories of products and be extremely innovation-oriented. Although the spate locations appear marginal, it has potential to offer some typical local specialty or be attractive. The constraint can be converted into an opportunity.

5.1.3 MAPPING OF TRUFFLES VALUE CHAIN AND STAKEHOLDERS IDENTIFICATION

The current study results show that neither there is any trade of truffles in Spate areas of Pakistan nor there are any value addition taking place so as a first step the adapted value chain will serve as a model to establish a real value chain in Pakistan. Following value chain has been picked from the Institute for Agricultural Research (INRA) France and modified according to the situation of Pakistan (INRA 2013):

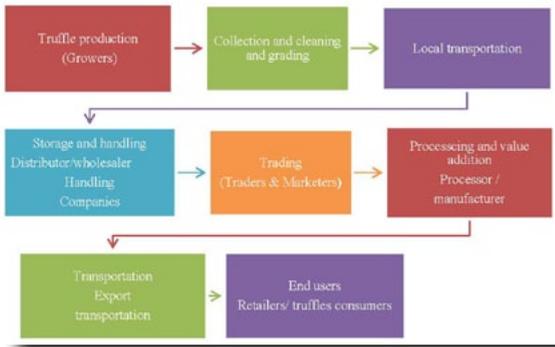


Figure 21: Truffles Chain

There could be four possible value chains for truffles depending upon the connectivity of the actors of value chain assuming that producer himself clean the truffle produce:

- Producer → Transporter → Wholesaler
Traders → Processor → Exporter
→ Consumer
- Producer → Wholesaler → Trader
→ Processor → Exporter →
Consumer
- Producer → Processor → Exporter
→ Consumer
- Producer → Consumer

The above chain shows that how different actors of value chain would like to connect through each other to reach the end consumer. The first one is the most complex value chain where numbers of actors are involved from producer to end consumer. However the chain in last is the simplest form currently followed in the spate areas as producer him/herself is consumer and consumption is done locally.

Truffles have proven to be grown by using artificial methods by inoculating the seedlings throughout the world. In Pakistan although they grow naturally in spate areas but their volumes are uncertain for establishing and promotion of value chain. The climatic conditions seem to be favorable for truffles growth. There is a definite potential for artificial propagation of truffles for certain volumes to establish a value chains so that market demand can be met. For this to start there is a dire need to first educate all the stakeholders of value chain at all the level. The academic startup will build the capacity of key player.

Therefore it is mandatory to educate and to build the capacity of every stakeholder according to their role in the chain. For the establishment phase starting from the nursery the truffles growers must be provided a backup support with inoculated plants of truffles with good specie having high market value.

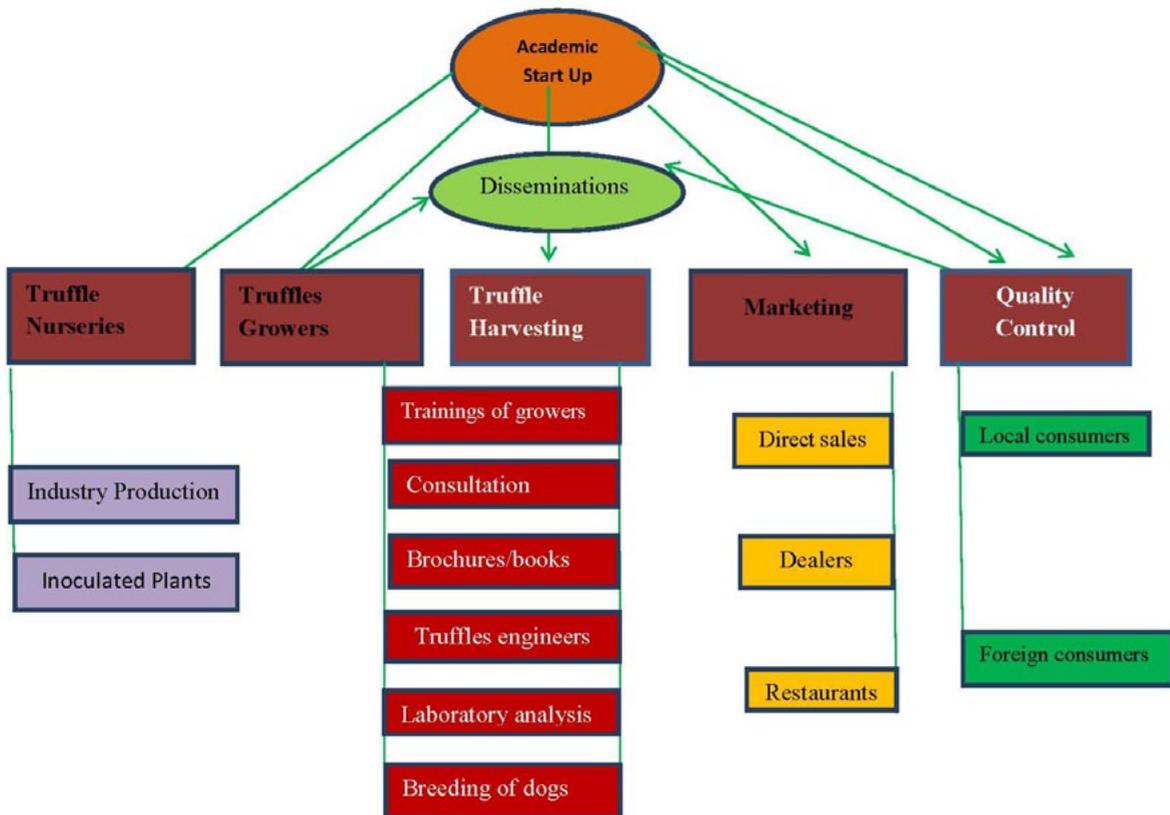


Figure 22: Truffles value chain in Pakistan

The nurseries for truffles could generate the inputs for the industry production by supplying inoculated plants to the truffle growers.

Growers and harvesters will be the major stakeholders and there is a need to lay emphasis on their capacity building by giving education, training programs, consultations and laboratory analysis facilities. This may take years but once the produce is ready it needs to be marketed efficiently much before its shelf life expires. There could be direct and indirect sales depending upon the type of the clientele ship. However the target audience would be restaurants, airlines, hotels, and foreign customers. Therefore marketing should be very effective in order to be competitive in the international market.

5.2 CONTEMPORARY STATUS QUO OF TRUFFLES IN SPATE AREAS

In order to analyze the current state of the truffles in the Spate areas, to record the perception of the local community and to document the market channels if any survey was conducted in Spate areas. Data was obtained from D.I. Khan and D. G. Khan and based on the data analysis following results were compiled which are reported as under:

5.2.1 AWARENESS IN THE LOCAL COMMUNITY OF SPATE AREAS REGARDING TRUFFLES

The awareness regarding truffle being the underground high value mushroom is not prevalent in the target community of Spate areas. In D.I. Khan the spate farmers do have awareness about truffles as an underground mushroom. However the awareness is very limited. However in D.G. Khan Level of awareness was much better than D.I. Khan. Farmers are aware that it is an underground mushroom.

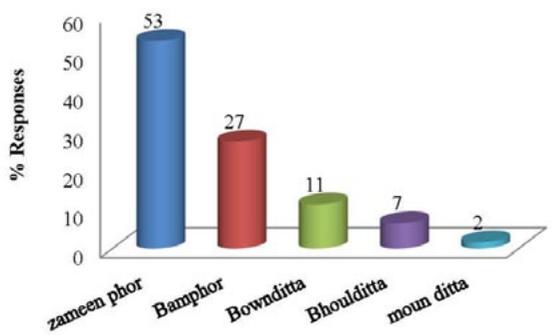


Figure 23: Vernacular names of truffles

When the respondents were investigated about their vigilance of truffles being a high priced culinary product in the international markets none of them were found to be aware.

The response was same in D.I. Khan and D.G. Khan. Moreover farmers were investigated that whether any campaign or awareness program has been launched in the past about truffles all respondents reported that no such campaign was launched to make farmers aware about the value of the truffles in the past.

During focus group discussions it was found out that generally in the Rod Kohi area of D.I. Khan and even in Dera city high ups and educated people do not know about the truffles. Some NGOs working in the spate areas were also asked about truffles that whether they are aware about the truffles or not but the reported response indicated complete unawareness.

5.2.2 VERNACULAR NAMES OF TRUFFLES

Respondents were not aware about the name of the truffles. There are different names used for truffles in different places in Spate areas. Out of total sample 53.2 % reported to use “Zameen phor” in the local language while 27.4 % respondents call it “Bamphor”. While “Bownditta”, “Bhoulditta” and “moun ditta” are the other vernacular names used by the local people.

5.2.3 COLOR OF TRUFFLE SPECIES

The following cross tabulation results shows that in D.I. Khan the brown specie is found which is reported by 54 % of the respondents in total. Whereas in D.G. Khan white specie is more prevalent and reported by 46 % of the respondents in total. The shape is irregular and they are like potato or like ginger. There is a need to make a scientific research about which specie spate truffles belong to.

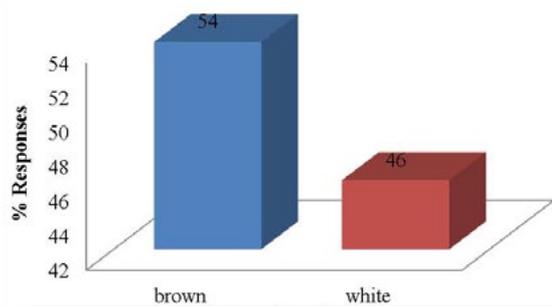


Figure 24: Colors of truffle species

Color * District Cross Tabulation

			District		
			DI Khan	DG Khan	Total
Color	Brown	Count	32	2	34
		% within District	100	6.7	54.8
	White	Count	0	28	28
		% within District	0	93.3	45.2
Total		Count	32	30	62
		% within District	100	100	100

Table 20: Cross Tabulation of Truffle colors and Districts

5.2.4 AVERAGE WEIGHT/SIZE RANGE OF THE TRUFFLES

The reported size of the truffles found in D I Khan and D.G. Khan ranges from 5- 25 grams. Around 60 % of the respondents reported to extract truffles around 10-20 grams. Whereas 39% reported the weight more than 20 grams from their fields.

