

Horticulture in Balochistan: Challenges and Prospects

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Abstract

Horticulture has a great potential in the Province. Of serious concern is the depletion of ground water and drought spell from 1997-2002 was a serious setback to the horticulture development. Perennial sources of ground water such as tube wells, wells, karezes, and springs were completely dried. The Provincial Government from its own resources and donor assistance has taken various steps to recharge the groundwater by construction of dams in the overdrawn basins, and to reduce the conveyance losses from source to field. Cold storages at different production areas are constructed by private sector through assistance by USAID/USDA and are functioning. The recommendations made in Horticulture Policy document prepared by the Ministry of Food, Agriculture and Livestock with the help of foreign and local consultants are approved by the Government of Balochistan and are in the process of implementation but slowly. Hopefully, it is anticipated that Horticulture will play an important role in years to come and issues confronting the sector will be resolved through appreciable extent.

INTRODUCTION

The total geographical area of Balochistan is 34.72 million hectares representing 44% of the total land mass of the country and which has 770 KM long coastal line. Cultivated area according to latest Agricultural Statistics of Balochistan is 2.49 million hectares (7%). Except for a small portion of the Province in the northeast, the climate is generally dry and hyper arid. Annual rainfall ranges from 50 mm in the desert area to 250 to 400 mm in the climate suits almost all kinds of fruits and vegetables to be grown where there are irrigation facilities (Archer, 1996).

Balochistan traces its history from times immemorial. Before the Christ, it had commerce and trade with ancient civilization of Babylon through Iran and into the valley of Tigris and Euphrates. The Province though recognized as one of the arid and hyper arid (some portion semi arid) area of the world, yet agriculture was the main occupation of most of population since centuries. Embankments for diverting flood water, into lands in bottom valleys was the norm of growing crops (Minchin, 1906).

Government of Balochistan with the assistance from donors and its own resources is making efforts to address the issue particularly focusing on recharge of ground water which has been depleted completely in three river basins like Pishin Lora, Nari River and partially Zhob River.

Agro-Ecological Zones

Traditionally, five distinct agro- ecological zones have been categorized since long in the Province ranging from sea coast to 1600 meters and above. The main criterion of the classification was mostly difference in altitude and temperature. Basically, this classification was based in categorizing the areas of the Province which are suitable for growing deciduous fruits because altitude besides other factors is of prime importance in setting the boundaries for deciduous fruits cultivation (Government Balochistan 1996)

In recent studies conducted by Consultant hired by ADB in determining the promising cropping pattern for irrigated agriculture, the Province was divided into six agro-ecological zones. The basis of categorizing besides altitude and temperature was source and availability of irrigation water, potential of water basin in the zones, water requirements of particular crops in a zone, climate, and average annual rainfall (Saeed, 2006).



Figure 2: Agro-ecological map of Balochistan.



Figure 3: Revised agro- ecological map showing water efficient indicating elevation of the province for determining water efficient cropping pattern.

Agro-Climatic Zones

Based on aridity index, crop growth index, temperature and evapo-transpiration, the Province is classified into 21 agro climatic zones. Aridity index is defined as the ratio between 50% probability of total seasonal rainfall. Crop growth index is the ratio between growing degree days available and growing degree days required while growing degree days are the sum of total heat summations (sum of the mean daily temperature above 10°C. for the growth period). Growing degree days show the effect of temperature on crop growth (Meteorology; WRRRI & NARC 2001).

Present Status of Horticulture

Balochistan excels in the production of almost all temperate fruits in the country with the exception of peaches and plums in which it is placed next to Khyber Pakhtoon Khawa. Production of dates ranks second to Sind. Balochistan's shares in national production of major deciduous fruits are 60% for apple, 90% for almond, 98% for grape, 75% for pomegranate and 100% for cherry (MINFAL, 2006)

Areas of tropical fruits such as banana and sub-tropical fruits such as papaya, chiku, guava and mango have increased, with the availability of irrigation water from Hub Dam and establishment of tube wells, particularly in Lasbella District.

