*CHAPTER-1*

# INTRODUCTION TO AGRICULTURE AND SEED INDUSTRY DEVELOPMENT IN PAKISTAN

## 1.1 INTRODUCTION

Pakistan is located on a great land mass north of tropic of cancer, between latitude 23° and 37° and longitude 61° and 75° east. It is bounded in the north west of Afghanistan, in the north by China, in the east by India and in the south by Arabian Sea. Administratively, Pakistan is divided into four provinces i.e. Punjab, Sindh, NWFP and Balochistan plus the State of Azad Jammu and Kashmir and several federally administrated tribal areas located in north west. The land scape of the country has four major distinct physical regions, i) Mountains, ii) Indus Plains iii) Sand Plains and iv) Plateau of Balochistan and Potohar. The population is estimated to be 140.50 million with a density of 176 person per km sq. Population growth per year rate is about 2.2 per cent. The literacy rate is around 59 per cent (Anonymous, 2001).

## 1.2 AGRICULTURE SECTOR

Pakistan has a geographical area of 796095 sq. km. Out of this area, about 58.50 million hectares is under cultivation. Land holding is very small in Pakistan. About 54296 families in the rural area are land less. The country has 67.3 per cent population in rural area. The total number of farmers in Pakistan is less than five million majority of which are under five hectares (Table-1.1).

**Table-1.1 Land utilization and farm distribution**

| Land use | Area (Million hectare) | Farm size (Hectares) | No. of farmers (Millions) |
|---|---|---|---|
| Total area reported | 59.28 | Small Farm (under 5 ha.) | 4.10 |
| Cultivated area | 21.99 | Medium Farm (5-10 ha.) | 0.62 |
| Forest area | 3.66 | Large farm (10 ha. and above) | 0.35 |

*Source: Agricultural Statistic of Pakistan, (1999-2000) MINFAL, Islamabad.*

Pakistan is a region of diversified agro-ecological climate from extreme cold to tropical and semi-tropical. Indus river is the largest river in Pakistan, covering approximately 80,000 sq. miles. Agriculture mostly depends on irrigation from canal. Pakistan has the largest canal irrigation system in the world. It irrigates about 70 per cent of the total agriculture land. Rest of the land is irrigated by tubewel (27%) and by other means. The north slopes of the Himalayas and sub-mountain tracts receive annual rainfall varying between 30 to 50 inches. Balochistan and part of Sindh provinces are the desert parts of the country where normally not more than 10 inches rainfall is registered. Pakistan has mainly kharif (winter) and Rabi (summer) seasons for agricultural crops. Food grains dominate the cropping system. They occupy 12.55 million hectares. Almost all types of crops can grow successfully in country.

However, major crops grown are wheat, cotton, rice, maize, sugarcane and potato. Good prospect exist for enhancing productivity as only one third of the established genetic potential is realized from existing crops varieties.

## 1.3 CONTRIBUTION OF AGRICULTURE

Agriculture is the largest sector of Pakistan's economy. It provides an employment to about 50 per cent of the labour force. It contributes about 25.0 per cent to GDP (Table-1.2).

**Table-1.2 Sectorial shares (%age) in GDP (at constant factor cost)**

| Major Sectors | Years | | | |
|---|---|---|---|---|
| | 1997-98 | 1998-99 | 1999-2000 | 2000-01 |
| Agriculture | 26.0 | 25.7 | 25.9 | 24.7 |
| Major crops | 10.7 | 10.4 | 10.9 | 9.9 |
| Minor crops | 4.8 | 4.9 | 4.8 | 4.2 |
| Livestock | 9.3 | 9.3 | 9.2 | 9.3 |
| Forestry | 0.1 | 0.1 | 0.1 | 0.4 |
| Trade (Whole sale & Retail) | 15.4 | 15.2 | 14.9 | 15.2 |
| Other Services | 8.9 | 9.1 | 9.3 | 9.6 |

*Source. Economy Survey (2000-01) Ministry of Finance, Government of Pakistan*

The performance of agriculture sector depends to a large extent on the vagaries of nature. Despite all the factors, the agriculture sector registered a growth rate of 5.84 per cent as compared to 1.95% last year (1998-99). During current fiscal year (1999-2000), Pakistan has harvested 21.079 million tons of wheat. The investment in agriculture sector has increased from 22 billion (Pak. Rs.) in 1997-98 to 45.90 billion in 1998-999. To mobilise the agricultural resources and to increase the availability of various agricultural inputs, the government has increased credit limit from Rs.40 billion in 1998-99 to 50 billion in 2000-2001, (Anonymous,2000).

### 1.3.1 Agriculture's Share in Trade

Agriculture is the major foreign exchange earning sector. Pakistan's export grew at an average rate of 7.6 per cent per annum during the first eight years from 1990-91 to 1997-98 but later on, it has fluctuating trend. Cotton and rice are the main export commodities (Table-1.3).

