COMPETITIVENESS SUPPORT FUND
Linking Finance to Innovation and Competitiveness
House No. 53, Street 1, F-6/3, Islamabad, Pakistan. Tel: +92-51-2272042-3, www.competitiveness.org.pk

Horticulture Action Plan: Background Paper
July 2007

USAID FROM THE AMERICAN PEOPLE

MINISTRY OF FINANCE
GOVERNMENT OF PAKISTAN

DISCLAIMER

The CSF's experts endeavor, using their best efforts in the time available, to provide high quality services hereunder and have relied on information provided to them by a wide range of other sources. However, they do not make any representations or warranties regarding the completeness or accuracy of the information included this report.

The information provided in this is report does not necessarily represent the views or positions of the U.S. Agency for International Development, the Ministry of Finance, Government of Pakistan.

About the Competitiveness Support Fund (CSF)

The Competitiveness Support Fund (CSF) is a joint initiative of the Ministry of Finance (MoF), Government of Pakistan and the United States Agency for International Development (USAID). The concept of the CSF is based on similar funds established in other economies (i.e., India, Thailand, Turkey, Ireland and Finland) and benchmarked against these funds, structured according to the international best practices and tailored to the current Pakistani economic environment.

The CSF has been established to support Pakistan's goal of a more competitive economy by providing input into policy decisions, working to improve regulatory and administrative frameworks and working to enhance public-private partnerships within the country. The CSF will also provide technical assistance and co-financing for initiatives related to innovation and competitiveness, the private sector with research institutes, universities and business incubators that contribute to creating a knowledge-driven economy.

Acknowledgements: This document is based largely on the work of others and is intended to summarize that work as an executable plan. The CSF thanks all those who offered time and advice and provided written material used in this document.

CONTENTS

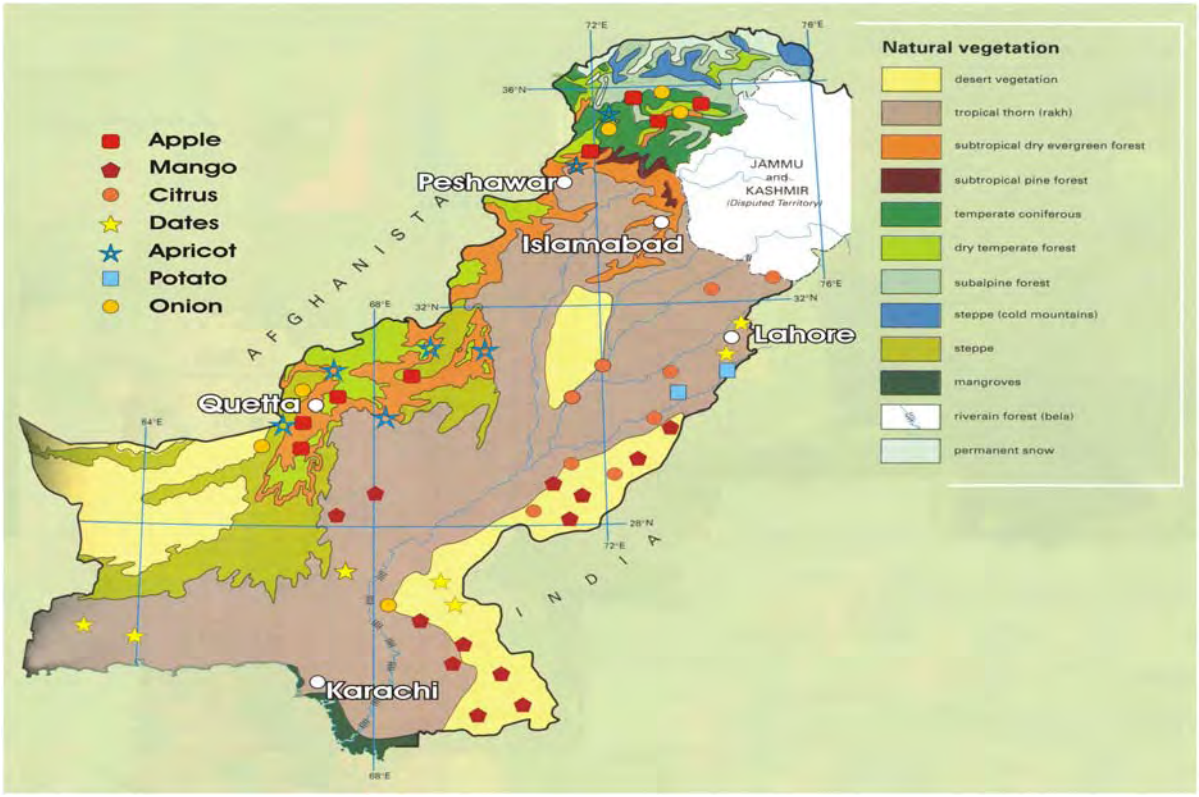
LIST OF APPENDICES

ACRONYMS

ABDP	Agribusiness Development and Diversification Project
ADB	Asian Development Bank
AMS	Aggregate Measure of Support
ASF	Agriculture Support Fund
CABB	Centre of Agriculture, Biochemistry and Biotechnology
CAJ	Concentrated Apple Juice
CEO	Chief Executive Officer
CPO	Crude Palm Oil
CSF	Competitiveness Support Fund
EPA	Environmental Protection Agency
FDA	Food and Drug Administration
FELDA	Federal Land Development Authority
FOB	Free on Board
FTA	Free Trade Agreement
GoP	Government of Pakistan
HACCP	Hazard Analysis and Critical Point System
IFPRI	International Food Policy Research Institute
JV	Joint Venture
LCC	Low Cost Countries
MI	Micronutrient Initiative
MINFAL	Ministry of Food, Agriculture and Livestock
MoF	Ministry of Finance, GoP
MoIP&SI	Ministry of Industries, Production and Special Initiatives
MoS&T	Ministry of Science & Technology
MRL	Maximum Residue Levels
NARC	National Agriculutral Research Centre
NBP	National Bank of Pakistan
NBFI's	Non Banking Financial Institutions
NCEMB	National Center of Excellence in Molecular Biology
NIAB	Nuclear Institute of Agriculture and Biology
NIBGE	National Institute for Biotechnology and Genetic Engineering
NNSP	National Nutrition Strategic Plan
NTB	Non-tariff Barriers
PARC	Pakistan Agricultural Research Centre
PCSIR	Pakistan Council of Scientific and Industrial Research
PFMA	Pakistan Flour Miller's Association
PK/O/M	Palm Kernels/Oil/Meal
PNAC	Pakistan National Accreditation Council
PNBC	Pakistan National Bio-Safety Committee
PSQCA	Pakistan Standards and Quality Control Authority
PPTA	Project Preparation Technical Assistance
PTA	Preferential Trade Agreement
R&D	Research and Development
SBP	State Bank of Pakistan
SME	Small and Medium Enterprise
SMEDA	Small and Medium Enterprise Development Authority of GoP