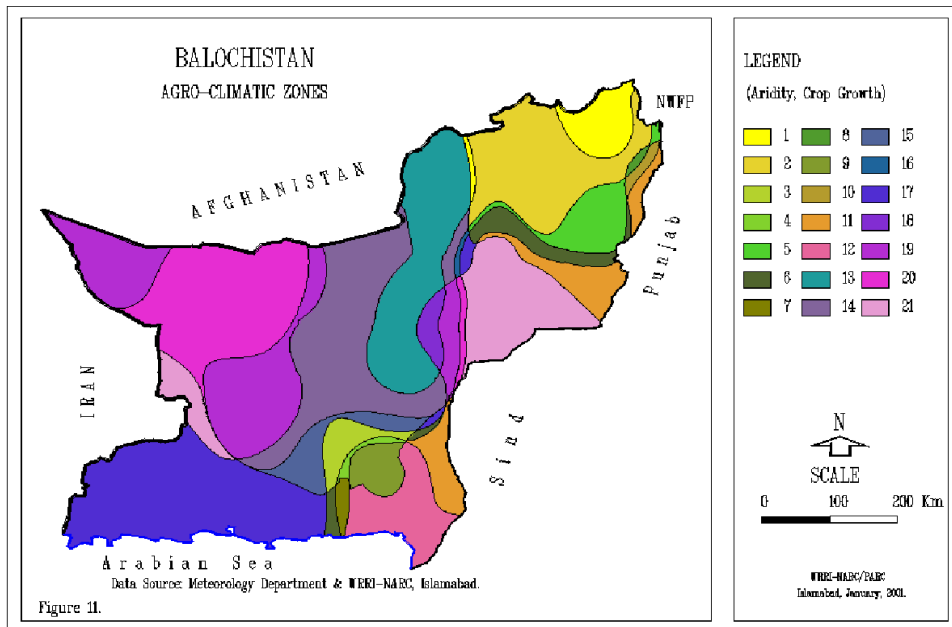


Figure 4. Map showing agro-climatic zoning of the province.

Significant progress has been made by the Private sector in construction of cold stores with the help of United States Department of Agriculture and Ministry of Food, Agriculture and Livestock at 11 areas of production. Also, three mini cold stores for grapes and one mini pack house for dates at Turbat, and one banana ripening store at Lasbella has been established. Also, an extensive program for capacity building of the community in raising fruit plant nurseries and packing and fruit packing, and improved orchard management methods have been chalked out.

Despite irrigation water limitation, horticulture is progressing and contributing to the economy of the Province besides providing jobs to the masses. At 2013-14 whole sale prices of various crops namely, fruits, vegetables, and condiments produced in the Province at Quetta market worth Rs. 212,212 million rupees; the contribution of fruit was Rs. 72,963 million, vegetables Rs. 343,472.0 million, condiments 17,036 million and crops 87,723 million rupees (Agri. Statistics, 2013-14).

Water Resources

Water resources are scarce in the Province and limits profitable horticulture production. Water both for irrigated agriculture and drinking purpose is derived from the surface water resources such as flood flows, perennial base flow in the river, sub-surface flow through river gravels, specific ground water sources through developing a traditional karezes, wells, and tube wells. The surface water resources of the Province also include water from Indus River and water from inland and coastal streams.

Under the Indus Water Accord, the share of Balochistan is 3.87 million acre feet. The existing Pat Feeder and Kirthar Canals have the capacity of 3178 and 1700 cusec respectively. The capacity of Pat Feeder Canal is being raised from 3,178 to 6,700 cusecs. Total irrigation water available and sources is shown in table 1 below:

Table 1: Total irrigation water available and sources.