**Table-1.3 Export of major agricultural commodities (Figs. in Rs. million)**

| Years | Fish & Fish preparation | Cotton yarn | Rice | Raw Wool |
|---|---|---|---|---|
| 1997-98 | 7374 | 49988 | 24562 | 293 |
| 1998-99 | 6175 | 47421 | 26825 | 134 |
| 1999-2000 | 7191 | 55815 | 27944 | 61 |
| 2000-01 (P) | 6223 | 44800 | 23085 | 50 |

*Source: Economic Survey of Pakistan (2000-01) Finance Division, Islamabad.*

Private sector has liberty for export/import of agricultural commodities after getting clearance from the Ministry of Agriculture and Ministry of Commerce. Agriculture sector has major share in total export of various industrial products (Table-1.4).

**Table-1.4 Major export of agricultural commodities and their share (% age) in total export**

| Commodity/ crops | Years | | | | | |
|---|---|---|---|---|---|---|
| | 1994-95 | 1995-96 | 1996-97 | 1997-98 | 1998-99 | 1999-00 |
| Cotton | 58.7 | 64.1 | 61.3 | 58.7 | 59.1 | 61.0 |
| Leather | 8.0 | 7.2 | 7.7 | 6.7 | 6.9 | 6.3 |
| Rice | 5.6 | 5.8 | 5.6 | 6.5 | 6.9 | 6.3 |
| Synthetic textile | 7.1 | 5.2 | 6.1 | 7.2 | 5.1 | 5.3 |
| Sport goods | 3.2 | 2.8 | 3.7 | 4.4 | 3.3 | 3.3 |
| Others | 17.4 | 14.9 | 15.6 | 16.5 | 14.4 | 13.1 |

*Source: Pakistan's Foreign Trade Key Indicators, Ministry of Commerce.*

### 1.3.2 Agro based industries

Pakistan has agro-based economy. To raise the economic status of farmers, agricultural raw material have to be exported in manufactured or semi manufactured form. Although, this sector is developing fast but proper documentation is not available. Any how, 2913 agro-based industries have been documented during 1990-91 (Table-1.5, Anonymous, 1998-99). This sector has absorbed millions of people for employment.

**Table-1.5 Number of agro-based industries with value of production**

**(Rs. Million)**

| S.No | Industries | 1987-88 | | 1990-91 | |
|---|---|---|---|---|---|
| | | No. of establish-ment | Value of production | No. of establish-ment | Value of production |
| 1. | Dairy products except ice cream | 12 | 821 | 14 | 1462 |
| 2. | Canning of fruits and vegetables | 9 | 118 | 14 | 595 |
| 3. | Vegetable ghee | 49 | 11034 | 54 | 12774 |
| 4. | Cotton seed oil | 108 | 1356 | 83 | 1154 |
| 5. | Other vegetable oils | 16 | 1212 | 17 | 1366 |
| 6. | Rice milling | 184 | 1038 | 208 | 1298 |
| 7. | Wheat and grain | 214 | 6658 | 259 | 11794 |
| 8. | Refined sugar | 40 | 13516 | 45 | 19473 |
| 9. | Tobacco manufacturing | 15 | 9074 | 19 | 8767 |

| S.No | Industries | 1987-88 | | 1990-91 | |
|---|---|---|---|---|---|
| | | No. of establish-ment | Value of production | No. of establish-ment | Value of production |
| 10. | Cotton spinning | 113 | 17177 | 177 | 48623 |
| 11. | Cotton weaving | 51 | 5087 | 77 | 11503 |
| 12. | Woolen textile | 52 | 11814 | 53 | 1994 |
| 13. | Finishing of textile | 266 | 2375 | 305 | 5409 |
| 14. | Carpets and rugs wool | 25 | 513 | 19 | 714 |
| 15. | Silk and silk textile | 307 | 6947 | 250 | 13474 |
| 16. | Ginning and bailing fibers | 302 | 12095 | 343 | 19838 |
| 17. | Manufacturing of furniture | 54 | 305 | 59 | 562 |
| 18. | Manufacturing of paper | 56 | 2952 | 74 | 5576 |
| 19. | Fertilizer | 9 | 6929 | 11 | 9927 |
| 20. | Pesticides and insecticides | 17 | 730 | 18 | 3046 |

*Source: Agricultural Statistics, 1998-99, MINFAL, GOP, Islamabad.*

The new emerging, seed industry is developing very fast. More than 376 seed companies have been registered. The manpower, no. of seed processing plants, their cost and production value of seed produced by various seed companies could not be documented so far in the Agricultural Statistics of Pakistan under the heading agro-based industries. This is the main purpose of this book **"Seed Industry of Pakistan"**. This document will help the planners and seed investors to put more attention on the seed sector.

## 1.4 AGRICULTURE SECTOR POLICY

Agriculture remains a high priority area and the government policies place special emphasis on rapid promotion and development of this sector. The government as a policy measures has intensified on support prices of various commodities, some relief in prices of key agricultural inputs, larger agricultural credit, improvement in irrigation and drainage, steps against adulteration in fertilizer, pesticides and seeds of various crops. Support price committee has given special task to review the whole system of pricing and marketing of agricultural commodities. All these steps have been initiated to move forward for self reliance.