SPS	Sanitary and Phyto Sanitary
SRO	Statutory Regulatory Order (also referred to as a Statutory Notification)
SWOG	Strategic Working Group
TBS	Tariff Based System
TBT	Technical Barriers to Trade
TDAP	Trade Development Authority of Pakistan (earlier known as the Export Promotion Bureau)
TRQs	Tariff Rate Quotas
TUSDEC	Technology Up-Gradation & Skill Development Centre
UHT	Ultra High Temperature
UNFAO	United Nations Food and Agricultural Organisation
USD	United States Dollar
VAT	Value Added Tax
VCA	Value Chain Analysis
WB	World Bank
WTO	World Trade Organization

HORTICULTURE PRODUCTION IN PAKISTAN



Action Plan for Horticulture Industry Development in Pakistan

BACKGROUND PAPER

An Action Plan for the Government of Pakistan's approach to the horticulture industry was developed by the CSF in May and June 2007. It is based on work undertaken in the context of an overall Study of the Food Industry undertaken by the CSF[1].

This background document supports an MS PowerPoint presentation of the Action Plan.

1. FINDINGS

The main findings of the Study related to horticulture were:

- Harvest losses: 25 to 40 percent
- Exports only about 5% of total harvest
- Relatively low export price
- Difficulty maintaining quality at destination
- High air transport cost = Low profit margins
- Inadequate international market information
- Research & training lacking
- Information available, but implementation lacking

2. ISSUES

The main **agricultural** issues were[2]:

- Nearly all the Pakistani fruit crop volume is based on old cultivars introduced years ago
- Noticeable absence of modern cultivars
- Lack of cultivar diversity which limits the portfolio available for marketing
- water stress is a common limitation to realizing maximum yield potential
- long periods of drought have diminished plant vigor and negatively impacted fruit development and quality
- physiological disorders are accentuated by drought stress
- the most common type of irrigation used in Pakistan for fruit crop production is surface flooding
- very inefficient method of water application
- results in soil compaction and increased root rot disorders, including mango tree quick decline
- better methods of water application include drip irrigation for grapes and micro-sprinkler irrigation for tree fruit
- a serious disease complex endangering the mango industry is 'dieback' or 'quick decline'.

[1] Much of the data on horticulture is taken from work done by the PHEDB, other active industry stakeholders have also contributed.
[2] Reported by Dr. David Picha to PISDAC Horticulture SWOG

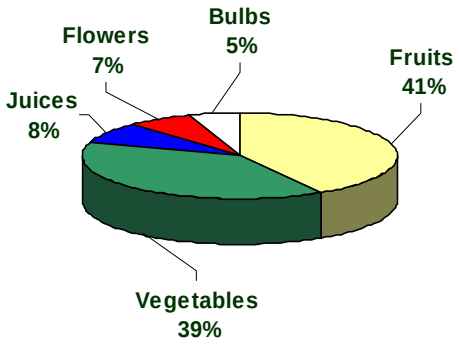
The main issues related to **quality** were:

- Lack of picking skills
- Low level of clean & hygienic handling
- Non-removal of field heat
- Inadequate grading
- Poor packing, storage, and transportation
- Correct temperature & atmospheric conditions for cold storage of Pakistani mangoes not established

3. INTERNATIONAL COMPETITION

The world market (estimated at $80 billion) offers considerable opportunities for the Pakistan industry, but also considerable challenges.

SHARES IN WORLD TRADE FOR DIFFERENT PRODUCTS[3]



International trends faced by Pakistan are:

- Fewer and larger packers/processors & handlers
- Packing houses and cold storage facilities in close proximity of production areas
- Stringent food safety requirements
- Automated systems for grading and packing
- Maritime transport in refrigerated containers

4. STRATEGIC FRAMEWORK

A strategic framework for the industry includes:

- Create conducive environment (Policy/Regulatory)
- Chase Export Target (US $ 600 - $1,000 million by 2012)[4]
- Create Brands–Pakistan recognition as a high premium/quality supplier
- Enter new markets – Especially top 20

[3] Source: PHEDB
[4] Target of $600 million estimated by PHEDB

- Exploit new products for exports – Peach, Pear, Apple , Plums, Apricot, Floriculture
- Adopt EurepGAP & HACCP certification
- Ensure international compliances (SPS, TBT, etc)
- Exploit niche markets (Organic foods)
- Develop world class infrastructure – cold storages, reefers, CFCs, agro processing zones
- Promote value addition
- Operational Linkages

5. POLICY AND REGULATORY ACTIONS

- National horticulture policy (In progress)[5]
- Trade policy (Incentives)
- Harmonization of grades & quality standards (mango, citrus, potato & onion)
- Branding (SUNPAK)
- EurepGAP certification (14 PMOs in process)
- HACCP certification (13)
- SPS (China, Iran, Philippines, Malaysia, USA?)
- FTAs

6. DEVELOPMENT PROJECTS

There are various development projects being undertaken nationwide at all levels.

- Technology for enhancing mango shelf life
- Special package for enhancing exports from Balochistan
- Value addition (tomato paste, fruit pulp, fried/dehydrated onion/vegetables)
- Flora project Punjab (CFC)
- Tunnel cultivation (flora & vegetables in Balochistan)
- EurepGAP mango (Multan)
- Centre of excellence (post-harvest)

The main agencies include:

- MinFAL - Overview of horticulture development at research and farm level
- PCSIR - Operates testing labs in major cities capable of undertaking SPS testing
- National Accreditation Council - Provides international certification e.g., EurepGAP
- PHEDB- Working on export strategy and related technical improvements and standards
- (ADB) ABD&DP -Is formulating a horticulture development policy
- ASF - Provides TA for certification
- PISDAC/SWOG - Industry discussion and development

[5] Being formulated by the ADB Agribusiness Development and Diversification Project, MinFAL

- Agricultural University of Faisalabad - Undertakes post-harvest research
- PAMCO - Is developing cool chains and stores at major airports
- NARC -Horticulture Institute
- SMEDA - Studies and mango pulp
- ACIAR/ASLF - Mango and citrus
- Pak-Swiss Malakand Fruit and Vegetable Development Project

7. ACTION PLAN APPROACH

The proposed Action Plan is based on the finding that many agencies are involved in the industry and that much good work is already being undertaken. However there may be a duplication of effort. GOP resources may not be used efficiently. Equally, a small effort and more coordination could move the industry past a "tipping point". Finance is an essential factor required to move the industry forwards. Many of the elements are in place that would enable the Pakistan horticulture industry to become a world-class industry if more focused and targeted efforts backed by finance are made.