The size of truffles is quite sizeable for export. The international standards stated for truffles by United Nations 2004, tag 20 gram weight of truffles for Extra Class provided free from defects with the exception of slight superficial defects provided do not affect the general appearance. The total volume of the truffles was also reported as 10-15 kg in one season.

5.2.5 SHELF LIFE OF TRUFFLES

The truffles found in D I Khan and D G Khan can be preserved for more than four weeks. It needs to be preserved in dry form. The moisture or water reduces the shelf life and it destroys in short period. The taste and color don't change in case it is kept away from water for 3-4 weeks. Around 85 % respondents reported the shelf life to be around 3-4 weeks however 14 % reported the shelf life 2-3 week. Shelf life may depend upon the moisture in the air and other environmental factors.

One old man reported in village Kanwa that when truffles are kept at dry place in room temperature for 15-20 days the upper layer disappear and yellow powder is produced in a small quantity which may be reserved in dry place at room temperature. In sowing season of Sorghum and millet this can be scaled in field which may give yield in September –November.

5.2.6 CONSUMPTION PATTERN OF TRUFFLES

31 % of the respondents reported that they do not hunt the truffles. While 29 % of the respondents reported to consume it as a food. Cooking of truffles is not liked by many of the respondents. The muddy truffles cannot be completely cleaned from mud even after washing. However it is boiled and used as salad with some condiments and spices. Some give gifts to their friends (23%). 17 % through away and do not use it for any purpose.

5.2.7 EMPLOYED HUNTING METHODS

The truffles are found underground in the field of millet and sorghum. Usually the soil shows the cracks and it is hunted. The bigger the truffle underground bigger is the crack, smaller truffles able to make a smaller crack on the ground. Majority of the respondents i.e. 48 % reported that they do not hunt truffles and plough it back in the soil and they get destroyed. 37% respondents

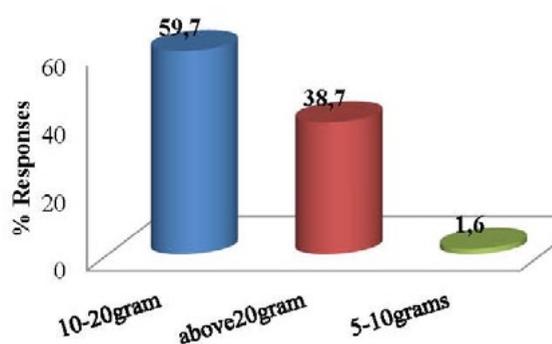


Figure 25: Size range of truffles

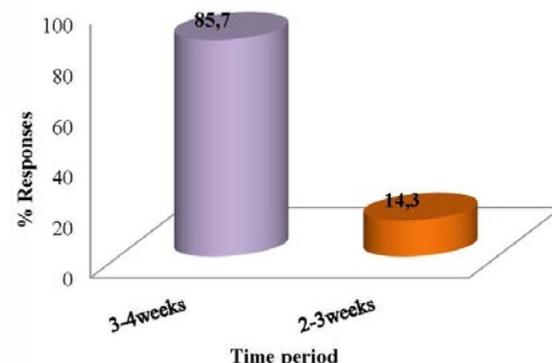


Figure 26: Shelf life of Truffles

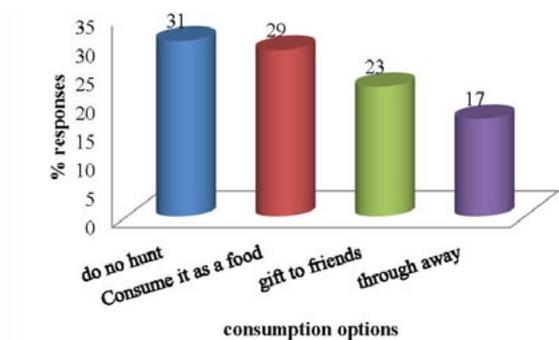


Figure 27: Consumption pattern of Truffles

hunt through cracks visible on ground with their hands. However few respondents around 14 % reported that they use iron rods to extract the truffles from the soil. Searching of truffles is also very laborious.

5.2.8 HOST PLANTS OF TRUFFLES

The reported host plants are Sorghum, millet and maize. Sorghum and millet are also cultivated together in these areas. However a large majority reported the presence of truffles in the fields of sorghum i.e. around 67%. Around 22 % respondents its presence in millet and 11.5 reported it is also found in the maize crop. The truffles show cracks when the crops are near to maturation

5.2.9 SEASONS OF TRUFFLES IN SPATE AREAS OF PAKISTAN

The availability of truffles usually depends upon the rainfall. If the rainfall occur in July truffles bulges out by making cracks in the soil in September to October. However if rainfall occurs in August then they become available in October to November.

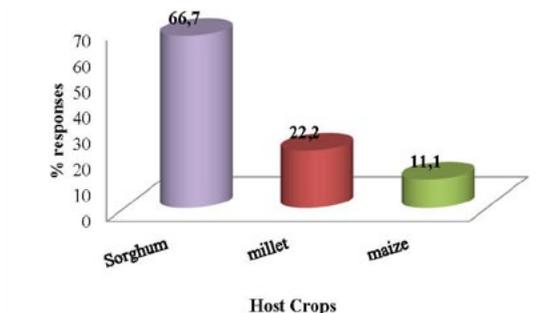


Figure 29: Host plants of truffles

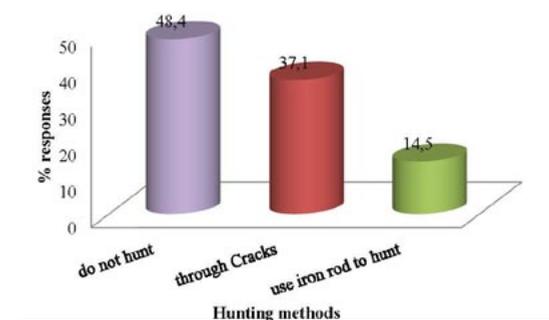


Figure 28: Hunting methods of truffles

50 % respondents reported the availability of truffles in July to August while 42.5 reported from July to September and some instances reported from July – October.

5.2.10 AVERAGE QUANTITY FOUND IN THE AREA

The mean quantity reported by the reported from the 28 respondents was around 1390 grams. The minimum quantity was 400 grams and maximum quantity was 15 kg.

5.2.11 TRADE AND MARKET

There is no formal trade of truffles in the local area. However some instances were reported where in local markets truffles are sold @ Rs. 400/kg like other vegetable during the month of September – November. The harvesters usually sale on the road sides after harvesting it. However the traces for any market channel could not be revealed. The market for truffles is not developed as it is not recognized as a commodity neither marketing channels are developed.

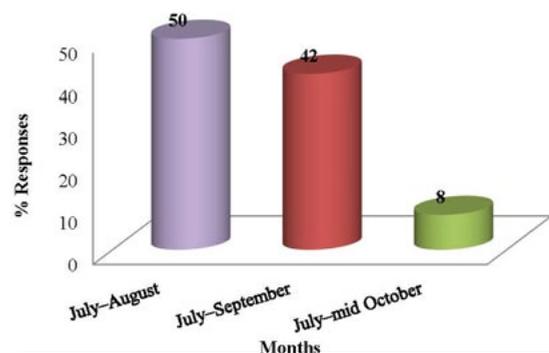


Figure 30: Seasons of truffles occurrence

5.3 MARKET ANALYSIS OF TRUFFLES

5.3.1 WHY TRUFFLES ARE IMPORTANT FOR PAKISTAN

The mountainous regions of Pakistan are endowed with the natural products which are organic in nature. There are many wild herbs, vegetables and shrubs in spate-irrigated areas that have useful local economic values. Spate irrigation by nature collects seeds from a large catchment and deposits them in the moist soil of the command area. In the spate-irrigated areas along the Kohi-Suleiman in Pakistan, drub grass is common (*Desmostychia bipinnata*), serving as an important source of fodder as well as land stabilizer. The short-lived blue moola flower is important for livestock as well, feed to sheep and cattle to improve the quality and fragrance of their milk. The wild tinda and chungu vegetables are important supplements to human diets. Another common sight is the small ak plant (*Calotropis procera*), which has a range of medicinal purposes, including anti-inflammatory treatment.

Another interesting plant is the lana shrub (*Salsola bariosma*), which is slowly burned and its ashes used as a detergent. Some of these wild species could have larger market opportunities. The most spectacular crop in this regard is the underground truffle mushroom, which is found in some spate irrigated areas in Pakistan that could fetch very high export prices (FAO 2009).

Some of the natural products have developed the commercial value while some remain unattended for some reasons. For instance truffles are highly priced in the global market yet there is a need for progress for the commercialization of this natural product. Morels which are also a high value and promising species of natural mushrooms and unlike truffles it is having a commercial market value in Pakistan and it has wider prospects within the country. The dried morels are being sold by rural farmers in mountainous regions of Pakistan at a high price to the enterprises dealing with export.

Truffles are spectacular mushroom species and are of much importance and have not been exploited for various reasons. It is a global delicacy remains unexposed due to lack of awareness, policy support, and appropriate R & D system (Majeed and Ahmad 2011). Price of truffle mushrooms varies from region to region and species to species, thus there is wide range of prices for different species. Temporal variation in the availability of truffles also affects the price in the market.

Truffles in the natural system are commonly having a seasonality character. High price of truffles is due to unpredictable growth habits. Retail prices typically range from hundreds to thousands of dollars per Kg. The common range of truffle price is between \$ 5000 to 6000 per kg. The huge variation in truffle prices in different countries and for different species is difficult to justify (NCAT 2004; Trappe et. al. 2008). Truffles of various kinds are found throughout Europe, Asia, America, Australia and Africa.

5.3.2 INTERNATIONAL QUALITY STANDARDS FOR TRUFFLES

The quality standards declared by the United Nation 2004 define the quality requirements of truffles at the export control stage, after preparation and packaging.

Classification

They must be intact, firm and sound, clean, and free from damage. Truffles are classified in three classes defined below:

(i) "Extra" Class

Superior quality truffles must be free from defects with the exception of slight superficial defects provided do not affect the general appearance, the quality, less regular and lobed along with presentation. The minimum weight is 20 g for Extra Class.