## 1.5 AGRICULTURAL MANAGEMENT

Agricultural development in the country is primarily concerned with the development of land, water resources, mechanization and enhanced/assured availability of modern inputs to conform with prescription of free market economy. The process of technical changes depend on the business and economic culture of the country. Ministry of Food, Agriculture and Livestock at the federal level acts as supreme body responsible

for policy planning and monitoring the whole agricultural management system in the country (Fig.1.1). All the administrative and policy decisions are taken by the supreme body i.e. Federal Committee on Agriculture (FCA) headed by Federal Minister of Agriculture and all the provincial ministries/secretaries and provincial heads of various institutions are represented there. Food security and price stabilization of crops is the function of PASSCO and APCOM. Agricultural research, development and education is under way in the country at four agricultural universities, 17 multidisciplinary institutes, 21 mono crop research institutes and 5 Agricultural Colleges and 4 Agricultural Universities (Table.1.6).

**Table-1.6 Agricultural Research & Education Infrastructure in Pakistan-2000**

| S.No | Type of Institution | Number |
|---|---|---|
| 1. | Multidisciplinary Research Institute. | 17 |
| 2. | Mono crop commodity institute. | 21 |
| 3. | Agricultural Universities. | 4 |
| 4. | Agricultural Colleges. | 5 |
| | **Grand Total:** | **47** |