In this case the CSF proposed that that these issues be tackled by a **Task Force for Horticulture Finance & Competitiveness (TFHF&C)**

8. TASK FORCE OPERATIONS

The TFHF&C would have a mandate with the following elements:

- **Vision** – a world class horticulture industry
- **Objective** – move the industry past the "tipping point"
- **Mission** – to facilitate the activities of the agencies involved in horticulture development
- **Mode** – action oriented aimed at de-bottlenecking
- **Outcome** – resources used efficiently

The Immediate Goal of the Task Force would be better coordinated efforts and more efficient resource allocation.

***Guidance* would be provided by the higher-level Task Force itself, *expertise* would be provided by the active agencies and projects and *coordination and support* would be provided by MinFAL and CSF.**

The Task Force does NOT aim to replicate work being planned by individual agencies, but provides a "clearing house" for information, resource allocation and coordination.

The TFHF&C would have the following membership:

- **Ministry of Finance (MOF)** – works with competitiveness and macroeconomic issues and has matching funds with CSF for capital investment

- **MINFAL**– has sector knowledge and people on farm and post-harvest with the ABD&DP and financial support for TA via the Agricultural Support Fund

- **Board of Investment (BOI)** – has the linkages with potential investors in the private sector

- **Commercial Banks (e**.g., National Bank, Habib Bank, Standard Chartered etc.) – to bring in the necessary finance from the private sector

- **Ministry of Commerce (MOC**)– Has policy and strategy for export trade with PHEDB

- **Ministry of Industry (MOI)** - works at industry level with PISDAC/Horticulture SWOG associations and stakeholders and has resources from SMEDA

- **Ministry of Health** – consumer awareness and nutrition

It is suggested that MOF provide the Chair for the main high-level Task Force with the support of a small **Policy and Coordination Secretariat** provide by the CSF.

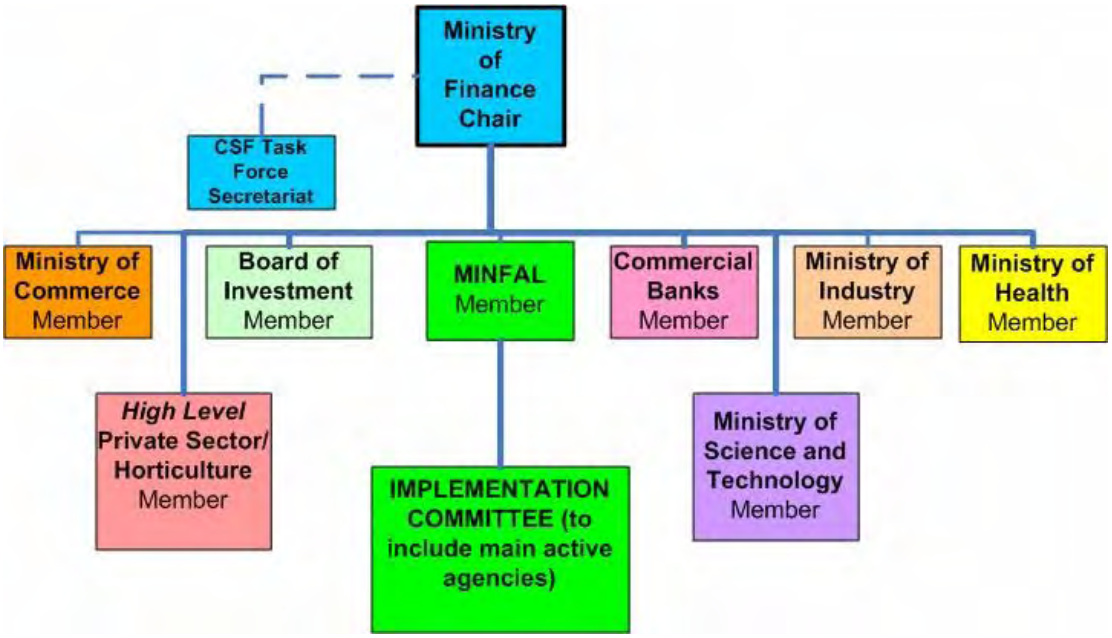
The TFHF&C, acting as a steering committee and meeting every 4-6 months, would appoint an **Implementation Committee** consisting of the technically qualified and active agents of the main members. These are:

- Pakistan Horticulture Export Development Board
- Agribusiness Development & Diversification Project
- Agricultural Support Fund
- SMEDA
- PISDAC/Horticulture SWOG

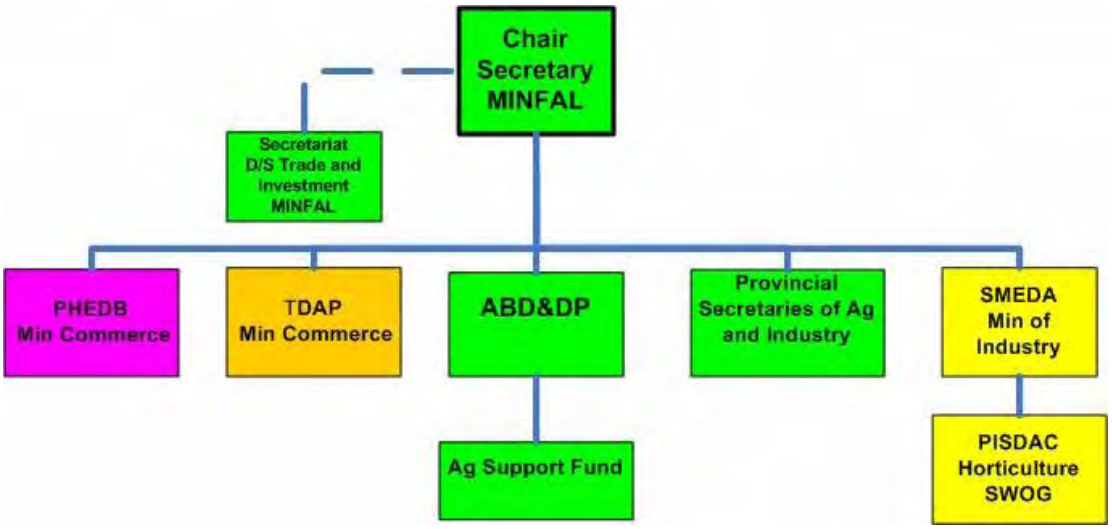
MInFAL would provide a **Technical Secretariat**. This Committee would meet at a minimum every month and be provided with reports and research to guide its decisions by the MinFAL and CSF Secretariats. The CSF (S) would have specialist staff experienced in all aspects of the industry and capable of crossing administrative boundaries. The Policy and Coordination Secretariat would employ as a Senior Advisor an international specialist with a significant reputation and work record in horticulture in Asia. The Secretariat would operate in close concert with the main operational agencies working under the line Ministries.