Source	Quantity in million cubic meter	Quantity in million acre foot
Sustainable ground water available	951	0.77
Flood water runoff from major rivers (average annual run off)	2,660	2.17
Indus perennial (kharif and rabi)	4,780	3.87
Indus flood water (average years)	2,272	1.84
Total	10,683	8.66

Source: Consultancy report technical Project SPRM TA4560 (Pk)

Beside Indus Basin, 13 river basins have been reported in Balochistan as shown in Table 2. Most rivers have water flow after rain storms. There are only few perennial rivers with a base flow of 100 cusecs. Table 2 shows the River Basin of the Province, status of ground water potential and exploitation

Ground water is the main source of water supply for horticulture / agriculture, domestic consumption. Under this system water is brought to the surface for raising crops, drinking purpose either by tube well, springs, and karezes. After 2002 to 2013, even with good rains and snow there was no recharge of ground water in areas where source of irrigation was tube wells. It shows that ground water has been depleted to such an extent that recharge due to rains and snow after 2003 to date were not sufficient to put the horticulture sector back to its position of decades of 70's and mid 80's. On the contrary, in areas of high altitudes where the sources of irrigation were only karezes and natural springs, the water was sufficient to grow horticulture crops especially fruits. The present status of river basins indicating ground water potential and its exploitation is shown in table 2.

Table 2: River basins and status of groundwater potential and exploitation in balochistan.

Hydrological basin	Groundwater potential available approx. (cusec)	Groundwater exploitation approx. (cusecs)	Groundwater potential available for future exploitation
Zhob river	125	40	85
Nari river	120	120	0
Kacchi plain river	95	25	70
Pishin lora	145	145	0
Mula river	26	10	16
Gaj river	38	20	18
Parli river	155	45	110
Harnai lora	28	5	23
Hangol river	168	20	148
Dasht river	51	10	41

Source: IUCN. Irrigation Sector Final Draft Balochistan Conservation Strategy 2000.

The total estimated perennially irrigated area 1.07 million hectares of which 556,956 hectares (51%) is irrigated by canals and restricted to districts of Nasirabad, Jaffarabad and part of Jhal Magsi districts which are fed by Pat Feeder, Desert and Khirthar canal systems emanating from the Gudu and Sukkur barrage on the Indus river respectively. The area irrigated by tube wells and open surface well is 418,048 hectares and 53,276 hectares which is 39% and 5% respectively of the total irrigated area. The area irrigated by karez, springs, minor irrigation sources such as diversion of water from perennial rivers, such as Nari, Hub, and Zhob is 49,059 hectares which comes to 5% of the total perennially irrigated area (Agriculture Statistics Government of Balochistan 2013-014).

Flood irrigation, locally known as *sailaba or manda sailaba* is widely practiced in the Province and different techniques have evolved over the centuries to utilize flood water for irrigation. The basic principle involves the diversion of flood water to the command area, where it is conveyed into large bunded basins to a depth of 60 to 90 centimeters and allowed to infiltrate into the soil (Vehelein, 1997).

Khushkaba is also practiced in the Province since centuries and is basically a small-scale version of *Sailaba*. It is usually a water harvesting technique. *Khushkaba* is dependent on winter rains and the catchment areas tend to be very small hence the risk involved is considerable (Vehelein 1997). The area irrigated through *Sailaba/* and *Khushkaba* is 58%, however, it fluctuates every year. This data relates to year 2013-14.

Main Constraints and Challenges Facing Horticulture In Balochistan

Water Related

As already mentioned, the area under horticultural crops increased considerably in the decades of 1970- 80 and till mid 1990 because of the supply of electricity from National Grid System. However, due to indiscriminate use of irrigation water through mismanagement coupled with subsidy charges on electricity provided by the federal Government in 1984-1985, the ground water was completely depleted from Pishin Lora, Nari River, and partially from Zhob river Basins as is evident from table 2. The areas under these overdrawn basins was mostly occupied by horticultural crops namely, apples, apricots, plums, peaches, and grapes in addition to vegetables like onion, chilies, tomato, okra, peas, cauliflower, cabbages etc.