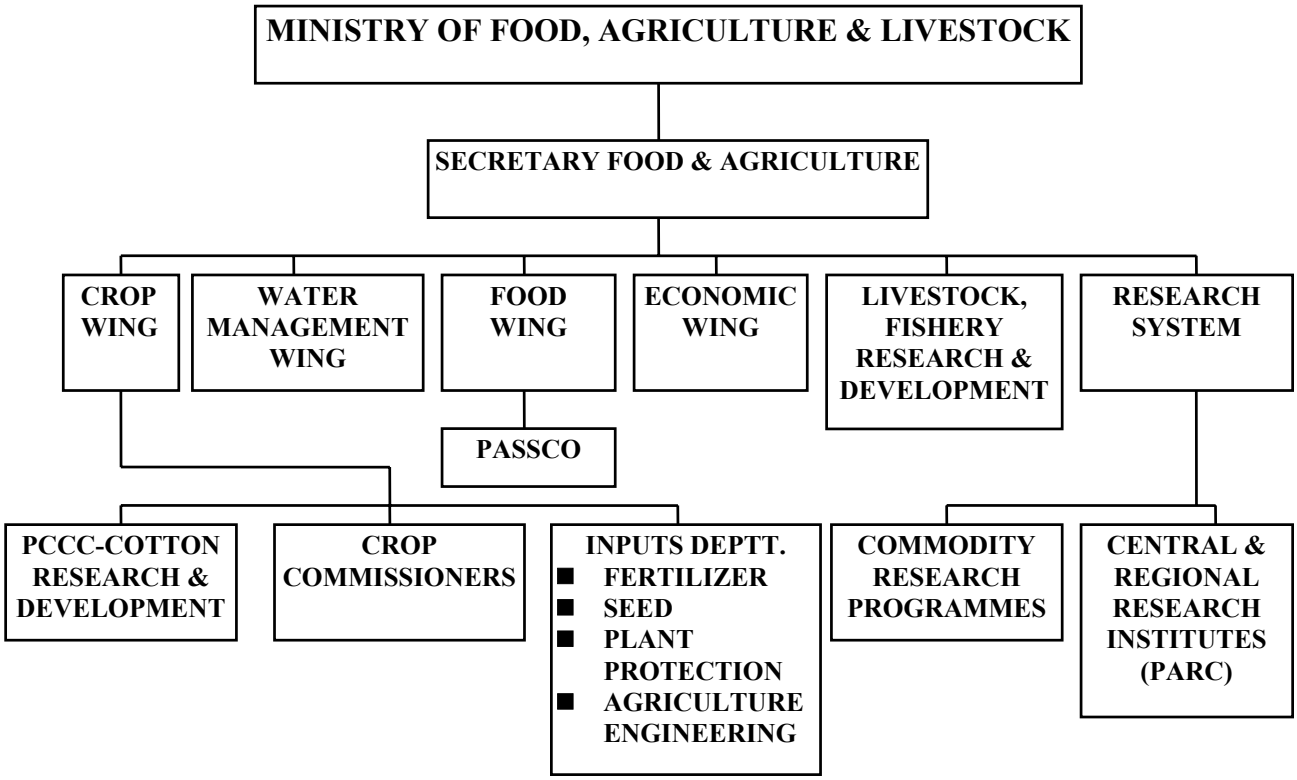
## 1.6 DEVELOPMENT OF SEED INDUSTRY IN PAKISTAN

### 1.6.1 Historical perspective

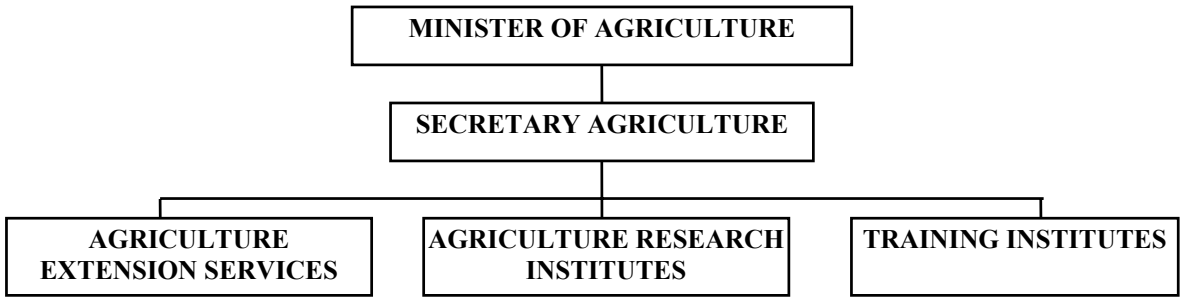
Seed is the carrier of the genetic potential for higher crop production. The seeds of improved varieties can enhance the production by 10-20 per cent. The systematic seed supply demands appropriate arrangement for variety registration followed by certification and distribution etc. After independence in 1947, the farmers of Pakistan often have to use their own saved seed or exchanging seed with other farmers. The seed sector remained almost unorganized upto fifties. During 1961, government established WPADC with the responsibility to produce and distribute seed in addition to heavy mandate of other agricultural development activities (Fig-1.2). Although this was first step towards the organization of seed programme but it could not give desired results because of weak linkages with research and plant breeding activities. So in early 1970's, it was dissolved.

In 1973, the Government of Pakistan, established a more broad based seed industry project with the assistance of FAO/IBRD. Although, in the initial proposal, it was envisaged to give more active role to private sector but participation of private sector was not considered appropriate at that stage due to their very low profile. Later on, this seed programme was given constitutional support in the form of the Seed Act, 1976. The Seed Act provides a regulatory mechanism for variety release and controlling the quality of seeds of various crops through establishing requisite infrastructure. With the enactment of Seed Act, 1976, National Seed Council at federal level and Provincial Seed Councils at provincial level were established.

**Fig.1.1 AGRICULTURAL MANAGEMENT SYSTEM IN PAKISTAN**




## AGRICULTURAL MANAGEMENT AT PROVINCIAL LEVEL




## ALLIED ORGANISATIONS AT FEDERAL LEVELS

1. **Agricultural Development Bank of Pakistan, Ministry of Finance.**
2. **Federal Bank for Cooperatives, Ministry of Finance.**
3. **Pakistan Tobacco Board, Ministry of Production and Industries.**
4. **Water and Power Development Authority, Ministry of Water and Power.**
5. **University education system controlled by University Grants Commission, Ministry of Education.**
6. **Centre of Excellence and High Technical Institutes, Ministry of Science and Technology.**
7. **Board of Investment.**
8. **Export Promotion Bureau.**