(ii) Class I

Good quality with slight defects, however, provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package they are slight defect in shape, development, coloring, superficial bruising. Minimum weight is 10 g for Class I.

(iii) Class II

Truffles which do not qualify for inclusion in the other classes but satisfy the minimum requirements in superior class and class I fall in this class. The defects in shape, development, coloring, bruising and damages caused by pests may be allowed provided the truffles retain their essential characteristics as regards the quality, the keeping quality and presentation. Minimum weight is 5 g for Class II.

The contents of each package be uniform and contain only truffles of the same origin, quality, maturity, development, coloration, species and commercial type. The truffles must be packed in such a way as to protect the produce properly.

The materials used inside the package must be new, clean and of a quality such as to avoid causing any external or internal damage to the produce. The fresh truffles have to be presented in canvas or string bags or other containers which do not affect their quality. Proper identification including packer name and address, information related to produce like commercial type and specie's Latin name, Origin of produce country of origin and, district where grown or local place name.

5.3.3 CURRENT SCENARIO OF TRUFFLES IN PAKISTAN

The awareness about truffles in Pakistan is limited to the few individuals so the commercialization is having distant prospects locally. Even the farmers having in their fields are not aware about the precious delicacy. The commercialization or creating demand locally seems to be a slow process in Pakistan. However, it has very bright prospects for the export to the international market. This study aims at pointing towards the potential market for the truffles and utilization of the unharnessed potential of truffles in Pakistan. Moreover, it also underpins the market where truffles are produced in tradable quantities throughout the world.

Truffles are hypogenous (underground) version of mushrooms. They don't form a prominent stem and their spore-bearing surfaces are enclosed. They rely on animals eating them (mycophagy) to distribute their spores, instead of air currents like mushrooms. Truffles resemble small potatoes, and often between the size of a marble and a golf ball. (Oregon Garden Rediscovery Forest and Oregon Forest Resources Institute 2005). In the spate area of Pakistan instead of animals, spores are brought by the hill torrents to different fields after flood and spores are distributed. They are found to make symbiotic relation with different crops like sorghum and millet fields (Majeed and Ahmad 2011).

According to Majeed and Ahmad 2011, In D. I. Khan district of KPK truffles are found in areas of Saggu, Kohawar, Shero-Kohna and Gundi Umar khan. Presence of truffles is also reported from Spate irrigation areas of D. G. Khan, Thana Bula Khan, Barkhan, Noshki, Narran, Kaghan and Murree hills.

There might be more areas, which are not yet identified, as a comprehensive survey is required. And ecologies where they are found are mostly rain fed, Spate irrigated areas, arid and wet

Import of Truffles in Pakistan		
Year	Quantity (Kg)	Value (Rs)
1997-98	600	50,000
1998-99	500	65,000

Table 21: Import of Truffles in Pakistan. (Source: Fruit, Vegetables and condiments Statistics of Pakistan 2001-2002, Ministry of food Agriculture and Livestock (economic Wing).

mountains of Pakistan and are found mostly in sandy-loam soils. In D.I. Khan Truffles are found in September-October, or during the growing season of sorghum and millets.

The truffle species in Pakistan are not yet identified yet white color resembles the white Italian truffle in general appearance. Unlike other countries harvesting is done differently i.e. the soil bulges out showing their presence and then farmers pull them out. As per local knowledge they appear mostly in the morning following the night having maximum suffocation (humidity with no wind). While moving out early in the morning these can be collected from the fields.

According to GOP 2003, truffles were imported in Pakistan way back in 90s. During the year 1997-98 a quantity of 600 kgs were imported for 50,000 Rs. In the subsequent year 500 kg were imported for the value of 65,000 Rs. However the sources of imports and its uses are not known. This data show that truffles have recognition in the past in Pakistan. However after that there is no indication of the truffles import or export in the statistics.

It is generally acknowledged that areas predisposed to warm summers, cool winters and with high average annual rainfall are best suited to truffle production. Soil structure, drainage and water holding capacity are also important factors. Soils suitable for truffle production must have a relatively high pH (in the range of 7.5-8.1). It is usually necessary to raise the pH of soils in most areas so as to achieve conditions suitable for truffle growth. Truffle availability in the Spate irrigated areas of Pakistan shows that the conditions are best suited for truffles and their growth.

5.3.4 GLOBAL DEMAND

The concept of "demand for truffles" is elusive due to complexity of their varietal character. Although estimating future demand is highly uncertain, the greatest uncertainty in calculations is the number of people able and willing to pay

for truffles. Demand and production is not the same thing, but in an economy where truffles compete globally, these factors may converge. (Piliz et al. 2009).

Fresh truffles attract the highest demand and prices. Preserved truffles are used mainly during out of season periods when fresh truffles are not available. The French are the world's largest consumers of truffles, followed by the United Kingdom, Belgium, Germany and Switzerland. Japan is the largest consumer of these truffles outside of the European Union (Garvey and Cooper 2001).

A review of the world truffle industry conducted by the Australian Bureau of Agriculture and Economic Research (2008) shows that Italy, France, Spain and China are the major exporting countries, while France, Japan, United States, Germany and Switzerland are the major importing countries. France, Italy and Spain are well-known for their production of high quality truffles, while China is a large producer, the Chinese truffles are considered to be of inferior quality to those from Europe.

5.3.5 GLOBAL SUPPLY

Published information about potential demand and incipient supply assert that supply will not meet demand in any part of the world for at least two or three more decades, and probably longer. There are about 50,000 acres of planted truffières in France. Nevertheless, 80-90% of France's truffles are currently produced in managed truffières, and such orchards are established throughout the world. Spain and Italy have extensive plantations and harvest significant crops from their native oak woodlands. Italy and other countries around the Adriatic Sea produce the highly-prized white truffle, but have had virtually no success with its cultivation. Truffières are being established in Mediterranean countries such as Turkey and Israel, as well as South Africa, Chile, and China. A couple thousand acres have been planted in New Zealand and Australia, where some operations are quite large and sophisticated.

Overall, several hundred truffières have been planted outside of Europe, but most are new and either have not yet started production or have not reached their full potential. Production in the rest of the world is underway and growing, but remains insignificant to date.

Until the last half-century, European truffles were only harvested in natural woodlands or in oak and hazelnut groves planted by farmers to

encourage naturally-occurring truffle production. Trees were not pre-inoculated in nurseries to enhance yields, and annual crop size varied with the weather. Now changing patterns of land use and two world wars reduced the harvest to only a hundred tons annually by the 1970s.

Truffles remain at peak freshness for only a few days. International shipping requires careful harvesting and rapid processing, packaging, and shipping arrangements to retain optimal quality. International trade also can be fraught with problems (Piliz et al. 2009).

5.3.6 GENERATING DEMAND FOR PAKISTANI TRUFFLES

In Pakistan as the market for the truffles is not yet developed locally. The potential is high in the international market. There is a need to create linkages with the commercial traders in the foreign countries where the markets are already developed. There is a need for wide range of steps to be taken to develop a local as well as international market for the Pakistani truffles as it is a niche wild crop in the country.

However market development is a slow process and creating awareness among farmers, traders and other stake holders of truffle value chain about the high value of truffles will take time. However for the market development following steps can be taken:

5.3.6.1 Generating / getting started

Those landowners/farmers who found truffles in their lands need to be trained either to harvest the truffles themselves or few individuals be trained and linked with the farmers for proper harvesting. Moreover accurate GPS coordinates be taken.

- Collection
Though collection of truffles around the world is a complex phenomenon and it needs dogs and pigs for the hunting of truffles. However the natural process also makes some indication some times for the presence of truffles. In the areas of D I Khan the suffocation helps the truffles to make the cracks in the land and farmers of the area hunt them easily.
- Processing
After harvesting, truffles must be thoroughly cleaned. The cleaning process enhances produce safety and quality, and includes cutting off any rotten spots or holes created by insects, brushing off the dirt, lightly rinsing and blotting dry. This simple process may also extend the shelf life. Truffles should then be refrigerated as soon as possible in a plastic or

glass container. Covering the truffles in a dry paper towel will help blot any excess moisture that accumulates.

- **Packaging and Storage**
Ecologically responsible packaging such as biodegradable cellulose, cardboard cartons and glass jars provide visibility while addressing environmental concerns.
- **Shipping**
It is essential to ensure that truffles are kept in a cool, climate controlled environment. Truffles should be packaged in a way that assumes delays in delivery, such as cancelled flights.

5.3.6.2 Testing the concepts

For the new product development thumb rule is to know where the marketing messages will work best it is often the biggest part of testing the concept. Does the consumer need, or want the Pakistani truffle?

5.3.6.3 Target market analytics

Current marketing trends for truffles are analyzed in depth. In the international market usually restaurants and resorts are the potential customers of truffles. However the tastes of the customers of restaurants have not developed about this niche crop. In Pakistan locally demand can be created for following groups

- In foreign embassies;
- Those grocery stores who meet the needs of foreign countries;
- International sales by creating linkages with foreign traders;
- Restaurants.

5.3.6.4 Beta / marketability tests

Arranging private tests groups, launching beta versions, and then forming test panels after the truffles have been tested will be improved further. The beta version of truffles can be sent to all the target customers.

5.3.6.5 Technicalities + product development

Improvements can be made by doing alterations to post-beta truffles marketing; the marketing of new product.

5.3.6.6 Commercialization

In this stage targeted consumers are focused along with their needs and wants. Therefore in Pakistan local customers will be focused but for the local customers there will be need to create/ generate demand along with commercialization. However the main commercialization process has to take place in the foreign markets. Monitoring will be a continuous process for the launching the commercial market of truffles according to the

needs and wants of the customers. Marketing is an integral part of the commercialization of any product. Refreshing advertisements during this stage will keep Pakistani truffle name firmly supplanted into the minds of those in the contemplation stages of purchase.

5.3.6.7 Post launch and perfect pricing

The efficiency of the process will be observed and continuous improvements can be made. Initially introductory prices will be introduced and after the customers are gotten in the new competitive prices will be determined. After the product is aged delivery process will be improved. Productivity during product development can be achieved if, and only if, goals are clearly defined along the way and each process has contingencies clearly outlined on paper.