Table 3: Showing extent of over irrigation by farmers through flood system.

Crop	No. of irrigation/ per year/ per season	Net apply/ per ha (mm³)	Net water required /per ha (mm³)	±Difference (mm³)
Apple	35-39	4391-4890	1,196-2,495	3,195-2,395
Apricot	35-39	4391-4890	1,497-1,697	2,894-3,194
Almond	18	2,295	1,497	798
Pomegranate	20	2,894	1,497	1,397
Summer Vegetable	15	1,896	1,098-1,497	399-798
Onion	17	2,146	1,497	649
Melons	15	1,896	1,497	399
Potato	16	1,996	1,497	499

Source: National Arid Land Development and Research Institute, Islamabad 1998

Water use efficiency

The efficiency of carrying water in earthen channels from source to field is almost reduced from 40% to 50%. Unlevelled field further contribute to uneven distribution of water. The flooding of orchards with precious irrigation water coupled with unlevelled fields reduced the efficiency to 50-60% (Ahmad, 2004). Over irrigation of orchard beyond the requirement of the plant is a drain on irrigation water. The table 3 shows the extent of over irrigation practices by farmer through flood system of irrigation in the orchards.

Choice of Fruit Crops In Various Ecological Zones

For raising fruit crops especially deciduous fruit crops, besides good soils, availability of irrigation water and marketing; the most important factors to be considered is the chilling requirement (cumulative hours e below 10°C from leaf fall to early spring). Unfortunately, this factor was all to gather ignored during plantation of high value crops like apple, apricot particularly in the areas whose altitude range was from 1150 M to 1550 M. In these areas, the chilling requirements of crops like apples (commercial varieties) is not fulfilled due to prevailing climatic conditions and quality and production is far below the optimum potential.

High delta crops like apples, apricots, and vegetables like onion, tomato were the main crops grown in spite of the fact that low delta fruit crops like grapes, almond, pomegranate, and vegetables like cantaloupes, coriander (green), salad, cucumber, bitter gourd, peas, chilies have less requirement of water as compared to onion, potato, cauliflower, cabbage.

Production Related

Non-availability of certified fruit plants and vegetable seed

There is no law or regulation in Balochistan to monitor the fruit plant nurseries in Private sector to assess the truthfulness of the varieties of fruit plants grown, health of the plants raised in these nurseries such as freedom from disease or insect attack etc. Due to absence of such monitoring system, the growers interested to grow a specific variety of fruit plant in their orchards having no alternatives and are compelled to obtain the plants from these unregistered nurseries. When the trees start to bear after three or four years then the growers realize, the mistake committed by him during purchase of budded/grafted plants from unreliable nurseries.

In the absence of any reliable and certified vegetable seed organization in the public or private sector, the growers are entirely dependent on the imported vegetable and potato seed from Punjab and Karachi as well as from foreign countries. Also for the past 10 to 15 years, imported hybrid vegetable seeds are preferred by the growers and there is no research back up to test the truthfulness of variety and merits of its adaptability under prevailing vegetables growing areas of the Province.

Excessive and injudicious use of agro-chemicals

For the last 10 to 15 years, the outdated and of low quality pesticides are smuggled from Iran and being cheap, the farmers are using it. There is no check or regulations in vogue to ban the use of these pesticides. In the final analysis, the growers suffer very high losses.

Also, the recommendations for the proper use and time of spray are either lacking or not transmitted to the growers. In addition, due to excessive use of pesticides, there is a serious problem of environmental hazard. Moreover, there is no awareness about the safe use of Pesticides among the labors that spray the trees and in many cases, there are some serious reports about the health hazards.