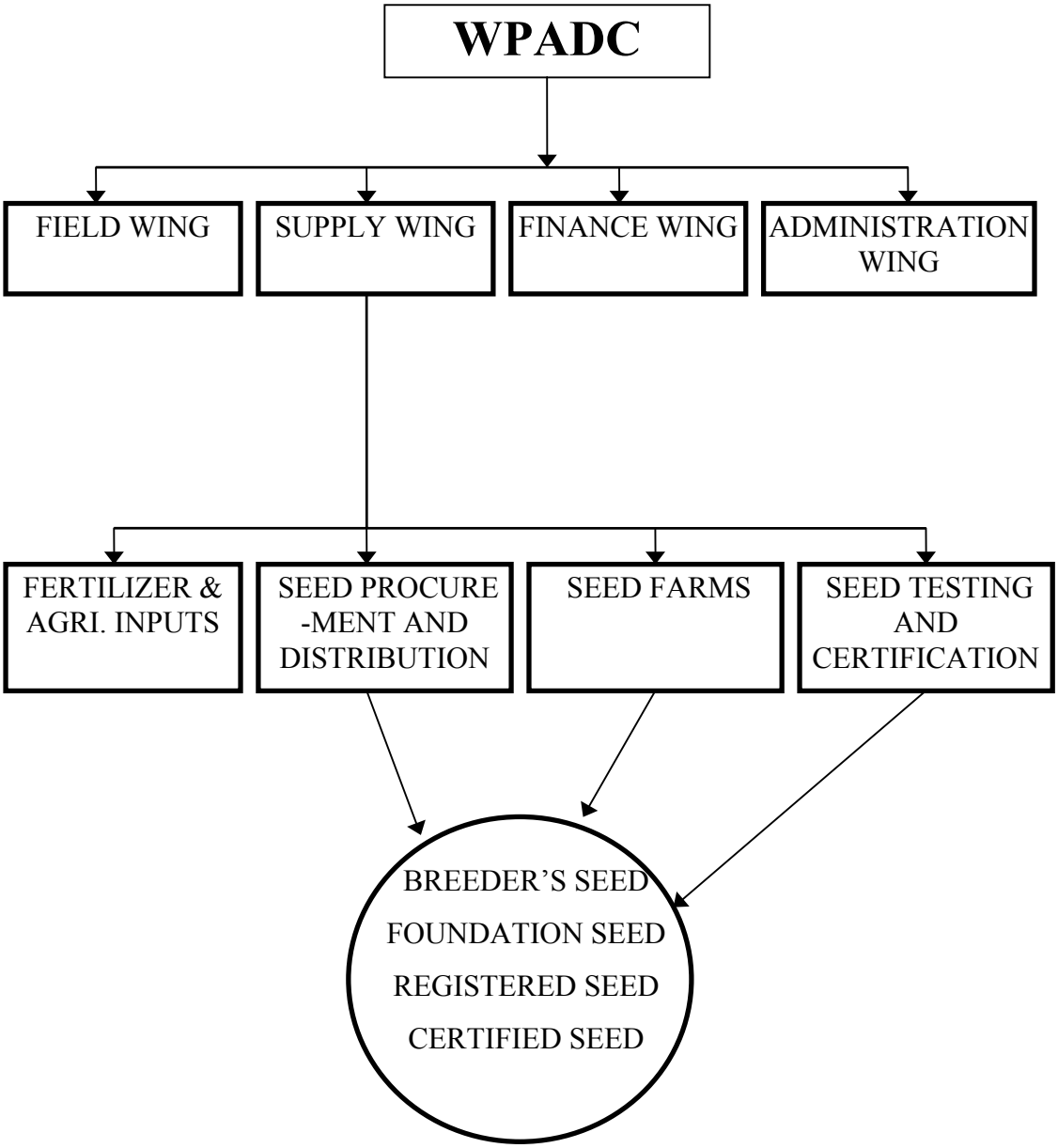



**Fig. 1.2**

**WEST PAKISTAN AGRICULTURAL DEVELOPMENT CORPORATION AND SEED SYSTEM (1961-1972)**

Federal Seed Certification Department and National Seed Registration Departments were established as an executive arms of National Seed Council. For seed production, multiplication, processing and distribution, the responsibilities were assigned to public sector seed corporations through their own network in their respective province (Fig. 1.3). The National Seed Council is the supreme body concerned with all pursuits of seed both from public and private seed sectors. It provides guidelines for all seed policies, seed projects, planning, seed import/export, inter provincial seed movements, seed standards and investment in seed industry. It is chaired by the Federal Minister for Food, Agriculture and Livestock.

### 1.6.2 Present status

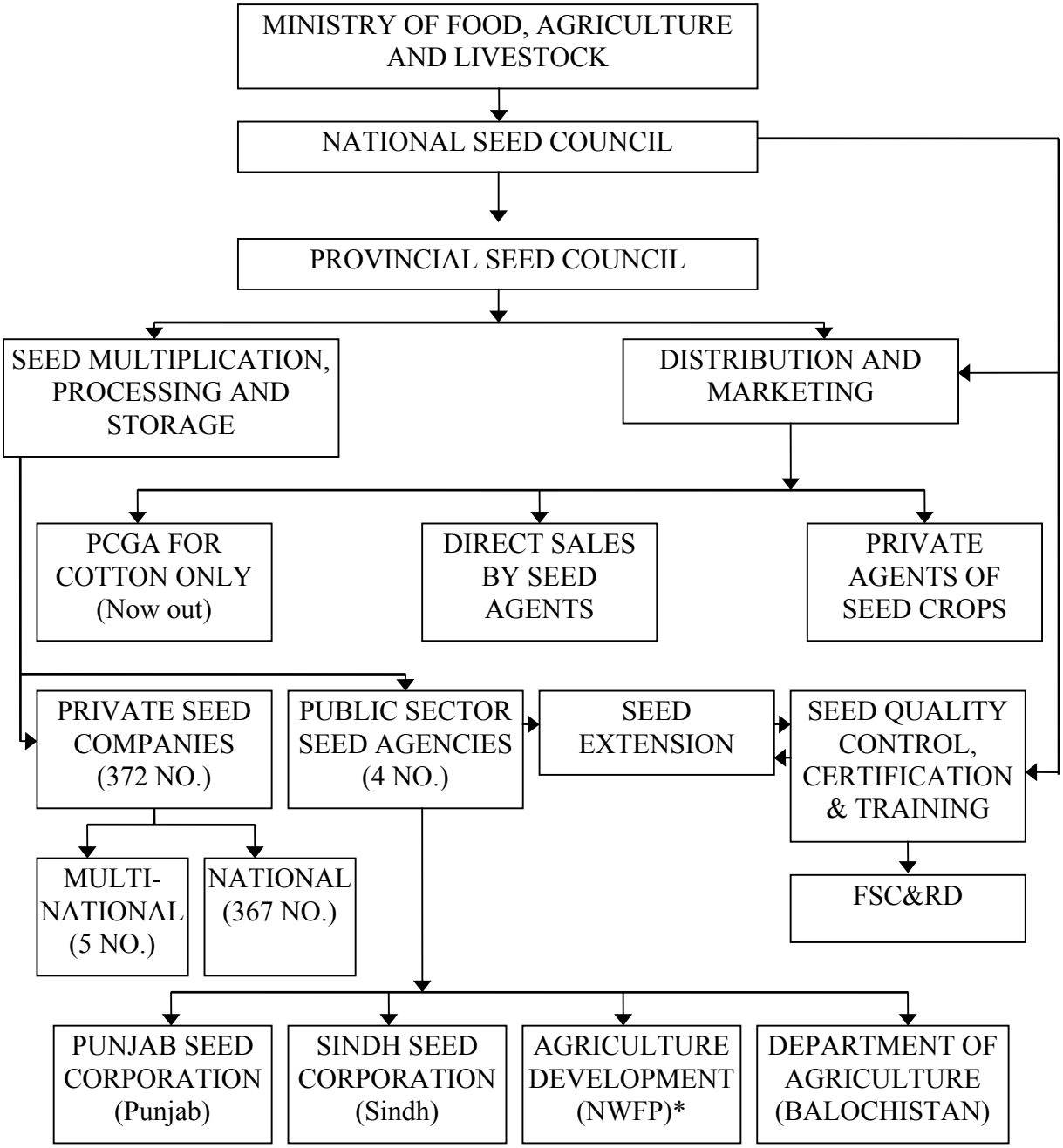
The public sector seed agencies established foundations for production of quality seeds of major crops and have created awareness among farming community to use certified seed. It is a fact that public sector could not meet even the replacement rate of seeds of major crops. The seed availability remained in public sector between 7 to 10 per cent. Realizing the fact, government adopted liberal policy regarding induction of private sector into seed business. The first private seed company was granted permission to do seed business in 1981, but the process of induction of private seed sector into seed business remained at low profile until 1990. The government adopted, more vigorous liberal privatization policy and declared the seed business at par with other industries during 1994. Due to liberal attitude in granting permission to do seed business and free services of seed quality control by the government, now 376 seed companies including four public sector seed agencies and five multinational have commenced their business in the country. Year wise induction of private seed companies in the different provinces of Pakistan is given in table-1.7.