5.3.6.8 Certifications

There are several certifying agencies in different countries. These certifications can be useful for ensuring that transactions with large or distant buyers go smoothly.

5.3.6.9 Promotion

Pakistani truffles are not well known and the identification of available specie has not yet taken place. The samples can be sent to the foreign dealers for the identification of specie. For the truffle market to grow beyond the small niche group of individuals who are aware, promotion will be essential. Building interest and credibility through a familiar media source is an excellent way to facilitate market growth. Individual could get the information about Pakistani truffles.

Customers also appreciate educational materials when they consider new products, especially when they are not familiar with the product's proper use. A pamphlet or brochure should be created to tell customers about this niche product, its uses and benefits, and even where and how it is harvested. This brochure could serve multiple target markets and could easily be created with commonly available computer software templates. Materials that make customers feel like they are closer to their food source and harvester perhaps will have great impact. Because customers are one group of target market end-users, promotional materials should emphasize terms like local and sustainable, in addition to the characteristics of the product itself such as aroma and mystique.



Figure 31: Life Cycle of Product.

5.3.6.10 Pricing

Specific prices are provided without guarantee of accuracy to assist the business plan developer in identifying all relevant and possible costs and revenues associated with non-timber forest product enterprise. Individuals should conduct their own pricing research, particularly for the purpose of forecasting. Every species is distinct and have different prices.

5.3.6.11 Industry support

As markets for truffles are well developed in many regions of the world and there are communities supporting the trade between interested buyer and sellers. Online communities also facilitate connections between buyers, sellers and service providers. Few industry directory (www.orforestdirectory.com), maintained by one organization, is a free, on-line business-to-business directory for small owners and businesses for a wide variety of forest products, including wild mushrooms and truffles. Food Hub (www.foodhub.org) is another fee-based on-line directory that connects professional food buyers and sellers in the Northwest.

5.4 SWOT ANALYSIS

5.4.1 STRENGTHS FOR PAKISTANI TRUFFLES MARKET DEVELOPMENT

- It grows wild in the spate areas;
- High prices in the international market and high economic value;
- Easy harvesting as it bulges out of land and shows the cracks due to which easy to harvest;
- Favorable environmental and climatic conditions;
- Proven production in many areas.

5.4.2 WEAKNESSES FOR PAKISTANI TRUFFLES MARKET

As the market for the truffles has not yet even started for the first phase of development.

Following are the weaknesses for the truffle market development:

- No awareness to farmer owing this delicacy;
- Production of truffles is not understood and so is the harvesting practices;
- Require high level of research to maintain a quality according to international standards.
- Perishability negatively impacts feasible shipping distances.
- Production highly reliant on environmental conditions.
- Identification of specie
- Certification of truffles
- No training currently available
- No resources yet developed
- Lack of expertise/experience

5.4.3 OPPORTUNITIES IN THE MARKET PLACE

- Improve the livelihood of the spate farmers who are resource poor.
- A low price will make the Pakistani truffles more competitive in the international market.
- The global truffle industry is well established.
- Only a tiny fraction of available wild truffles are harvested in the world so supply is not expected to meet demand for many decades.

5.4.4 THREATS IN THE MARKETPLACE

- High competition in the international market
- Perishability of the truffles may be a barrier for the distant distribution.
- Poor quality product may damage the reputation of Pakistani truffles.
- Lack of training/expertise available
- Lack of technology available

5.5 KEY SUCCESS FACTORS

- Sales to the foreign equivalent of any of the above target markets can be great additional sources of sales for your business, but there will be some extra hurdles to navigate. In addition to the language, cultural differences, currency exchange and time differences, each international market operates under its own import and produce regulations.
- Open farmers markets provide a forum for directly educating consumers in assessing truffle ripeness and how to use a truffle without losing its flavor.
- Having a buyer or multiple buyers ready to take your harvest quickly.
- Keeping good records. Having sales receipts that document business income, and the expenses incurred to earn that income, will make tax time much easier.
- Understanding the customer. What is done to the product affects who will want to buy it and why.
- Understanding applicable laws. Laws govern all areas of business including health and safety of employees, harvesting and transport of special forest goods, food safety and income.
- Knowing the business's revenue needs and planning to meet them.
- Knowing the time and resources required for the value chain and being prepared with these prior to the first harvest.

5.6 STRATEGY AND ACTION PLAN FOR GENERATING DEMAND FOR LOCAL CONSUMPTION AND EXPORT OF TRUFFLES

Based on the above review and analysis following strategy is devised for the promotion of value chain of the truffles as niche product for local consumption and export promotion:

5.6.1 RESEARCH PROGRAM

The most important and fundamental step for establishing a value chain for truffles is to start the research program under which different activities must be started for creating awareness, identification, preservation and managing competitive advantage, technical research, quality assurance, traceability, Food Safety, labeling and export documentation. Truffle availability in the Spate irrigated areas of Pakistan shows that the conditions are best suited for truffles and their growth. However there is a need to conduct the research on the environmental data for truffles.

5.6.2 AWARENESS

Awareness about truffles and its high value in the international market must be recognized by the farmers and the local communities. Educating Pakistani consumers about truffles and establishing the Pakistani Truffle Industry is a first step for the establishment of value chain. Furthermore foreign consumer need to make aware about the Pakistani truffles through marketing effectively.

5.6.3 RECOGNIZING THE NEED FOR ADDITIONAL SKILLS

There is a need for learning of skills that can be made available to the farmers in Spate areas. So that their produce of natural truffles can be brought on forefront in the international market. The benefits of obtaining these skills will better equip more growers in creating sustainable and profitable businesses for the rural poor of the area. At present there are no skills in Pakistan regarding production of truffles and other related operations. Skill deficiencies address future needs. Skill shortages replicate the immediate needs. The skills and expertise can be acquired from external sources in order to build the in house capacity.

5.6.4 TRAINING

Capacity building of stakeholders involved in truffles value chain seems an important aspect of truffles program penetration. Natural owners of the truffles must be given the education for proper harvesting of the truffles so that they do not get wasted and their value doesn't decrease due to improper harvesting methods. Moreover taking the opportunity of suitable conditions training and education of local community is made for artificial production of truffles for the purpose of exports in the international market.

5.6.5 MARKET DEVELOPMENT

This study confirms that the local community use of truffles is not very frequent as food. However it is used seldom as salads. Nor is there any other use reported by the local community of spate area. However the domestic market development will be a slow process and take some time to develop. However the process of market development has been defined above.

Moreover the market for truffles is developed in the international level and many countries including USA, Japan, China, Australia, France, and Germany are doing the business of truffles at commercial scale. So these markets can serve as a client for Pakistani truffles provided quality standards are met for harvesting, preservation and packing etc. However customer demand and ability to supply the market are the crucial factors and are quite challenging.

5.6.6 INTERNATIONAL COMPETITION

The major world exporters of truffles are Italy, France, Spain and China. While the major world importers are France, Japan, United States, Germany and Switzerland. However France, Italy and Spain are well-known for their production of high quality truffles. China is a large producer, the Chinese truffles are considered to be of inferior quality. Outside of Europe and China, there are an increasing numbers of farms or truffières in Australia, New Zealand, United States, Argentina, Chile, Israel and South Africa.

5.6.7 ENVIRONMENTAL DATA ANALYSIS NATURAL TRUFFLE GROWING AREAS

Another important step is to analyze the composition, structure, pH and water holding capacity of soils of the Spate areas where truffles grow naturally, the historical regional weather data such as temperature variations and rainfall averages, nuances in seasonal yields relative to particular local weather phenomena and natural distribution of both host species/competitors. Therefore understanding the environmental conditions found in the natural ecosystems supporting truffle production is required.

5.6.8. NATURAL PRODUCTION AND CULTIVATED GROWING ENVIRONMENTS.

Conducting analysis of the controllable environmental conditions in managed truffières in other countries and compare with the environmental data of areas where presence of the truffles is certain. For managed truffières soil amendments, irrigation regimes, tree density rates and host species along with topography, weather and other related aspect should be investigated. Following those experiments can be done in suitable sites of spate ecologies.

5.6.9 ORGANIZATIONS FOR LEARNING METHODS TRUFFLE PRODUCTION

In order to learn techniques from the organizations involved in the truffle production professionals of related fields could be sent for trainings to learn the data collection techniques, and tree propagation and production of truffles relating to specific maintenance and irrigation operations carried out on a season-by-season basis. Through observation and face to-face interviews learn techniques and processes associated with food value adding operations.

Determine methods of truffle infusion and incorporation into compatible and complimentary foods according to Pakistani taste and oil products. After trainings and launching the truffles products participate in local market and dedicate seasonal festival activities. Observe and apply grading, quality, handling and storage techniques used in other countries.

Conduct interviews with industry agents about marketing, quality control and the expectations of international markets. Also learn and determine packaging and shipping methods. Moreover Shelf-life extension technologies and further processing may include blast freezing, vacuum packaging and high pressure processing and applications of new technologies.

5.6.10 GOVERNMENT SUPPORT

Since the current production quantity and quality of Pakistani truffles is yet not certain. Government organization must participate in the promotion of value chain of truffles present in spate area by contacting the truffles growers association operating in different countries. Private organization may lack access to technical and research resources. Government can also extend support in research and development of truffles propagation along with support to collaborate with International supply & distribution chains and for labeling, packaging and quality standards.



Figure 32: Harvesting truffles from the field



Figure 33: Truffle collection

6 MEDICINAL PLANTS OF SPATE AREAS - SUPPLY CHAIN AND MARKET ANALYSIS

6.1 GLOBAL STATUS OF MEDICINAL PLANTS

Medicinal plants have played a significant role in various ancient traditional systems of medication such as the Chinese, Ayurvedic, Unani, and their secondary's in many Asian Countries. Medicinal plants still play an important role in emerging and developing countries of Asia, both in preventive and curative treatments, despite advances in modern western medicine. They also generate income to the people of many Asian countries who earn their livelihood from selling collected materials from the forest, or by cultivating on their farms (UNIDO, 2003). The use of medicinal plants for the maintenance of health is used as a custom in various developing countries (Sher et. al 2006).