Power load shedding, breakdown during growing season

One of the serious issues confronting the horticulture of this Province is the load shedding during the peak growing season which continues almost from 15 to 18 hours in the rural areas where most of the orchards and vegetables are grown. The growers have approached the concerned officials of the Federal Government but the issue is not resolved as yet according to the demands of the growers.

Lack of Knowledge and Skills in Improved Horticulture

Management operations

There is dearth of skilled and trained persons in orchard management. Training and pruning of deciduous fruit trees is the first step in maintaining the shape and bearing capacity of the fruit tree. There are very few persons available who are well versed with the proper methods of training and pruning.

Also, deep hoeing the orchards is the most common practice in Balochistan. This operation damages to considerable extent the feeding roots which are spread in the first 10 to 15 cm in the soil and which are damaged resulting in reducing the productive life of the trees.

The fertilizer is broadcasted instead of applying along the periphery of the tree which is a recommended practice. Also, the doses of fertilizers applied are far less than the recommended dose resulting in the low yield.

The harvesting of fruits according to recommendation should be carried right from the early morning i.e, before sunrise till noon to avoid quality deterioration. In this Province, the harvesting is usually performed by unskilled labours and is continued all day long. Harvesting after noon damages the quality of fruit due to field heat and if stored in cold stores, its quality deteriorates. During harvesting, especially in apple fruit spur is also removed which is attached to fruit. The fruit spur usually takes 5 to 6 years to mature for bearing fruit.

Marketing and Post Harvest Handling

Non –availability of appropriate package material and facility in production area

At present about 80% to 90% package material used for fruits in the fruit growing areas are wooden crates. This material is not only unhygienic, unattractive but also the quality of fruit deteriorates during transportation from farm gate to markets.

Poor post harvest handling techniques.

Fruits generally do not cease their metabolic activities even after harvest. The most important of these processes is respiration. As most of the horticultural crops are perishable, pre-cooling is the first step before shipment or storage of commodities. The pre-cooling refers to rapid removal of field heat.

There are no cold storage facilities for removing field heat of the commodity after harvest either through hydro cooling or air cooling near main production areas. During packing in the absence of any mechanical grading of horticulture produce, the fruit is graded manually which is an out-dated practice.

Institutional

Lack of coordination and linkages among agriculture research, education, extension, ngos and farmers organizations in the province

Agriculture Department of Balochistan has well established set up all over the Province as compared to last 10 years there is enough staff. Also, some NGO's and Community Based Organizations are working in the Province far the last many years and

one of their areas is to improve the agriculture of the community by imparting training to and test the improved technology under their conditions.

Unfortunately, there is lack of coordination among these organizations in conveying the latest technologies to the farmers and to create awareness among the farming community about the marketing information system.

Inadequate research and development infrastructure

There are four horticulture research institutes in the Province. The main research Institute (previously named as a Deciduous Fruit Development Centre) is at Agriculture Research Institute Quetta, other three Institutes are located at Pishin (Main crops grapes and stone fruits), Turbat Horticulture Research institutes is working on Dates, Horticulture Research Institute at Khuzdar (Baghbana) is now mainly concentrating on olive which is a new crop in the Province and has a great potential.

The main constraint of the research Institutes located outside Quetta is poor infrastructure, lack of laboratory facilities, equipment and transport. Also, there is shortage of well qualified professional staff at these institutes.

Untimely release of budget/ shortage of budget

Timeliness of operation in Agriculture is the prerequisite for undertaking Research and Development farm activities. Lengthy and conventional official procedure regarding untimely and late release of budget especially to outstations delays the field operations and in some cases approved research plan is either stopped or shifted to next year.

The most ideal budget allocation of Administrative and Operational Budget is 50:50. Agriculture Research Master Plan prepared in 1995 under World Bank financed Project recommended 60:40 ratios of administrative and operational for the Agriculture Research program in the Province but this recommendation has not been enforced yet.