A suggested organization chart for the TFHF&C follows:

MAIN HIGH-LEVEL TASK FORCE



IMPLEMENTATION COMMITTEE



APPENDIX 1

THE HORTICULTURE INDUSTRY

Pakistan's climate is suitable for the production of various horticultural crops (see Table 5)[6]. As with other crops, it is the Punjab that dominates the production of both fruits and vegetables, accounting for 63% of fruits and 60% of vegetables. Citrus, especially the small fruit known as "kinnow" is produced in the largest volume around Sarghoda and forms the basis for a commercial juice industry in that area. Mango is also heavily produced in Punjab and comprises the second largest volume of fruit. It is consumed fresh and used for juice manufacture. Together these two fruits in Punjab alone account for 48% of all fruit produced in Pakistan. Balochistan produces the second largest volume of fruit, mainly apple and dates.

For vegetables, once again Punjab dominates with the production of potato. This vegetable represents 30% of all vegetables produced in Pakistan and is followed by onion. All other green vegetables are lumped into an "Other" category and are almost all consumed locally at a subsistence level.

TABLE 1: HORTICULTURE PRODUCTION

Item	Punjab	Sindh	NWFP	Balochistan	Pakistan
			000 tons		
Citrus	1,872	29	37	6	1,944
Mango	1,312	350	6	7	1,675
Dates	43	318	9	252	622
Banana	12	130	13	3	158
Apple	4		128	220	352
Other	954	118	320	495	1,887
All Fruits	**4,197**	**945**	**513**	**983**	**6,638**
Potato	1,850	3	125	48	2,026
Onion	265	711	211	579	1,766
Other veg	2,069	198	369	412	3,048
All Veg	**4,184**	**912**	**705**	**1,039**	**6,840**
TOTAL	**8,381**	**1,857**	**1,218**	**2,022**	**13,478**

Source: Pakistan Agricultural Statistics 2004/05

Little has changed in production technology, harvesting practices, packaging and post harvest care within the horticulture industry over the last decade. As a result the industry has been unable to establish itself in export markets or indeed to significantly improve the volume of output.

The lackluster performance of the horticulture industry in Pakistan is due to a multitude of factors. These include old cultivars, poor production practices (e.g., flood irrigation of fruit tress), poor pest management, inadequate harvesting and post-harvest procedures and a lack of infrastructure, especially cold storage. In summary, at least according to expert

[6] The most recent study of the industry is the report by Dr. David Picha for the Horticulture SWOG entitled "Pakistan Fruit Sector Analyses and Recommendations" 2007, unpublished.

agronomist, there is not one single aspect of the horticulture industry in Pakistan that is undertaken properly. As a result, the availability of fruit for export and for processing is limited.

Most of the fruit and vegetable production is consumed in fresh form. However, there is a small fruit and vegetable processing industry, which is concentrated around the major cities. There are 25 small and medium industrial units, having an estimated capacity of 45,000 mt, engaged in the production of squashes, jams and jellies, pickles and a small quantity of canned fruits and vegetables. The production of canned fruits is estimated at 15,000 mt; jams, jellies and marmalades at 2,000 mt; pickles and sauces at 10,000 mt and syrup and squashes at 18,000 million bottles. Most of the producers of these products are based in the urban areas. Approximately 30 fruit juice pulp processing plants with an installed capacity of 500,000 mt per annum are engaged in the production of fruit juices and fruit drinks

The traditional fruit and vegetable processing industries preserve a large quantity of various fruits and vegetables, by using traditional methods of preservation. The fruits and vegetables are dehydrated by exposing them to strong sunshine and hot wind. The use of dried fruits and vegetables was quite common in the past. With the development of modern means of transportation, cold storage the use of dried vegetables and fruits has reduced and as a result the production of dried fruits and vegetables is gradually decreasing.

The use of "*Murabbajat*" marmalades, traditional preparations from various fruits, is quite popular. Fresh fruits are converted into marmalades and used as a health food and medicine. Traditional doctors (*Hakeems*) treat a number of diseases with these marmalades. These marmalades are generally produced by the rural-based cottage industry, not using modern processing techniques or machinery. The annual production of *Murrabajat* marmalades is estimated as 30,000 mt/annum.

APPENDIX 2

TRADE IN HORTICULTURE PRODUCTS

The world horticulture market is valued at $80 billion to which Pakistan contributes an annual $130 million. Only about 16% of fruits are being processed although this activity offers great opportunities to augment volume of value added products using modern technology. The fruits and vegetables exported in fresh form attract discount prices because exporters are unable to provide adequate grading and packing. Once again value is lost from both the fresh fruits and vegetables and also from no-export grade produce that could be processed into e.g., juices, but which isn't because the processing capacity is not in place. To make this clear: Pakistan can produce a large range of tropical and temperate fruits and vegetables. The country loses value immediately at the post-harvest stage and then more value at the exporter level because of inability to meet standards. The non-export grade fruit swamps the domestic market, dropping prices while 3rd grade produce is lost entirely because it exceeds the capacity of the industry to process it into manufactured products.

Despite this situation the prospects for Pakistan's horticulture export industry remain good. Its share in the world market has risen steadily from about 5% in 1991 to 12% (value 2004). Potential markets exist in Europe and the Middle East but they need to be developed by the industry itself.

GLOBAL TRADE VERSUS PAKISTAN

	World	Pakistan
	US$ 000	
Apples	1,811,449	58
Banana	1,040,655	662
Mandarins	836,687	29,838
Mangoes	359,353	22,480
Onion	773,400	6,145
Potato	2,042,779	5,572

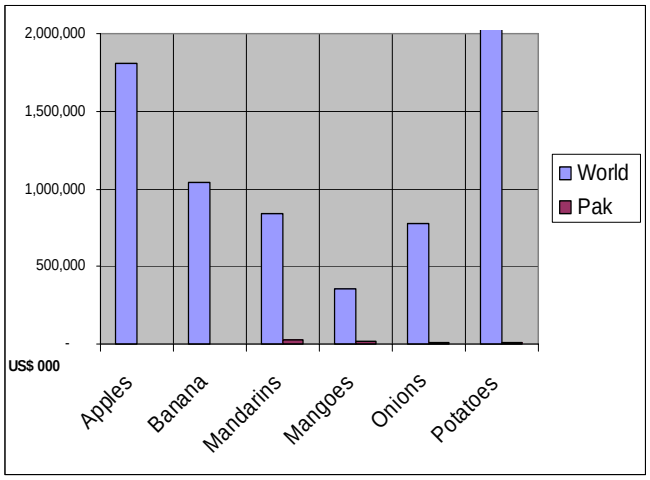


TABLE 1: EXPORTS OF PAKISTAN FRUITS AND VEGETABLES (2005/06)