According to Ali et. al. 2012, around 70-80% of the world population use traditional medicine for curing their ailments and diseases. But the percentage of people using traditional medicine decreased with time in developed countries i.e. 40-50% in Germany, 42% in the USA, 48% in Australia and 49% in France (Titz, 2004). This might be due to the unsustainable collection methods and decrease of medicinal plant in the wild.

On global scale with the dominance of few countries, approx. 0.467 m tons, worth US \$1.2 B medicinal plants were traded annually during 1991-2003 (Lange, 2006). Regarding the markets for medicinal plants, China is at the top followed by France, Germany, Italy, Japan, Spain, the UK and the USA. Japan is leading among the per capita consumption of botanical medicines in the world (Laird, 1999). The world market for herbal medicines were US \$19.4 billion, with Europe at the top (6.7) followed by Asia (5.1), and America (4.0), Japan (2.2) and the rest of the world (US \$ 1.4 billion) during 1999 (Laird & Pierce, 2002).

According to Anonymous, (2003) global sales of herbal products were about US \$ 60 billion in 2002. While on the bases of average import trade volume Pakistan is at 9 positions among the top 12 countries, with 10.65 thousand tons, worth US \$9.8138 m during 1991-2003 (Lange, 2006).

6.1.1 IMPORTANCE OF MEDICINAL HERBS IN PAKISTAN

Ahmad et. al. 2011, reported that rural people in Pakistan are engaged in the business of natural resource of which medicinal plants carry a great importance. The rural households meet their expenses through selling these resources. However, trade of medicinal plants is a complex process involving many players like collector, middleman, whole seller, retailers. According to Swiss Development Center and Inter- Cooperation 2000, middle man and whole sellers earn a lot of profit from the sale of the medicinal plants. For this reason their prices increase two to three folds after reaching International markets.

Local rural people have rich indigenous knowledge about distribution, abundance, harvesting and marketing of medicinal and aromatic plants. Most of these plants are used for the treatments of various ailments like stomach gastro intestinal problems, arthritis, skin diseases, aching, scabies, eczema even for sore throat and fever. Information regarding the harvesting and use of specific plant parts of medicinal and aromatic plants is an indigenous art (Ahmad et. al. 2011). According to Karkii and Williams 1999, rural people have high dependency on medicinal and aromatic plants. Increased human population along with livestock resulted in alarming decrease in the biomass coverage of certain economically and medicinally valuable plants. Continuous harvesting resulted in over exploitation of resources and decreased population of these plants in different areas of the country.

Sher et al., 2006 reported collection and sale of medicinal plants as an important economic activity in northern parts of Pakistan, and among 5000 families mostly women and children are involved in this process. These collectors receive minimum in the trade chain of medicinal herbs.

Problem of low prices of medicinal plants and non-availability of the local purchaser is a common problem. Those trading medicinal plants there are different problems including transport permit acquisition, supply of low quality produce, continuously low margins, and nonexistence of the business association and lack of access to market information.

Trade of medicinal plants in Pakistan is quite informal and carried out through unrecognized routs in private sector with no or low state control. Threatened species are also collected without checks causing depletion rapidly. Collection of medicinal plants by unskilled persons is also a problem in this sector. However, commercialization

of some medicinal plants like walnut bark and morel mushrooms also function as safety net and livelihood options in this area (Sher et.al. 2006; Qureshi 2000; and Sher and Hussain 2003).

Pakistan has a diverse flora containing about 6000 plant species. About 80% of the people belonging to the rural areas still depend upon the local herbal medicines (Ahmed, 1999). In the recent years, efforts have been made to document the traditional knowledge about local medicinal flora.

In this regard traditional utilization and conservation status of 160 plants has been described from Margalla Hills National Park (Shinwari and Khan, 2000). Similarly, Shah (2001) listed about 58 species of medicinal plants from Ayubia National Park near Nathia Gali Ahmad et. al. 2013, reported that four medicinal plant species are considered best by the local people of Balochistan in terms of marketable value, no side effect, easy availability, fragrance, and inducing of sleep. These are *Withania coagulans*, *Plantago ovata*, *Tamarix aphylla* and *Peganum harmala*. Most of the medicinal plants were collected and consumed by the locals themselves as house hold health care items. The trade of medicinal plants in the area was negligible. According to Saqib et. al. 2006 deliberated the uses of different species of medicinal plants:

- *Morchella conica*, *Dioscorea deltoidea*, *Juglans regia*, *Polygonatum verticilatum*, *Berginia ciliata* and *Withania somnifera* are used as body tonic and aphrodisiac agent.
- *Artemisia vulgare*, *Melia azadrach*, *Rumex dentatus*, *Rosa moschata* and *Berberis lyceum* are used for stomachaches and considered as digestive elements.

- *Pistacea integerrima*, *Geranium wallichianum*, *Thymus linearis*, *Podophyllum emodii* and *Cichorium intybus* are used for kidney and liver problems including kidney stones removal.
- *Adiantum capillus-veneris*, *Geranium wallichianum*, and *Solanum nigrum* are used as febrifuge.
- *Adiantum capillus-veneris*, *Paeonia emodii* and *Lotus corniculatus* are used for curing backache and considered as body tonic.
- *Colchicum luteum*, *Polygonatum verticilatum*, *Valeriana jatamansi*, *Aesculus indicus*, *Zizyphus sativa*, *Datura stramonium* and *Aconitum violaceum* are used for rheumatism and analgesic.
- *Taxus bucata* and *Artemisia vulgaris* are used as antispasmodic agent.
- *Pistacea integerrima* and *Zizyphus sativa* are used for cough, cold, asthma and other respiratory infections.

6.1.2 PREVALENCE OF MEDICINAL PLANTS IN DIFFERENT AREAS OF COUNTRY

Although there are hundreds of medicinal plants but those which are well recognized and identified for their uses and have the formal trade and high monetary value is reported under following tables with special focus on the study area:

Sr. No	Botanical Name	Vernacular Name	Occurrence	Price / kg		Quantity traded		Rarity
				2004-05	2005-06	2004-05	2005-06	
1	Acorus Calamus L	Skawaja	Mingora, Barikot	120	270	300	290	common
2	Berberis Lycium Royle	Koarai	Khwazakhela, Madyan	100	150	40	36	common
3	Dioscorea deltoidea Wall.ex Kunth	Kaneez	Kalam, Madyan	47	100	0.025	0.012	rare
4	Mallotus Philippensis (Lam) Muell	Kamela/Kambela	Mingora, Marghuzar	120	280	2	1.9	infrequent
5	Myrtus communist L.	Barg-e-abulanse	Kokarai Marghuzar, Jambil	30	60	1.23	1.2	very rare
6	Polygonatum multiflorum (L.) All	Musli Sapaaid	Madyan, Bahrain, Kalam	700	1250	3	2.5	very rare
7	Polygonatum verticillatum (L.) All.	Noori alam	Bahrain Kohistan	850	1600	3.4	3.3	very rare
8	Rheum australe D.Don	Chotial/rewandcheni	Mankial, Madyan,	70	100	3.2	2.9	infrequent
9	Saussurea Lappa Dene	Kust/kut	Mankiyal, Kalam	1200	1600	2.9	2.9	very rare

Table 22: Medicinal plants exported to different countries from Pakistan in 2004-06 (Source: Ali et.al. 2012)

Sr. No	Botanical Name	Vernacular Name	Occurrence	Price / kg		Quantity traded		Rarity
				2004-05	2005-06	2004-05	2005-06	
1	Adiantum Capillus veneris L.	Sumbal/parsiaushah	Miandam, Fatehpur, Madyan	150	260	70.5	69.9	infrequent
2	Adiantum incisum Forsk	Masle Sumbal	Fatehpur, Madyan, Miandam	120	250	80	58.8	infrequent
3	Bergenia Ciliata (Haw) Sternb.f. ciliata	Bogandi	Kalam	230	400	60.78	60	very rare
4	Bistorta amplexicaulis D. Don Green	Anjabar/tarwa panara	Upper Sawat	300	450	500	430	rare
5	Colchicurn Luteum Baker	Suranjan Talkh	Mankial Madyan	420	700	80	57.80	very rare
6	Morchilla Delicosa	Pashakhalai Guchi	Madyan	8.000	10.000	1.2	1	very rare
7	Morchilla esculenta	Spina Guchi	Kalam, Madyan	8.000	10.000	6	5	very rare
8	Morchella rotunda	Guchi	Shahpur, Madyan	8.000	10.000	2.1	0.9	very rare
9	Paeonia emodi var. emodi	Mamekh	Kalam, Kohistan	8.000	12.000	80.25	54.5	very rare
10	Pistacia chinensis subsp. Integerrima (J.L. Stewart) Rech.f.	Kakarasinghi/Shna	Kalam, Kohistan	85	200	55.55	54.5	very rare
11	Podophyium emodi Wall. Ex Royle	Kakora	Bahrain, Kohistan	350	450	35.5	34	very rare
12	Valeriana jatamansi Jones	Mushki bala/asaran	Madyan, Mankial	250	300	400	299.4	rare
13	Viola pilosa Blume	Goli Banafsha	Kohistan	500	700	6.000	4899.2	rare

Table 23: Medicinal plants used locally and exported from Pakistan 2004-06 (Source: Ali et. al. 2012)