Policy and Regulatory Frame Work

Ineffective and insufficient quarantine laws in the province

The Federal Department of Plant Protection Department is responsible to enforce and implement quarantine laws to check the entry of plants seed, flowers bulbs in the country/ Province. It has been observed that many growers, private nursery owners who deal with the floriculture have been importing various plants and bulbs of flower from abroad or from the neighbor countries like Iran, India besides Europe, Middle East. These plants flower bulbs, seeds carry with them many insect, pest larvae, diseases which are non-existence in this Province. Consequently, such pests are difficult to control and in some cases, may not be environment friendly if high doses of pesticides are required for their control.

Participation of stakeholders in developing and planning of horticulture research program

The main purpose of Horticulture Research and Development Program is to solve the problems of the growers' stake holders engaged in Horticulture Business. During the decades of 1980 and 90, under USAID, WORLD BANK, and UNDP assisted programs namely Farming System Research, Rapid Appraisal Program the stake holders like community, growers, private sector were involved to diagnose the problems on the field by research staff and very useful reports were made. However, at present, the stakeholders are not involved during planning of Research Program in Horticulture.

Absence of any monitoring and evaluation of research, extension and education in horticulture in the province

There is no system in place to monitor and evaluate the research, development and teaching of Horticulture in the Province. Guide lines for Monitoring and Evaluation has already been prepared under World Bank Assisted Project namely "Agriculture Research Program phase II.

Prospects and Future of horticulture In Balochistan

Irrigation water and not land (soils) is the limiting factor confronting Horticulture Development expansion in the Province. Horticulture has great potential in the Province subject to economical use of water and its conservation as recommended by the experts and research Institutes. Also, regular supply of electricity during peak growing seasons, switching over to high-efficiency systems for conservation of irrigation water and a capacity building program for technical persons, farmers and all stakeholders will not only improve the economical condition of the growers but will be a source of revenue for the Province.

Balochistan due to its arid climate does not have any serious fungal diseases as are prevalent in areas where humidity is high especially during monsoon season in the plains. This Province is most ideal for growing vegetable seed and before independence the vegetable seed from this province of selected vegetables used to cater the demands of the other parts of the sub continent to some extent. Experiments conducted at the higher altitudes of the Province have proven that Potato seeds produced in the high altitude of the Province is equally good compared to imported potato seeds from Holland or any other European country.

Wealth of information and recommendations have been accumulated for the past 10-15 years in the reports submitted to Government by various donors focusing mainly on the status of water available and how the flood water which is going waste can be best utilized for irrigation. Also, how the available water can be conserved to its maximum capacity by various tested technologies are available in the Province. In addition, horticulture policy document prepared by the foreign and local consultants have highlighted the issues facing the Horticulture sector and have made recommendations to Government of Balochistan.

The recommendations made by the consultants both expatriate and local are detailed below. Some of recommendations are being followed by public sector organizations; NGO's working in rural areas with the community and by some progressive growers and farmers organizations, but lot of Development strategies and policy issues as recommended in various reports yet to be implemented.

Water Related

Application efficiency

Although the water is the most precious resource in Balochistan yet the conveyance losses from source to field range from 20% to 30%. The channels are not lined and there is seepage of water from unlined channels. The unlevelled field further reduces the application efficiency from 10 to 15% In real term, application efficiency range is from 75% to 55%. By improving the application efficiency additional areas can be brought under high value crops like fruits and vegetables (Ahmad. S.2012).

The USAID assisted Project "US Assistance to Agriculture in Balochistan Border Areas (USABBA) "has conducted experiment on farmers' field by simply lining the channels and construction of water storage tank. The water losses were reduced and additional area was put under irrigation at three to four target areas of the Project (IMEC, 2011).

On Farm Water Management Directorate of the Department of Agriculture has also been actively involved in cooperation with the interested growers on cost sharing basis to reduce the conveyance losses by making lined channel and water storage tanks. However, due to budget constraints, the activities are limited and there is an urgent need to expand its activities and creating awareness among farming communities to follow the recommendations.