Commodity	2001/02	2002/03	2003/04	2004/05	2005/06
Fruits					
Apple	299	78	61	62	59
Kinnow	20,842	21,704	30,763	20,683	38,965
Mango	14,036	17,626	23,426	15,953	32,353
Date Fresh	2,080	1,655	1,284	2,037	2,681
Date Dried	25,546	23,449	21,449	27,714	29,669
Other Fruits	20,268	18,643	25,696	24,793	24,957
All Fruits	**83,089**	**83,155**	**102,679**	**91,242**	**128,684**
Vegetables					
Potato	6,091	6,818	5,807	3,100	2,887
Onion	5,427	6,086	6,332	3,738	5,563
Other Vegetable	7,476	13,591	13,543	14,151	17,046
All Vegetables	**18,994**	**26,495**	**25,682**	**20,989**	**25,496**
Processed					
Juices	3,788	5,026	5,612	13,944	14,531
Total	**105,871**	**114,676**	**133,973**	**126,175**	**168,711**

Source: PHEDB

Commodity	World (MT)	Pakistan (MT)
Mandarin	2,733,569	149,587 (5.5%)
Mango	820,877	77,468 (9.4%)
Dates	611,217	64,923 (10.6%)
Potato	8,775,150	20,762 (0.2%)
Onion	4,617,766	29,597 (0.6%)

Source: PHEDB

APPENDIX 3

CASE STUDY OF THE APPLE JUICE VALUE CHAIN

The juice and beverage industry is one of the largest industrial sectors in Pakistan. Currently, of an estimated one million metric tons[7] of cold beverages sold in Pakistan each year, 90% represent carbonated soft drinks (i.e., sodas, of which most of them are colas). The remaining 10% of cold beverages purchased and consumed (100,000 tons) are juices, nectars and still water. Of these, 10% (10,000 tons) represent the approximate sales of 100% pure juice. Most of the existing fruit juice factories operate in Lahore, Bahawalpur, Karachi, Hyderabad, Hattar (NWFP), Lorali, and Sargodha. As reported by SMEDA, 24 formal fruit juice and pulp processing facilities, plus a number of small informal factories are operating in Pakistan. Estimated installed capacity is approximately 400,000 metric tons per year with a growth rate of 20% to 25% based on a total fruit juice market of Rs2.5 – Rs2.6 billion.

The beverage market in Pakistan is expected to grow at between 20% - 25% per annum. While demand may increase, what is not clear is which sector of the market, and product groups are likely to benefit from this growth. If the market continues to grow as it has in the past several years, the largest growth is likely to take place in the carbonated soft drink sector where investments in sales campaigns continue to overshadow the non-carbonated soft drink market because local juice manufacturers generally do not have the resources to compete e.g., with Coca-cola or Pepsico. Nevertheless, given a more reliable supply of raw material and sufficient investment in advertising and marketing, opportunities exist for the juice industry to influence consumption patterns and consumer preferences towards greater consumption of pure juice and high juice content drinks.

The market for 100% pure juice ("nectar") in Pakistan will grow only slowly over time. Not only does a 100% pure juice product cost more than the juice drink, soft drink and bottled water alternatives, but that the general populace has limited discretionary income (and juice definitely represents a discretionary purchase); has limited knowledge of the nutritional differences between fruit drink (10% - 15% pure juice) and 100% pure juice; and make cold beverage purchase decisions based on the following order: price; taste; and brand.

Taking into account consumer and market conditions, Pakistan juice processors have chosen not to invest in equipment and processes that would convert fruits directly into 100% pure juice. For example, many apple juice manufacturers have chosen to import 100% juice concentrate (CAJ) from Iran; blend that concentrate and package it to sell as 250ml or one liter 100% pure juice consumer products in Pakistan. Making a 100% pure juice product in this way saves not only the additional capital required to purchase extra juicing equipment – and perhaps the building and land on which to operate it, but also the continual operating and maintenance costs associated with the extra juice-making machinery.

The commercial success of a fruit juice processing facility is dependant on:

- the continuous availability of raw material,

[7] Global Development Studies: Value Chain analysis for World Bank

- cost and quality of electricity,
- an efficient distribution infrastructure, including a cold chain for fresh juices and juices in non-aseptic packaging.

The example taken for value-chain analysis is that of apples[8], however most of the larger manufacturers are able to use fruit juice concentrate from any fruit source, so the lessons learned are generally applicable to the fruit juice sector as a whole.

Pakistan has a good *potential* supply of apples originating from temperate areas in some of the poorest parts of the country. However, on-farm, post-harvest and pre-processing losses of apples and other fruits continue to be substantial, often contributing to limited and inconsistent supply of raw material for juice manufacturers. A number of solutions are suggested[9] including:

- Improving the apple grading and sorting process at the farm
- Forward-contracting:
- Local processing facilities closer to the source of raw material:
- Introduce the use of mobile semi-processing units:

Once fruits are harvested, they are transferred by truck to a processing facility. While harvested most fruits should be processed within 48 hours of picking, given poor road conditions and limited logistical management capacity, apples are often not delivered to the processing facility until 5 to 7 days after they have been picked. This contributes to high pre-processing losses.

After arrival at the processing facility, fruits may be temporarily stored before they are processed. Investment required to develop a reasonably high quality storage area can be as much as Rs10,000,000, with a monthly operating expense of approximately Rs22,000. After the fruits are washed, sorted, graded, cut and cored, they are made into a pulp which is either stored and sold to end users such as bakeries, confectioners, and other food processing companies, or are used to produce juice. Given the limited and inconsistent supply of fruit and the high cost of electricity, there is only limited bulk storage of juice concentrates. In fact, much of the juices are packaged immediately into 250ml Tetra Pak for the consumer market.

After receiving fruits at the processing facility, the raw material is washed, cut and (in the case of apples) cored or de-stoned (mango). Then the fruit is cooked and mashed to produce pulp. Once the pulping process is completed, the pulp is transferred to a barrel for distribution. The stored pulp generally has three channels through which it is distributed:

- Immediately transferred to end users such as bakeries, baby food manufacturers, and confectioners.
- Distributed to a canning facility where jams and other preserves are produced.
- Put into a cold storage for transfer to a juicing factory.

[8] Data for this analysis are taken from the excellent work done by Global Development Services for the World Bank's study on competitiveness, so far unpublished

[9] For very detailed technical recommendations the reader is referred to the report (unpublished) by David Picha for the Horticulture SWOG

During the pulping process, processors are generally able to yield 1.4% of the total weight of e.g. fresh apples in double strength, and 94.4% in single strength pulp. The remaining 4.1% of the weight is waste, which is sold to animal feed manufacturers and other secondary and tertiary by-product processors.