Present day seed industry is a combination of public and private seed sector. This is called as formal seed system. Farmers in Pakistan also save their own seed and exchange seed with each other or buy seed from the local traders and market under the informal seed system (Fig-1.4). With the induction of private seed sector, the availability of quality seed has increased up to 18 per cent. The total investment in installation of 143 seed processing plants/units, is about Rs. 818.655 million and share of private sector is Rs.639.783 million. The processing capacity has increased from 12.24 to 35.43 per cent. Total employment generation in seed industry according to the data available so far is 24716. The storage capacity has been increased up to 18.17 per cent against the total estimated seed requirement (1340719 mt.) for all crops (Table1.8 and 1.9). It is expected that seed industry will become one of the leading employment generating sector for our economy.

There is no restriction on private sector to distribute or export/import of any crop seed. Presently, private sector mainly trade in low volume high profit seeds. Where as the public sector has the mandate to produce high volume low cost seeds like wheat and pulses. The multinationals deal in hybrid seeds of oilseed, corn and forages but these companies mainly import the seeds of these hybrid crops. There is strong desire from the farming community that main emphasis should be given on local hybrid seed production, so that it could be made available at appropriate price.

**Fig. 1.3**

# ORGANIZATION OF SEED SECTOR




PCGA = Pakistan Cotton Ginners Association.
FSC&RD = Federal Seed Certification and Registration Department.
* = Agriculture Development Authority has closed its seed activities and now seed production & multiplication has been taken over by various components of NWFP Department of Agriculture from 2001.