Harnessing flood water

As is evident from table 1 about 7.99 MAF flood water is available for irrigation but is not being utilized fully for want of storing this water in delay action dams or check dams and is going waste. According to rough estimates only 0.49 MAF is being used now. Flood Water seems to be the future hope for the Agriculture /Horticulture development of the Province if scientific approach is applied in designing structure and to check erosion of inlet and out lets in the embankments meant for the diversion of flood water.

The Provincial Government with the help of USAID has identified 26 delay action dams' sites to harness this flood water. Seventeen sites are located in the overdrawn basins like Pishin Lora, Nari River and Zhob River. Feasibility report has been prepared. According to feasibility report, the water to be stored in dams will be around 28,355 acre-feet and the command area of these dams is estimated to be 11,297 acres. The water available to over drawn basins will be 19,961 acre-feet and area to be irrigated will be 7490 acres (Government of Balochistan 2012).

However, the reports have emphasized that unless watershed management is not taken into consideration at the dam sites, the benefit expected would not be achieved. It is anticipated that this important aspect must have been considered and the community may have been made aware during the field visits for the identification of sites.

Production Related

Method of irrigation

Almost all reports dealing with Water Conservation have recommended that use of high efficiency irrigation like trickle or drip seems to be the only option left for growing high value crops particularly fruits. The areas where source of irrigation is tube wells and where the ground water depletion is of great concern; the drip irrigation will be a step forward in conservation of water. The present system of irrigation like flooding the orchard is outdated and there is tremendous wastage of water. Trickle irrigation system has been installed at Fruit Development Project. Transfer of this technology to the growers is needed and the farmers should be provided training.

Adjusting cropping pattern with water availability

Keeping in view the water constraint there is a need to adjust cropping pattern. Studies conducted under Project "Supporting implementation of IWRM Policy in Balochistan "has recommended adjusting the cropping pattern of all crops in various agro-ecological zones based on water efficiency and economical returns (Saeed., 2006).

In Balochistan for example, apple is the leading fruit crop covering 42% of the area under fruits. The annual water requirement of apple is 625 mm. However, 17% area under apple is located in those districts which are climatically not suitable and are also water deficient. Alternate crops equally economical with low water requirement like apricot, plums, peaches whose water requirement ranges from 400 mm to 450 mm

compared to apple are recommended. Water requirement of pomegranate, grapes and almond is 350 mm and fetches good price in the market (MINFA, 1998).

New crop like olive has been proved successful at Research stations and some growers are already planted in their orchards. Fig and pistachio are very hardy plants and their water requirement is far less than the crops grown at present. Fig is a very perishable crop if marketed fresh. However, if dried for which the technology is available, it will be very paying crop.

Management Operations

Range of cultural operations starting from land leveling, lay out of the fields, tree planting, fertilizer application, spray operations, picking, harvesting, and timely irrigation intervals as recommended are mostly carried out in orchards and for vegetable growing by seasonal labors. Barring few exceptions, most of the labors engaged are unskilled. Training of unskilled labors in Good Agriculture Practices (GAP) is very essential to increase the per unit yield which at present is far below its maximum potential.

Marketing and post-harvest handling

The Horticulture Policy document has recommended intensive training program for the unskilled labors that are hired for picking, harvesting of fruits. The training program should focus on latest techniques and using proper equipment to avoid deterioration in quality of fruit during harvesting. Improved packing materials namely card board instead of wooden crates which are being used now need to be introduced on large scale and labors need to be trained about the improved methods for grading and packing the fruits.

Support to marketing efforts for existing fruits and processed products which have potential for export is recommended. Enforcement of Market Information System and improvement of infra structure especially all weather-proof shade house for fruits brought to main markets will be a step forward for better reducing the losses during transportation.