Botanical name	Vernacular name
<i>Cyperus rotundus</i> Linn.	kaloora or kal
<i>Asphodelus tenuifolius</i> Cavan	Piyazi
<i>Avena fatua</i> Linn.	Jodal or Jangli jai.
<i>Phalaris minor</i> Retz.	Dumbi Sitti
<i>Cynodon dactylon</i> (Linn.); Pers.	Lawn grass
<i>Cenchrus ciliaris</i> Linn	Dhaman grass
<i>Panicum turgidum</i> Forssk	Cheena
<i>Typhaelephantina</i> Pers	Koondar
<i>Trianthema portulacastrum</i> Linn.	It Sit
<i>Achyranthes aspera</i> Linn.	Phut kanda
<i>Aerva persica</i> (Burm.f.); Juss.	Bui
<i>Amaranthus viridis</i> Linn.	Phut booti
<i>Anethum graveolens</i> Linn	Soayai
<i>Rhazya stricta</i> Decne	Siwanar
<i>Calotropis procera</i> (Willd.); R.Br.	Ak
<i>Leptadenia pyrotechnica</i> (Forssk.); Decne	Kehp
<i>Carthamus oxycantha</i> M.B.	Kandiyari
<i>Conyza bonariensis</i> (Linn.); Cronq.	Chabal gra
<i>Eclipta prostrata</i> (Linn)	Pattrati
<i>Gnaphalium luteoalbum</i> Linn.	Sanwari
<i>Launaea procumbens</i> (Roxb.); Ramayya and Rajagopal.	Bhathala
<i>Sonchus asper</i> (Linn.); Hill	Bathal
<i>Xanthium strumarium</i> Linn	Put Kunda
<i>Heliotropium strigosum</i> Willd	Saloonak booti
<i>Passiflora foetida</i> (Linn.) Medik	Chagyi Sarsoon
<i>Eruca sativa</i> Mill; Gard	Tara mera
<i>Sisymbrium irio</i> Linn.	Khobalai
<i>Stellaria media</i> (Linn.); Vill.	Salooni booti
<i>Chenopodium album</i> Linn.	Bathu or Batoon
<i>Convolvulus arvensis</i> Linn.	Wun weehry
<i>Ipomoea eriocarpa</i> R.Br.	wanweer bail
<i>Citrullus colocynthis</i> (Linn.); Schrad.	Buranmba
<i>Citrullus lanatus</i> (Thumb.); Mats. And Nakai	Cheebar
<i>Euphorbia helioscopia</i> Linn.	Chatri doodhak
<i>Euphorbia prostrata</i> Ait; Hort	Hazar dani
<i>Alhagi maurorum</i> Medic.	Jawansa
<i>Lathyrus aphaca</i> Linn	Jangli matter or Pattrari
<i>Melilotus alba</i> Desr.	Sinje
<i>Medicago denticulata</i> Willd.	Mehna
<i>Sophora mollis</i> (Royle); Baker.	Phagan booti
<i>Trigonellacorniculata</i> (Linn.); Linn	Meethi
<i>Trifolium resupinatum</i> Linn	Loosin
<i>Vicia sativa</i> Linn.	Mattri
<i>Fumaria indica</i> Haussk	Pit para
<i>Abutilon indicum</i> (Linn.); Sweet.	Giddar war
<i>Malva neglecta</i> Wallr.	Malook booti
<i>Boerhaavia coccinea</i> Mill; Gard.	IT Sit
<i>Oxalis corniculata</i> Linn.	Patri
<i>Rumex obtusifolius</i> Linn	Jangli pala
<i>Protulaca oleracea</i> Linn.	Loonrak
<i>Anagallis arvensis</i> Linn.	Neeli booti
<i>Ranunculus scleratus</i> Linn.	Gul-e-ashrafi
<i>Galium aparine</i> Linn;	Wanwair booti

Veronica anagallis Linn.	Hazar booti
Datura metel Linn.	Datura
Datura stramonium Linn.	Datura
Hyocyamus niger Linn.	Khoob kalan
Solanum nigrum Linn.	Mako
Solanum surrettense Burm.	Kandiyari
Withania coagulans\ Dunal.	Askand
Withania somnifera (Linn.); Dunal.	Jangli paneer
Verbena officinalis Linn.	Chandni
Fagonia indica Burm. F.	Dhaman
Peganum hermala Linn.	Harmal
Tribulus terrestris Linn.	Bakhra

Table 24: Medicinal Plants in D.G. Khan (Source: Gulshan et. al. 2012)

Botanical name	Vernicular name
Abelmoschus esculentus	Bhindi, Okra
Albizia lebbeck	Sirin, Siris
Allium cepa	Piaz
Aloe barbadense	Kuwargandal
Azadirachta indica	Neem
Cassia italica	Gidar toora
Cassia fistula	Amaltas
Cicer arietinum	Chanra, channa
Citrullus lanatus	Hindwana
Cordia dichotoma	Lasora
Coriandrum sativum	Dharian, dhania
Crotalaria burhia.	Sassai
Cucumis melo	Kharbuza
Dalbergia sissoo	Tali,
Foeniculum vulgare	kalwo
Ficus benghalensis	Bohir, bargad
Ficus carica	Anjeer
Grewia asiatica	Phalsa
Hordeum vulgare	Jau
Mangifera indica	Mango
Phyla nodiflora	Bukan
Portulaca oleracea	Lunrak
Prosopis cineraria	Jand Saranga
Sonchus asper	Bhathal
Syzygium cumini J	Jamu, Jaman
Tamarix aphylla	Frash

Table 25: Medicinal Plants in D I Khan (Source: Marwat et.al. 2008)

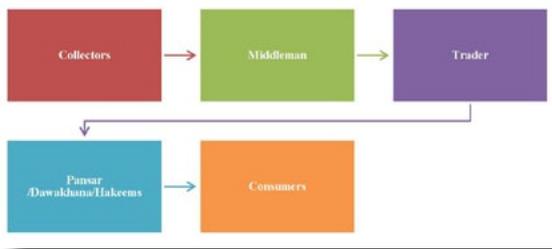


Figure 34: Supply Chain of Medicinal Plants

6.2 SUPPLY AND VALUE CHAIN OF MEDICINAL PLANTS IN THE SPATE AREAS (D I KHAN AND D G KHAN)

The market study of collection and trade patterns for medicinal species was conducted during summer season in year 2014 in Spate irrigated areas of D I Khan and D G Khan to assess the supply chain and its possible conversion into value chain of the area. Survey was conducted in Dera Ghazi Khan city, Taunsa, Sharif, D. G. Khan, Kot Qaisrani, and markets of Dera city. Interviews and focus group discussions from the local community was carried out to assess the local consumption, collection methods employed in the area along with local trade if any. The channels for medicinal plants in the target areas are quite unorganized. Following supply chain was figured out in the target area for medicinal plants that may be converted to supply chain at some stage.

Collectors are the primary actors of the supply chain. They collect the medicinal plants from the production area. Collection is done manually however collectors may sale to the middleman

either after drying or without drying. From the collectors the medicinal plants are sold to middle man and then to the local traders.

Medicinal plants are sold to wholesalers via middlemen. These are sold either in national markets outside Spate Areas. Some quantities of these medicinal plants are traded by hakims in their medical clinics and in shops at domestic herbal markets. Hakims mostly collected these plants themselves or had them gathered by adult collectors or children. In this way the hakims make a good profit from the sale of medicinal plants. The medicinal plants are sold in raw form and supplied from one actor to the other. However after the processing of plants into value added products it becomes the value chain. However chain may differ depending upon the situation.

POSSIBLE SUPPLY CHAINS

Followings is the possible supply chain for medicinal plants. Traders supply variety of medicinal plants in raw form to pansar (herb seller), Dawakhana (herbal medicinal shops), hakeem (herbalists), exporters and processing companies. Some actors sell them in the raw form e.g. pansar. However rest all actors mentioned in the figure below herbal medicine shops, herbalists exporters and processing companies add value of raw medicinal plants by converting them into medicines for various ailments, herbal drinks, cosmetics etc. after the value addition the supply chain converts into value chain.

The supply chain turns into value chain when processing companies are added into the chain. These processing companies then sale the value added products to consumer through distributors.

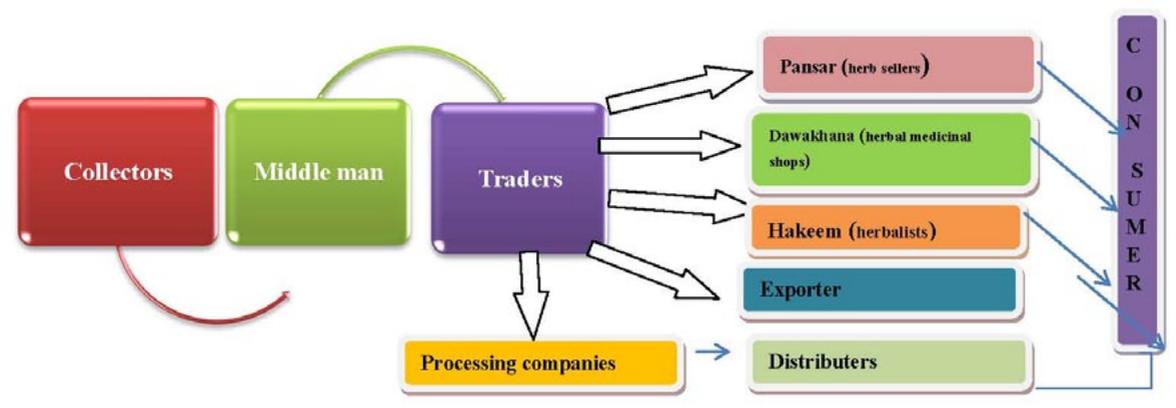


Figure 35: Supply and Value Chain of medicinal plants in target area

6.3 MARKET OF MEDICINAL HERBS IN PAKISTAN

Since prehistoric period, medicinal plants have been used for the cure of various diseases. These plants were in common use by the local people and were of great importance that's why a lot of people were engaged in the trade of important medicinal herbs throughout the world. People living in villages have been using indigenous plants as medicines because this knowledge transfers from generation to generation and is based on experiences. Besides, villages are far away from cities and mostly lack proper health facilities (Ahmad et. al. 2013) Medicinal plants (MP) are important for the livelihoods of poor communities all over the world. Most of Medicinal plants are flowering plants. Out of the c. 32000 species of higher plants (Prance, 2001), more than 10 percent are used medicinally. Estimates suggest that global medicinal plant business will reach \$ 5 trillion (US) by 2050 (Shinwari, 2010).

According to Karkii and Williams, 1999 almost 2000 medicinal and aromatic plant species are estimated to exist in Pakistan, however few of them are harvested and 90% of them are imported. This is mainly due to the knowledge on medicinal plants being confined to the tribal areas. The pattern of distribution of individual species is quite variable due to difference in altitude and habitat.

Due to poverty, low literacy rate, less communication means and non-availability of modern medicinal facilities, the people are depending on natural resources especially the

plants for different purposes (Sarwat et al., 2012; and Khan et. al. 2012). Generally there are three categories of the medicinal plants i.e. locally consumed, nationally traded and exported. Ali et. al. 2012, reported that the quantity of medicinal plants traded decreased from 8.056 million to 6.644 million kg in 2005-06 from the previous year.