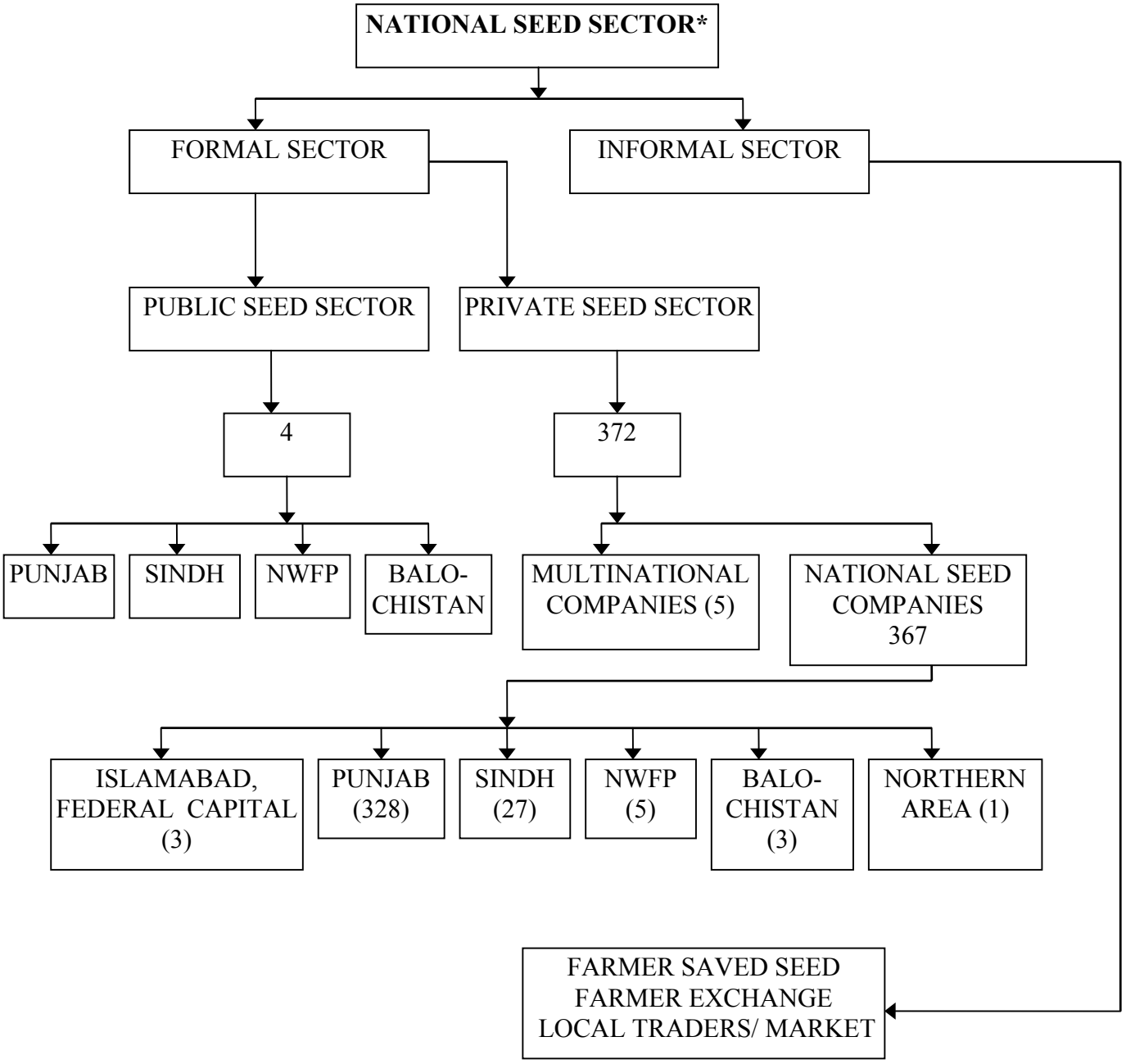
**Table.1.7 Year wise induction of private seed sector (excluding public sector and multinationals) upto 32nd meeting of Working Group-2002**

| Years | No. of seed companies granted permission* | | | | | | |
|---|---|---|---|---|---|---|---|
| | Punjab | Sindh | NWFP | Baloch-istan | Islamabad (Federal Capital) | N.A (Gilgit) | Total |
| 1981 | 2 | - | - | - | - | - | 2 |
| 1982 | 3 | - | - | - | - | - | 3 |
| 1983 | - | - | - | - | - | - | - |
| 1984 | 2 | - | - | - | - | - | - |
| 1985 | - | - | - | - | - | - | - |
| 1986 | - | - | - | - | - | - | - |
| 1987 | 2 | - | - | - | - | - | 2 |
| 1988 | - | - | - | - | - | - | - |
| 1989 | - | - | - | - | - | - | - |
| 1990 | - | - | - | - | - | - | - |
| 1991 | 3 | - | - | - | - | - | 3 |
| 1992 | 2 | - | - | - | - | - | 2 |
| 1993 | 11 | - | - | - | - | - | 11 |
| 1994 | 11 | - | - | - | - | - | 11 |
| 1995 | 33 | - | - | - | - | - | 33 |
| 1996 | 40 | 3 | - | - | - | - | 43 |
| 1997 | 24 | 4 | - | 1 | - | - | 29 |
| 1998 | 49 | 2 | 2 | 1 | - | - | 54 |
| 1999 | 95 | 10 | 2 | - | 2 | - | 109 |
| 2000 | 9 | 1 | - | - | 1 | 1 | 12 |
| 2001 | 19 | 2 | 1 | - | - | - | 22 |
| 2002 | 23 | 5 | - | 1 | - | - | 29 |
| **Total:** | **328** | **27** | **5** | **3** | **3** | **1** | **367** |

**** Excluding 22 seed companies which have been de-registered upto Jan.2002.***

**Table-1.8 Seed processing plants/units, cost, processing and storage capacity of seed sector in Pakistan-2000**

| Seed sector | Seed processing | | | Seed storage capacity(mt.) |
|---|---|---|---|---|
| | No. of plants/ units | Cost Rs. (Pak.) million | Processing capacity (mt.) | |
| Public sector seed agencies | 36 | 178.872 | 216150 | 50623 |
| National private seed companies | 103 | 229.783 | 239496 | 178772 |
| Multinational seed companies | 4 | 410.00 | 19408 | 14325 |
| **Total (Pakistan):** | **143** | **818.655** | **442654** | **243720** |
| Percentage of seed processing and storage capacity against the estimated seed requirement. | | | **(35.43%)** | **(18.17%)** |




*** Quality control by FSC&RD**

**Fig.1.4 SEED PRODUCTION AND SUPPLY IN PAKISTAN**

**Table-1.9 Manpower engaged in public and private seed sector agencies in Pakistan-2000**

| S.No | Seed sector | Agricultural Graduates | Other technical and supporting staff | Seed marketing network. |
|---|---|---|---|---|
| 1. | Public sector | 76 | 740 | 2003 |
| 2. | National Private Seed companies | 426 | 1521 | 7902 |
| 3. | Multinational Companies | 177 | 255 | 702 |
| 4. | FSC&RD | 82 | 225 | - |
| | **Total (Pakistan)** | **761** | **2741** | **10607** |