Juice production consists of four major stages: preparation; processing and pasteurization; packaging; and packing. The three highest value adding activities are packaging(65.8%); processing (22.9%); and the raw material - apples (9.2%). This distribution of value-added would be representative across the board for all fruit juices. The greatest value added was the Tetra Pak packaging material at 98.7%, at US$179.40/1,000 liter of 250ml consumer packets, or US$0.042/250ml packet and US$0.0018/straw. The third largest cost was electricity at 0.9%, or approximately US$1.70/1,000 liters of 250ml packets. Inputs such as sugar, electricity and water will be discussed in detail in a later chapter since they directly affect competitiveness of the entire industry. However, note that for fruit juice sugar constituted 92%, approximately US$0.009/250ml packet. Cooking costs approximately US$65.17/1,000 liters of 250ml packets, of which US$64.33 (98%) constituted natural gas costs, and 2% value added came from electricity. The processing factories use natural gas to heat the boilers, which in turn provide the heat for cooking. Reducing the natural gas costs may require increasing boiler efficiency and/or redesigning the cooking and/or pulp-making process.

TABLE 1: PRODUCTION COSTS AND MARGINS OF APPLE JUICE

	10% drink *Rupees per 250 ml pack*	**100% "Nectar"**
Paper	3.00	3.00
Sugar	0.75	nil
Pulp or concentrate	0.25	4.00
Additives	0.10	nil
OH	0.50	0.50
Other	0.20	0.20
Production Cost	**4.80**	**7.70**
Retail price	8.50	14.50
Margin	**3.70**	**6.80**
% Margin	*77.10*	*88.30*

Source: Global Development Solutions LLC/World Bank

Given that packaging represents such an important element in fruit juice manufacture, it must be considered in greater detail. The most common form of packaging for local fruit juice is a 250ml carton. Tetra Pak dominates the formal sector in this market accounting for an estimated 61% of all costs associated with processing. Given the absence of a well established cold chain, Tetra Pak thoroughly researched the need for long shelf life, refrigerator-free packaging and designed both machines and its packaging material to offer an excellent end product; no other companies have seriously challenged Tetra Pak with another packaging or product that performs as well at the same or lower cost.

There are three other packaging options available to juice manufacturers, none of which are economically viable for this particular product. The three packaging options include aluminum laminated pouch packs; tin packaging; and glass/plastic bottles. Transport packaging consists of the tray onto which the 250ml consumer packets are placed, and the shrink-wrap that secures the packets onto the tray. While the transport packaging cost per milliliter could be reduced by increasing the size of consumer packets to 500ml or one liter, the processor would have to consider the possibility of selling less drink overall, as many consumers on a limited budget might not buy larger packets. Also in a 250ml/packet size, some consumers may consider the juice drink an "impulse" purchase.

Juices are consumed in rural and urban centers alike, but with the exception of large manufacturers like Shezan, which manages a national distribution system, the distribution reach of most juice manufacturers is confined to the city and surrounding areas in which the juice is produced. Where juice manufacturers distribute outside the immediate proximity, a wholesaler would be designated to a particular city or wholesale area, which generally covers department stores, supermarkets and bakeries. Secondary wholesalers are also used for distribution, particularly in rural areas, to distribute to convenience stores, town shops and local bakeries. The distribution agent, on the other hand, handles city markets and institutional sales such as hotels, hospitals and schools.

There are several key distortions that impact the competitiveness of the juice sector. The four major distortions include: weak labeling standards; poor road conditions/pre-process losses; lack of continuous supply of fresh fruits. It is estimated (World Bank op.cit) that these distortions lead to an opportunity cost of as much as $69.8 million per annum for the apple juice industry alone.

TABLE 2: OPPORTUNITY COST LOSSES FOR APPLE JUICE

Weak labeling standard	**$6,500,000**
Increase in juice sales (tons)	10,000
Selling price ($/ton)	$650
Poor road conditions/pre-processing loss	**8,786,979**
Production of apples	315,430
Transport losses	30%
Apple-juice conversion ratio	7
Selling price ($/ton)	$650
Lack of continuous supply of apples	**$39,000,000**
Installed capacity of juice processing facilities (tons)	400,000
Capacity utilization	35%
Current capacity utilization	20%
Potential production volume (tons)	60,000
Selling price ($/ton)	$650
Increased price of sugar	**$15,576,600**
Selling price ($/ton)	$650
Margin (%)	77%
Estimated production cost	500.5
Reduction in sugar cost	22%
Revised production cost ($)	390.9
Revised margin	259.61

Potential production volume (tons)	60,000
TOTAL OPPORTUNITY COST	**$69,863,579**

Source: Global Development Solutions LLC/World Bank

APPENDIX 4

SANITARY AND PHYTO-SANITARY ISSUES

Pakistan faces significant non-tariff barriers to trade related to poor performance in the area of SPS compliance. The WTO Agreement on the application of SPSC measures specifies that countries should base their technical regulations on international standards. If they conform to these international SPS measures then there should not be barriers to trade. The way this procedure operates is that imported products require certificates issued by internationally accredited bodies or exporting authorities in the exporting country. Recent outbreaks of food born diseases such as BSE have emphasized the importance of these regulations. At the same time, if domestic industries comply with these requirements then the overall health of the population should improve.

Pakistan has been subject to a number of bans, for example on meat to the Middle East, animal casing to Romania and potato to the Russian Federation. Most recently fish and seafood exports have been banned to the EU following a 2007 inspection of Karachi Fish Harbour that found unhygienic conditions. During 2004-05 the country was subject to 26 EU food alerts (see table).

TABLE 1: FOOD ALERTS NOTIFIED TO THE EU

Date	Notifying Country	Product and Reason
26-01-04	Italy	Chick peas – rodent faeces
06-04-04	Germany	Spice mixes – unapproved color additives
07-05-04	UK	Chilli pickle – erucic acid
25-05-04	Greece	Masala spice mixture – erucic acid
27-02-04	Norway	Chilli powder - aflatoxin
21-02-05	Austria	Bitter apricot kernels – Hydrocyanic acid
01-03-05	Italy	Sesame seeds - bacteria
13-03-05	UK	Chilli powder - aflatoxin

Source: Pakistan's Agro-based Exports & Sanitary and Phyto-sanitary (SPS) Compliance, Joint UNIDO and World Bank Study

Two kinds of standards must be distinguished: these are:

a. **Product standards** which relate to the characteristics that the goods posses, including size, shape, appearance, chemical residues
b. **Process standards** that relate to the way and place in which the products are manufactured and packaged.