While the price per plant species increased due to which the total amount of money circulated increased from Rs. 4476 to Rs. 5084.7 million. This increase is due to increased demand from national and institutes. There are four main markets of the Pakistan which manages the export of the medicinal herbs to different countries. These markets are Peshawar, Lahore, Karachi and Rawalpindi. However some plants dealers in swat valley also export directly to different countries. The numbers of species which are exported to different countries are very few but the quantities are large. The supply of these herbs depends upon the season and demand from the foreign countries. Supply to the national markets is sent directly to the major cities for the local consumption.

The season of plant growth usually starts from March to June. Some plants are sent to Rawalpindi and Lahore in the fresh or raw forms. Which are then dried and graded as per the standards of the local market and then distributed in the various parts of the country to Pansars and Hakims who use them for various diseases and sale at premium prices. Due to population explosion the local trade as well as export rates of medicinal plants have been affected.

National Organizations	International Organizations
Botany Dept. Peshawar University	IUCN (International Union for Conservation of Nature) Advocacy, Policy Issues
Pakistan Forest Institute (PFI) In & Ex. Situ conservation,	WWF-P (World Wide Fund for Nature-Pakistan) In-situ Conservation
KP-Agricultural University, Peshawar	SDC(Swiss development Corporation) Socio-economic uplift
Kohat University of Science & Technology	
Shaheed Benazir Bhutto University	
Hazara University	

Table 26: Organization Involved in the Research and Conservation of Medicinal Plants in KPK

6.4 URBAN MARKETS FOR MEDICINAL PLANTS IN PAKISTAN

USAID and IFPRI 2013 identified four markets for the trade of medicinal and aromatic plants.

- **Peshawar**
The species of medicinal plants sold in Peshawar herbal markets are generally obtained from District Swat, Lahore, and Afghanistan. Peshawar market also supplies some imported medicinal and aromatic plants to District Swat and Afghanistan for local uses. The market receives large quantities of herbal materials from District Swat which is then supplied to Lahore.
- **Lahore**
Majority of the dealers in Lahore herbal market are trading crude herbs imported from India. Over 50% of materials traded in Lahore are of Indian origin, and this is mainly due to cross border trade via train. The Lahore herbal market acts as a hub of national trade of medicinal plants. It is not only catering to the needs of smaller markets in various cities and towns of the province of Punjab but also supplies considerable quantities of materials to the Karachi market. The middlemen of the medicinal plants trade usually bring the materials from District Swat to Lahore.
- **Karachi**
Most of the crude herbal items traded in Karachi markets are obtained from the Lahore herbal markets. However, a few agents also bring the material directly from up-country, including District Swat. Prices of various items in Karachi market are generally 10-20% higher than Lahore, reflecting higher transportation, higher labor costs, and profits of additional middlemen.
- **Islamabad**
Islamabad is another final market for medicinal and aromatic plants from District Swat. Both the Lahore and Karachi herbals markets are the major source of materials to the large national herbal pharmaceutical companies. These companies generally purchase materials through middlemen or so-called suppliers.

6.5 MARKET CHANNELS USED FOR MEDICINAL PLANTS

Mingora is the main trade center for many high value plants in District Swat. Mingora supplies considerable quantities of plants to various national trading centers in Pakistan including Peshawar, Lahore and Karachi, and also abroad.

Direct linkages in the market channels between the various herbal markets in District Swat and the national and international levels are also there. Mingora receives material from various hilly areas, while Lahore herbal market acts as the major center of trade in the country receiving imported material from abroad and from the country sources. Karachi is a key export terminal.

In District Swat, the collection and trade of high value medicinal plants is highly uncoordinated and varying (i.e. from area to area and species to species). One common marketing channel for obtaining plants from District Swat is that dealers from the national market send representatives to local dealers (beopari) in Mingora to put up their demand. The local dealers pass the message to their agents, who are local shopkeepers of the valley. These agents inform small shopkeepers and collectors. The collectors bring the species gathered by tribesman and themselves to the local shopkeepers and agents. Collectors sell the medicinal and aromatic plants at prices a small margin higher than they pay to the gatherers. The gatherers and collectors are mostly illiterate and do not negotiate for the price of the plant materials. They gather sizeable quantities but do not receive high returns. The dealers of Mingora get the material from the agents when it is ready. In this way the plant materials pass through three or four hands.

There are a number of different routes to market. Normally collectors and farmers of Medicinal and aromatic plants bring their produce to the nearest market, where it is sold to wholesalers directly or through the middlemen generally known as commission agents. These materials are transported to the bigger city markets to the wholesalers and from there the materials are stored for export, sold to retailers, or supplied to the manufacturers. Interplay of middlemen in trade often acts as a shield, blocking communication between the primary collectors of the plants and their consuming centers.

The limited access to markets and dependence on intermediaries has a direct effect on the prices. Approximately 320 large wholesalers

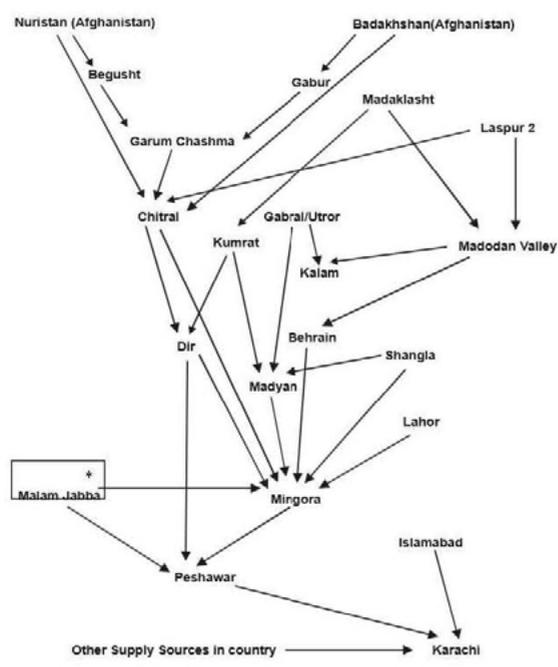


Figure 36: Marketing Channels Of medicinal Plants (Source: Sher and Yousaf 2014)

are operating in the markets located in Mingora of District Swat and in main cities of the country. Additionally, markets are located in some smaller towns of District Swat like Madyan, Miandam and Behrain. Pakistan is involved in domestic production, trade and consumption of medicinal and aromatic plants and also in trade which is dominated by wholesaler dealers. At the retail level, small shopkeepers, pansar stores, and some hakims rely on wholesalers for their supply or operate in a more informal manner.

The marketing of Medicinal and aromatic plants faces diverse problems encountered at various stages. The raw Medicinal and aromatic plants are either sold dried or fresh to the local commission agents and shopkeepers who sell them to wholesalers. The wholesalers sell them to the pharmaceutical companies or to exporters. The collection and trade of crude Medicinal and aromatic plants is very erratic in many parts of the country including District Swat.

Quantities collected in the wild are always uncertain. Thus, the availability of particular crude Medicinal and aromatic plants remains very unstable and market trends cannot be easily determined. Market information is primarily price oriented but has flaws because the reported prices do not show how product quality, volume traded, consignments size, or origin affects the price. The prices are disseminated without analysis. The marketing channels for Medicinal and aromatic plants involve several intermediaries through which the processors/manufacturers of

herbal medicines acquire their raw materials from traders. However, some processors/manufacturers have more-recently developed direct contacts with producers/collectors (USAID and IFPRI 2013).

6.6 FOREIGN TRADE

In last decade the medicinal plants were exported to Germany, Switzerland, USA, and other European countries. Along with the destruction of the local flora the export is also decreasing with the passage of time. The potential of medicinal plants is very high in Pakistan but unfortunately there are no set standards for the trade of the medicinal plants. And there are no efforts on ground for the conservation of the species involved in the trade (Ali et.al. 2012). Ali et.al. 2012, reported 99 species of medicinal plants out of them only 22 species are supplied to the National market and 21 are exported contributing Rs. 1,82,75,63,700 to the local, National and International market.

According to USAID and IFPRI 2013, Pakistan exports high value plants to different countries of world and generate over US\$10.5 million annually in 2012, and the import of herbal material as a whole was worth US\$ 130 million annually while most of the supply coming from District Swat, but its market share has been declining. Reasons for the decline were identified as unreliable and poor quality of the material supplied, length of the supply chain, and poor marketing strategies.

Pakistan exports and imports significant quantities of herbal material trade with other countries. The bulk of the Medicinal and aromatic plants materials is exported from developing countries while major markets are in the developed countries. Herbal markets of Karachi (Jodia Bazar) and Lahore (Akbari Mandi) act as a main source for Medicinal and aromatic plants export.

The destination of exports includes Germany, USA, Middle East, Switzerland and many other countries. The share of District Swat in the export market is estimated to be substantial, possibly as high as 40% or more. Export of crude herbal items to different countries is largely through individual and local exporters of Karachi and Lahore. The herbal market of Lahore City (Akbari Mandi) acts as a main hub and receives very large quantities of imported herbs from India and more recently China.

Other sources of imports include Thailand, Indonesia, Tanzania, Iran, and Afghanistan.

An increasing market trend of imports has occurred, particularly from India, China, Iran and Afghanistan. This is partly attributed to an increasing demand in domestic markets of Pakistan. In Pakistan the foreign trade through unconventional routes, including cross border exchanges, is often unmonitored and is part of the undocumented economy of the country (USAID and IFPRI 2013).

6.7 DEMAND AND SUPPLY GAP

Trade of the medicinal plants depends upon the demand of the plants. The price of the medicinal plants is variable and factors which makes the prices variable are their seasonality character, demand and supply from the market. The price of the dried plants is two to three folds greater than the fresh plants. During the season when there is access supply the prices comes down in case of small supplier.

On the other hand if the demand from the market is greater than the price rises for big suppliers. However the profit ratio is different for different stakeholders e.g. collectors, traders, and exporters and there is significant difference in the margins. For example the sale price of Banafsha (*Viola serpens*) for collectors is Rs.20 to 25 its price for the dealers is Rs.180 and its price for the Dawakhanas or Manufacturing factories is above Rs.500. Similarly the rhizomes of Mushkebala (*Valeriana jatamansi* Jones.) are sold by the collectors for Rs.30 kg⁻¹, by the middlemen at Rs.90 kg⁻¹ and by the exporters at Rs.260 to 300 kg (Ali et. al. 2012).