Provision of cold stores in the production area along with training of the growers, technical staff for managing the cold stores is a prerequisite for the operation of cold stores and the persons responsible for operation and maintenance of cold stores must be trained. Fortunately, progress has been made to implement this recommendation. Under United States Department of Agriculture (USDA) through Winrock International under Pakistan Agriculture Cold Chain Development Project had provided financial assistance to the fruit growers of the Province for the establishment of cold stores in the production area.

Eleven cold stores for fruits like apples, cherries and other perishable fruits in the Districts Quetta, Pishin, Killa Abdullah, and Pishin have been constructed and all are functional. In addition to this, grape packing house are established at Mastung, Pishin and Killa Abdullah districts are also working. Mini cold store for dates at Turbat and banana ripening plant has been established at District Lasbella (USDA, 2011).

Institutional

Reorientation of research and development program

According to recommendations of the Horticulture Policy document, the research should be demand driven to address growers' problem at field level. The Provincial Agriculture Research Master Plan has already undertaken diagnostic survey by visiting the field of the whole Province and had involved farmers. A comprehensive report under Farming Research Component of the Project has identified the priority area

of research. The report was prepared in 1996 and needs to be revised as the conditions have been considerably changed due to drought spell, of 1998-2002.

Introduction/ selection of plants which are in demand at export market should be initiated as there is great demand of fruits/ vegetables in the neighboring countries like Iran, Middle East and Gulf States. Horticulture Research Stations/ Institutes need to be established in various Agro-ecological zones. Water Management Research should be obligatory cross cutting point in all the research programs. Breeding for hybrid vegetable seed should be initiated and progressive farmers are involved in seed production business.

Policy Guidelines

The following Policy Guidelines are suggested for the development of horticulture in the Province to the Government of Balochistan.

Production

- Horticulture sector to be accorded the status of industry.
- Switching gradually to efficient irrigation system. Efficient irrigation system should be linked with subsidy provided to the farmers on electricity for orchards.
- Fruit Plant nurseries should be registered. Plants should be certified by Federal Seed Certification Department.
- Strict Quarantine measures at sea port, air ports and border posts for the plants, seed imported
- Vapor Heat Treatment (VHT) technology for disinfestations of diseases and for extending the shelf life of fruits, vegetables, dried and processed fruits to be exported at air ports or sea ports.
- Incentive to growers for production of vegetable seed.
- Introduction of Crop Insurance.

Marketing, post harvest handling of horticulture crops

- Improvement of infra structure, paved roads from production area to market.
- Provision of technical assistance to the growers, persons engaged in marketing, grading, packing, and maintenance of cold stores.
- Credit facilities for cold storage, packing and grading house.
- Price support for perishable commodities.

Export oriented production

- Adoption of Good Agricultural Practices focusing on orchard hygiene and sanitation.
- Standardizing packing and grading according to the demand of Export markets.
- Vapor Heat Treatment (VHT) technology for disinfestations of diseases and for extending the shelf life of fruits, vegetables, dried and processed fruits to be exported at air ports or sea ports.
- To provide rebate in freight charges for the commodities to be exported for two to three years.

CONCLUSION

Balochistan is considered future fruit basket of the country. The main problems facing the Horticulture Sectors have since been identified and lot of reports, data is available in the Province for putting the Horticulture sector on firm footings. The only solution is to implement the recommendations on the ground. Some NGO's have already initiated to follow the recommendations in their target areas but that is only on limited scale.

If all the stake holders make some coordinated efforts for implementing the recommendations and if these recommendations are transferred to the end users in a proper way, most of the problems will be solved. Also, there is immense scope of exporting the fruits and vegetables to the neighboring countries and some farmers have already initiated the export of their fruits to Iran, Gulf countries and to some extent to Far East but efforts are needed to explore the markets and following the World Trade Organizations rules.

If a comprehensive Capacity Building Program is put into practice, there is no doubt that Horticulture sector will contribute to the economy of the Province and provide jobs to the people. This will be a step towards alleviating the poverty.

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