Pakistan's food industry is generally deficient in both these areas for reasons that have been mentioned repeatedly in this Study. Product standards are usually deficient because consumers are often unwilling to pay for high quality products and don't insist on adequate packaging and labeling. Equally there is a lack of enforcement (e.g., of laws dealing with adulteration) and a lack of knowledge by manufacturers of what is required. This is

especially true when it comes to process standards. Poor understanding of technical processes and the need for "food standard" buildings and machinery is a major characteristic of the industry.

There is a hierarchy of SPS issues and actions as follows:

TABLE 2: MAJOR SPS ISSUES FACING PAKISTAN

Measure	**Issues and actions**
Awareness and recognition	Consumers and other stakeholders must be aware of the issues of hygiene and contents. The link between nutrition and health must be established
Application of good basic practices	Such as EuroGAP and HACCP including traceability
Suitable and applied regulations	Food laws and regulations must be relevant, in place and enforced
Clarity of institutional structures and roles	Functions of various institutions often overlap or are dysfunctional. Some necessary institutions may be lacking
Risk management	National competent authorities have to be able to respond to the development of the more basic elements of the SPS measures
SPS diplomacy	WTO members need to set agreed international standards

Source: UNIDO and the World Bank Study op.cit.

TABLE 3: SPS ISSUES IN HORTICULTURE

Key SPS Measures	Issues and Actions
Compliance	In 2004 Pakistan ranked 32nd in the number of countries with consignments rejected by the EU. The majority of notifications are for processed products.
Pesticide residues	Maximum residue levels (MRLs) are exceeded. Studies suggest serious misuse of pesticides.
Traceability	Farm and market records are non-existent. Such records are essential for exports to USA and Europe
Terrorism impact	Need for detailed records of origin by exporters to the USA
HACCP and GMP certifications	Some progress has been made with pack houses but it is limited. HACCP needs top be combined with Good Manufacturing Practices
EuroGAP	E-GAP certification is a focus for development especially in the mango industry.
Post-harvest treatments	Specific post-harvest treatments are prescribed for exports e.g., of mango and kinnow. The industry is making some progress but facilities are generally inadequate and knowledge is lacking
Irradiation	There is some capacity in Pakistan. Irradiation is not always required
Pest risk assessment	Pakistan must be able to provide evidence of pest free areas

Source: UNIDO and the World Bank Study op.cit.

APPENDIX 5: EUREPGAP

EurepGAP started in 1997 as an initiative by retailers belonging to the Euro-Retailer Produce Working Group (EUREP). British retailers in conjunction with supermarkets in continental Europe were the driving forces. They reacted on growing concerns by the consumers with product safety, environmental and labor standards and decided to take more responsibility for what happened in the supply chain.

EurepGAP is a private sector body that sets voluntary standards for the certification of agricultural products around the globe.
EurepGAP is an equal partnership of agricultural producers and retailers which want to establish certification standards and procedures for Good Agricultural Practices (GAP).
EurepGAP is a pre-farm-gate-standard that means the certificate covers the process of the certified product from before the seed is planted until it leaves the farm. EurepGAP is a business-to-business label and is therefore not directly visible for the consumers.

The EurepGAP standard is primarily designed to maintain consumer confidence in food quality and food safety. Other important goals are to minimize detrimental environmental impacts of farming operations, optimize the use of inputs and to ensure a responsible approach to worker health and safety.

APPENDIX 6

HAZARD ANALYSIS AND CRITICAL CONTROL POINTS

HACCP has the following objectives:

- Analyze hazards. Potential hazards associated with a food and measures to control those hazards are identified. The hazard could be biological, such as a microbe; chemical, such as a toxin; or physical, such as ground glass or metal fragments.

- Identify critical control points. These are points in a food's production--from its raw state through processing and shipping to consumption by the consumer--at which the potential hazard can be controlled or eliminated. Examples are cooking, cooling, packaging, and metal detection.

- Establish preventive measures with critical limits for each control point. For a cooked food, for example, this might include setting the minimum cooking temperature and time required to ensure the elimination of any harmful microbes.

- Establish procedures to monitor the critical control points. Such procedures might include determining how and by whom cooking time and temperature should be monitored.

- Establish corrective actions to be taken when monitoring shows that a critical limit has not been met--for example, reprocessing or disposing of food if the minimum cooking temperature is not met.

- Establish procedures to verify that the system is working properly--for example, testing time-and-temperature recording devices to verify that a cooking unit is working properly.

- Establish effective recordkeeping to document the HACCP system. This would include records of hazards and their control methods, the monitoring of safety requirements and action taken to correct potential problems. Each of these principles must be backed by sound scientific knowledge: for example, published microbiological studies on time and temperature factors for controlling foodborne pathogens.

APPENDIX 7

LIST OF PRINCIPLE PERSONS CONSULTED[10]

1 Mr. Ishfaq Ahmed Afridi
Manager Associate
Small and Medium Enterprise Development Authority
Ministry of Industries Productions & Spicial Initiatives Government of Pakistan
State Life Building The Mall Peshawar Cantt
Tel: 091-111-111-456-091-9213046-47 Fax: 091-5268908
E mail-: iafridi@smeda.org.pk

2 Mr. Muhammad Ali Gardezi
Managing Director
Punjab Small Industries Corporation
4th Floor LDA Plaza Egerton Road
Lahore Pakistan
Tel 042-9200453-9200463 Fax: 042-9200464
E mail :- maligardezi@yahoo.com

3 Mr. Ali Sarfraz
Chief Operating Officer
SME Business Support Fund
Office # 304 Siddiq trade Center main Boulevard Gulberg
Lahore Pakistan
Te:- 042-5782008 -042-5782013Cell: 0301-8420232
Fax :- 042-5781814
E mail :- ali.sarfraz@bsf.org.pk

4 Mr. Nasim Raiz
Chief of Section (ECA)
Planning & Development Department Lahore
Pakistan
Tel:-042-9210889

5 Naheed S Durrani
Additional Secretary (Implementation)
Service General Administration & Coordination Department
Government of Sindh Karachi Pakistan
Tel: 021-9213326-7
E mail:-naheedsd@gmail.com

6 Dr. Badaruddin Soomro
Chairman

[10] This list is a sub-set of those met concerned with horticulture during preparation of the Food Industry Study undertaken by CSF; a full list is found in that Study

Ministry of Food, Agriculture & Livestoke Gove of Pakistan
Tel: 051-9203966-051-4445109 Fax: 051-9203312
E mail-; chair@isb.comsats.net.pk

7. Syed Mohammad Ali
Assistant Representative
Food & Agriculture Organization Of The United Nations
UN House, 5th Floor,Saudi Pak Tower
61-A,Jinnah Avenue,P.O. Box 1476,Islamabad
Tele:051-2800086
Fax:051-2800054