6.8 TRENDS AND PROSPECTS

Nearly seventy percent of the population of urban and rural areas benefit from the Unani system of medicine in spite of very sophisticated hospitals and allopathic practitioners which work under the Government of Pakistan. In the rural areas, household remedies are being used for generations. Tibb-e-Nabvi` provides base for the traditional Unani system of medicine in Pakistan.

Medicinal plants used by the practitioners of this system are easily available in the forest, mountains, valleys, gardens and agricultural fields. This system is relatively cheap and quite near to nature. In Indo-Pak subcontinent, these traditional systems are called as "Unani" or "Ayurvedic" system (Marwat et.al. 2008).

The trade of these medicinal plants is a source of the seasonal job opportunities for men, women

and children. In Swat District 99840 individual were provided with the job opportunities related to medicinal plants. Of them 75 % were children, 21 % were women 4 % were old age people.

Those who were involved in the trade were collectors which are 93 %, 6 % were dealers and 1 % were wholesalers (Ali et.al. 2012).

In D.I. Khan the varied agro-climatic conditions make it possible for almost all different kinds of medicinal plants in particular and other useful plants in general to grow. Every year a considerable amount of foreign exchange is involved in the import of the drugs and other products of foreign origin. The utilization of indigenous drug resources (Medicinal Plants) will increase the importance of the drugs and other products of foreign origin. The utilization of indigenous drug resources (Medicinal Plants) will increase the importance of the local industry on the one hand and will minimize the expenditure incurred on the purchase of foreign drugs on the other (Marwat et.al. 2008).

Ali et.al. 2012, reported that local elders of Swat area are of the view that The most important and fundamental step for establishing a value chain is to start the research program under which different activities must be started for creating awareness, identification, preservation and managing competitive advantage , technical research, quality assurance, traceability, Food Safety, labeling and export documentation. Truffle availability in the Spate irrigated areas of Pakistan shows that the conditions are best suited for truffles and their growth. However there is a need to conduct the research on the environmental data for truffles.

Nowadays the medicinal plants are collected in large volumes from remote valleys. All these threats have dragged some of the species towards extinction. Early measures to manage medicinal flora for sustaining its market supply and securing livelihood opportunities of rural communities is imperative.

Gulshan et.al. 2012, studied the medicinal plants of D. G. Khan which are used traditionally as medicines by herbs-man (Hakims), plant traders or village elders to cure various infectious as well as functional human diseases. These preserved tribal practices are found suitable and helpful in treatment of the poor and illiterate people on low cost basis. The dominant families are Fabacaceae, Solanaceae , Asteraceae, Poaceae and Brassicaceae.

These medicinal plants are used to cure about 30 various types of diseases. The common disease of the area is stomach related like ulcer and dysentery.

Cough, headache, jaundice, toothache, sores, wounds and skin diseases are the other prevalent diseases. Peoples' dependency on traditional medicine is still high as in rural areas modern or allopathic medicines are hard to find and certain stigmas like side effects related to these modern medicines hinders people to use them. Most of the species used for medicinal purposes are wild and expert herb-men collect them.

Marwat et. al 2011 reported that various areas of D. I. Khan region are enriched with useful medicinal plants of them majority is not fully exploited. Some medicinally important plant species are fast dwindling, mainly due to human interference. The area needs proper protection for the conservation and survival of natural resources with the help of local people. Following table shows the prevalence of the medicinal herbs in D I Khan:

Trade of crude vegetable drugs is very intermittent in Pakistan. Prices fluctuate greatly due to variations in external and internal demands within the country.

Traders frequently underpay collectors of the raw materials and sell the products at a large profit. Hence the availability of particular crude drugs remains very unstable and market trends cannot be easily determined. The margin of profit earned by the traders is very large since they purchase the crude drugs at nominal rates and obtain the maximum price from the consumers. The export of crude drugs from Pakistan is very erratic due to the "Standards restrictions" imposed by the developed countries of the world.

Essential Oils of Anise, Caraway, Coriander, Fennel, Lavender, Spearmint and Rosemary are extensively used as flavors both in domestic consumption and abroad. Raw material for these culinary herbs is cultivated to obtain the product (FAO 1992).

BOX IV: QARSHI INDUSTRIES PRIVATE LIMITED

Qarshi industry having slogan of: curing naturally, caring globally is a leading company operating throughout Pakistan. It has over 200 of products produced from natural herbs and plants by maintaining high quality standards by acquiring latest technology and procedures to deliver superior value to its customers. Qarshi is the only organization in SARRC, middle east & Africa having 9 international and national certifications and accreditations ISO 9001, ISO 14001, HACCP, HALAL, Green Office, ISO 17025 (Norway and PNCA), organic and PCP certification.



The process is continuously monitored by the quality control professionals. They are offering wide range of food products e.g. Refreshing Syrups, Natural Mineral Water, Soft Drinks, Jams, Marmalades, Murabbas & Honey, Ketchup & Sauces, Johar Joshanda, Instant Powder Drinks. And products for different ailments e.g. products for male Disorders, Tonics, Children care products, Ear Disorder, Anti Allergics, Liver Disorder, Tooth Care, Orthopedic Disorder, CNS Disorder, Research Products, Renal Urinary, Heart Disorder, Female Disorder, Blood Related Disorder, Gastro Intestinal Disorder, Respiratory Tract Disorder and Anti Pyretic Disorder. Qarshi is managing its customer ship internationally. It is having outlets in UAE, UK, Saudia, Oman, Qattar, Bahrain, Afghanistan, Uzbekistan, South Africa, Philippines, USA, Canada, and France. Moreover it is operating several health shops in the country especially Lahore.

In Pakistan there are companies which produce the herbal medicines and are successfully doing their businesses. Of them Qurshi industries private limited, and Hamdard private limited are most patented and preferred by the consumer. Box IV contain the case study of Qarshi industry Pakistan.

6.9 ISSUES IN TRADE AND MARKETING OF MEDICINAL PLANTS

Following are the main issues in the sub sector of medicinal plants that must be taken care of: (Ali et.al. 2012; Qureshi 2000; Sher and Hussain 2003):

- Low prices for medicinal plants and non-availability of local purchaser is one of the major issues.
- Supply of low quality produce, declining margins, nonexistence of business association and lack of access to market information.
- Medicinal plant trade in Pakistan in general is largely in the unorganized private sector with very little state control. Often the rare or threatened plant species are collected without check.
- Trade and collection of plant material is mostly handled by unskilled persons.
- The price of medicinal plants is not constant. It fluctuates with the season as well as with the demand and supply from the market. The price of dry plants is almost double and at times triple the price of plants sold in fresh or wet form.
- In Pakistan medicinal plants has immense potential but unfortunately trade has not yet been standardized, nor has any attempt been made to investigate the conservation status of the species involved in trade. All the medicinal plants are available for local consumption

6.10 RECOMMENDATIONS

- Uprooting of the endangered species should be banned to check the irreversible loss of these species.
- The plant collectors are needed to be trained in proper harvesting methods.
- Introduction of selected medicinal plants as minor crops will not only reduce the pressure on the natural vegetation but will also improve the Socio economic conditions of the farmers.
- Rotational or controlled grazing pattern should be used to ensure sustainability of medicinal plants.
- Correct identification of medicinal Plants is essential and for this purpose collaboration among the taxonomists and the local Herbalists is vital.
- The collectors should be educated for pre and post harvesting methods e.g. identification of plants, their proper time of collection and preservation.
- The price and quality of medicinal plants in the market is not uniform, so necessary measures should be taken in this regard for the uniformity.
- Recommended Processing techniques should be adopted that can be done through Proper storage Facilities established.
- Focus on high value species and segregation of species could be one of the good measures to be taken.
- Establish links with support services (government & private)

The problems in the medicinal plants can be addressed by improving the knowledge of those at the start of the supply chain, improving linkages among all steps in the chain, and developing sustainable harvesting practices. It is important to note that in Pakistan the foreign trade through unconventional routes, including cross border exchanges, is often unmonitored and is part of the undocumented economy of the country.

7. CONCLUSION

This study analyzes the prevailing supply and possible value chain of traditional crops, truffles and medicinal plants. In spate irrigated area D.I. Khan and D.G. Khan were selected for analysis.

Wheat is consumed at local level for as grain for flour and its straw is used as fodder for the livestock in that area. Surplus wheat is marketed at village level either to consumer at village level, or village shops where grain are traded some of grains are purchased by the middle man who collects the wheat from the farmer at farm gate level some of the farmer also sell their produce to grain markets.

Shopkeeper and wholesale buyer serve as actor in purchasing the output , from here it moves to processor for value addition like flour , there is no any specified processing company or actor in that area . The grains are taken to local miller who serve as processor and grind the grains covert into flour. Last it comes to retailer or wholesaler and the consumer for the consumption.

Gram is second most important crop of Rabi season. Gram is consumed at local level, farmer produce and sell at local level marketing is done either through middle man or direct selling in grain market. There are no processors or nay value addition exists in gram. Sorghum and millet are important grain in spate area yet there is no supply chain as it is mostly self-consumed or sold to fellow farmers.

There is no company or any agency who specifically deal with organic general dealer buy and sale purchase, if marketing and tagging is done there exist potential for better supply chain. Although the organic value chains are not well developed yet there is prevalence of small models of organic value chains which are running successfully in different regions of the country. Most of them are in the big cities like Lahore and Karachi. Individual farmers, institutions and NGOs had initiated different promotional activities of organic farming but these activities are not coordinated and documented properly.

The awareness about truffles in Pakistan is limited to the few individuals so the commercialization is having distant prospects locally. The commercialization or creating demand locally seems to be a slow process in Pakistan. Pakistani truffles are not well known and the identification of available specie has not yet taken place. The most important and fundamental step for establishing a value chain is to start the research program under which different activities must be started for creating awareness, identification, preservation and managing competitive advantage , technical research, quality assurance, traceability, Food Safety, labeling and export documentation. In Pakistan medicinal plants has immense potential but unfortunately trade has not yet been standardized. All the medicinal plants are available for local consumption.

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