8. **Sajid Naseer Khan**
General Manager
Punjab Vocational Training Council
98-B/3,Gulberg III, Lahore
Tele:5714428,5872044-48
Fax:5872040
E-mail:pvtc_gm@hotmail.com

9 **Dr . Kausar Abdulla Malik**
Member(Biosciences & Administration)
Pakistan Atomic Energy Commission
PAEC Headquarters,P.O Box 1114
Islamabad,Pakistan
Tele:9203149
Fax:9205385

10. **Muhammad Rashid**
Ph.D, Soil Science
Soil & Water Conservation Research Institute,Chakwal
Tele:594500
Fax:594504
E-mail:rashid42pk@yahoo.com

11. **Dr. Ronny Adhikarya**
Representative
Food & Agriculture Organisation of the United Nations
5th Floor,Saudi Pak Tower,61-A,Jinnah Avenue
P.O. Box 1476
Tele:2800032
Fax:2800054

12. **Ali Raza**
Head
IUCN
FT-4 10/11 Parin Lodge,Bath Island Road,Clifton
Karachi 75530,Pakistan
Tele:021-583-2913/5374072-75

Fax:021-5838106-5835760
E-mail:ali.raza@khi.iucnp.org

13. **Ikramullah Khan**
Chairman
Saeed Acres Fruit Farms
Drub House,20,Chinar Road,University Town,
Peshawar
Tele:091-5850482
Cell:0345-9131802
E-mail:drubhous@brain.net.pk

14. **Dr. Fayyaz Ahmad**
Chief Executive
ECO Foods
14-km,Multan Road Lahore,Pakistan
Tele:042-7511506
Fax:042-7511844
Cell:0300-8440216
E-mail:abt_8@hotmail.com

15. **Khalid Khan**
Chief Executive
Agribusiness Support Fund
144-CCA,Phase IV,DHA,Lahore
Tele:042-5749083
Cell:0300-8816100
Fax:042-5749084
Email:khalid.khan@asf.org.pk

16. **Kamaran Masood**
Financial Analyst/Investment Advisor
Agribusiness Support Fund
144-CCA,Phase IV,DHA,Lahore
Tele:042-5749083
Fax:042-5749084
Email:kamran.niazi@asf.org.pk

17. **Haider Ali Babarkhail**
Area Development Manager
The Bank of Khyber
Charsadda Branch,Mardan Road
Charsadda
Tele:021-511329
Cell:0320-5227417
Email:haiderworld@hotmail.com

18. **Syed Sarfraz**
National Sales Manager

Faraz Foods
14 km,G.T Road More Eminabad,Gujranwala
Pakistan
Tele:92-55-3263827
Fax:92-55-3269091
Email:faraz_foods@yahoo.com

19. **Javed Iqbal**
Chief Executive
Faraz Foods
14 km,G.T Road More Eminabad,Gujranwala
Pakistan
Tele:92-55-3263827
Fax:92-55-3269091
Email:faraz_foods@yahoo.com

20. **Manzoor Rehman**
Senior Project Implentation Specialist
Asian Development Bank
OPF Building,Shahrah-e-Jamhuriyat
G-5/2,Islamabad,P.O. Box 1863
Islamabad
Email:mrehaman@adb.org

21. **Salman Ahmad**
Senior Advisor
PISDAC
49-J Model Town Lahore,Pakistan
Tele:042-5847906
Fax:042-5847905
Email:salman256@gmail.com

22. **Bashir Ahmed Nadim**
Managing Director
Lasbela Industrial Estates Development Authority
Tele:0853-33320
Fax:0853-32470

23. **Muhammad Ashraf**
Director General
AHK National Centre for Rural Development & MA
Ministry of Local Government & Rural Development
Park Road,Chak Shahzad,Islamabad
Tele:9255154
Fax:9255157
Email:dgncrd@isd.wol.net.pk

24. **Fazal A. Nizamani**
Project Director
Government of Sindh

Barrack No. 87-88
Sindh Secretariat # 4-B,Opp.Sindh Assembly Building
Karachi
Tele:021-9206396
Fax:021-9206393
Email:fnizamania@yahoo.com

25. **Iihamddin**
Deputy Director
Federal Seed Certification & Registration Department
608 Benevolent Fund Building,Peshawar Cantt,Peshawar,NWFP
Pakistan
Tele:091-9213010
Fax:091-9213010
Email:ilham@brain.net.pk

26. **Dr. Kauser Abdulla Malik**
Member
Planning Commission,Government of Pakistan,P- Block,Pak Secretariat
Islamabad
Tele:051-9201974
Email:kamalik@comsats.net.pk

27. **Dr. Abdul Hayee**
Agricultural Marketing Specialist
Social Sciences Division
20-G-5/1 P.O. Box 1031
Islamabad 44000
Pakistan
Tele:051-9202548
Fax:0519202968
Email:ahqureshi75@hotmail.com

28. **Muhammad Akbar Khan**
Managing Director
N.W.F.P Small Industries Development Board,Kohat Peshawar
Tele:091-9212224
Cell:0300-9081261

29. **Mansur Arifeen**
Chief Executive
PAMCO
2nd floor,Building # 3,Associated House,7- Egerton Road Lahore
Tele;042-9204421
Fax042--9204420
Email:marifeen@pamco.bz

30. **Tajammal Hussain Nisar**
Provincial Coordinator
Agribusiness Development & Diversification Project
Tele:042-042-5899765
Fax:042-5749081
Email:thinsar@gmail.com

31. Dr Tariq Ahmed
Agribusiness Specialist
Agribusiness Development & Diversification Project
Government of Pakistan Ministry of Food,Agriculture & Livestock,144-CCA,
Phase -IV,D.H.A. Lahore
Tele:042-042-5899765
Fax:042-5749081

32. Agha Muhammad
Media Consultant
PHEB
Head Office,2nd floor,126 y Commercial Area
Phase III Dha,Lahore
Tele:111-111-742
Fax:042-5727160
Email:aajamal@phdeb.org.pk

33. Afaq Tiwana
Chairman
Agrimall
1st floor,Mustafa center,45-F,Main Market Gulberg II,Lahore 54660
Tele:042-5788221-4
Fax:042-5788231
Email:afaq-tiwana@agrimall.net

34. Imtiaz Z. Nasir
Business Development Officer
PAMCO
2nd Floor,Building # 3,Associated House,7-Egerton Road,Lahore
Tele:042-9204421
Fax:042-9204420
Email:imtiaz@pamco.bz

35. Dr. Amanullah Malik
Assistant Professor
University of Agriculture,Faisalabad,38040
Tele:041-9200161
Fax:041-2602171
Email:malikaman1@tahoo.com

36. Dr. M.A Pervez
Professor/Diector
Institute of Horticultural Sciences,University of Agriculture,Faislabad
Tele:00092-41-9201086
Email:pervez62@hotmail.com