**Summary**

- Total Agriculture Graduates = 761
- Total Technical and Supporting Staff = 2741
- Total manpower with seed dealers =10607 x 2= 21214

**Grand Total = 24716**

## 1.7 RECENT DEVELOPMENT

To produce high quality seeds of various crops, the Federal Seed Certification and Registration Department has started many new activities. In the new era of globalisation and international trade of seed across the border, we have to fulfill the obligation of WTO/TRIP etc. In this scenario, our seed products need to meet the international standard. It can only be possible if we strengthen our quality control system. Some of the recent development made in seed industry are as follow:

1. Seed Act enforcement.
2. Monitoring of seed quality during export and import.
3. Seed health programme.
4. Rules for horticultural fruit plant.
5. Establishment of variety data bank.

### 1.7.1 Seed Act enforcement

In order to monitor the quality of seed in the market and safeguard the interest and rights of farming community, Seed Act, 1976 has been enforced. Seed samples are drawn from the seed stores and checked in the laboratory. If the quality is not matched with label of containers, challans are made and submitted to the Court. A total amount of Rs. 3,71,500/- fine imposed by the Court, has been deposited in the government treasury (Table-1.10).

**Table-1.10 Seed Act Enforcement from 1995-96 to 1999-2000 by FSC&RD**

| Years | No. of challans | No. of bags seized | No. of cases decided | Pending cases | Fine imposed (Rs.) |
|---|---|---|---|---|---|
| 1995-96 | 127 | 5147 | 58 | 69 | 65,200 |
| 1996-97 | 240 | 7214 | 112 | 128 | 76,700 |
| 1997-98 | 163 | 3631 | 88 | 75 | 78,100 |
| 1998-99 | 350 | 9620 | 101 | 249 | 63,000 |
| 1999-2000 | 542 | 4506 | 118 | 424 | 88,500 |
| 2000-2001 | 240 | 4576 | 89 | 151 | 83600 |
| **Total:** | **1662** | **34594** | **566** | **1096** | **455100** |

Note:- *The confiscated stock auctioned during 1999-2000, was about 1,41,578 kg. worth Rs. 7,09,320/- deposited to Govt. Treasury.*

### 1.7.2. Monitoring of seed quality during export/import

Movement of seed and exchange of germplasm across geographical boundaries has manifold importance of high quality seed. Likewise, the problem of seed-borne diseases has assumed great significance in agriculture. Now the quality of seed during export and import is regulated under Seed (Truth-in-Labeling) Rules, 1991. The importer must have to inform the FSC&RD on the prescribed application form, the probable date of arrival of the seeds and other progating material, so that seed samples could be drawn to test for purity and germination etc. to conform the information given on the annexed labels of the container/bags. There is a need to test all the seed consignment for their health status. It will help our agriculture to save from disease epidemics.

### 1.7.3. Seed health testing

Seed health programme within the quality control system provide a scientific basis for disease management. Pakistan is lucky to develop seed health programme during 1985 in collaboration with FAO/DANIDA. Later on, during 1995, seed health facility was further extended to legume crops with the assistance of ICARDA. Although seed testing facility is available at the Headquarters of the FSC&RD but it should be extended to regional offices located in various agro ecological regions. All the seed lots of pre-basic and basic category should be tested 100 percent while the 10% of the certified seed lots be tested under seed health certification programme(Bhutta et al, 1992).

### 1.7.4. Rules for horticultural fruit plants

Pakistan earns millions rupees of foreign exchange from export of various fruits. It can be further expanded by improving the quality of fruits. The certification of nursery stocks has been considered essential for improving and establishing uniform, true to type quality orchards. Disease free nursery can boost up production and quality of fruits for export purpose.

National Seed Council has recently approved the rules for certification of fruit plants. A project entitled, establishment of seed testing laboratory at Mingora, Swat, is

developing mechanism for registration of private fruit nursery for the production of certified fruit plants.

### 1.7.5. Establishment of variety data bank

Variety protection system is being practised in many countries of the world as a requirement of WTO. Now the Plant variety will move very fast in different regions of the world. It has increased the necessity of data bank more than previous. The FSC&RD has established a computerized variety data bank for all the registered varieties. The data base covers the descriptive morphological details on Distinctness Uniformity and Stability (DUS) characteristic along with value for cultivation and use, information on breeding history parentage and pedigree etc. Up till now 364 varieties of different crops have been registered and computerized in variety data bank. (Table.1.11).

**Table-1.11 No. of crop varieties registered and released from 1947 to 2000 in Pakistan**

| S.No | Crop | No. of varieties registered and released* | | Total |
|---|---|---|---|---|
| | | Public sector | Private sector | |
| 1. | Barley & Oat | 11 | - | 11 |
| 2. | Cotton | 61 | - | 61 |
| 3. | Fodder & Forages | 11 | 1 | 12 |
| 4. | Maize & Millet | 22 | 2 | 24 |
| 5. | Oilseeds | 38 | 5 | 43 |
| 6. | Potato | 11 | - | 11 |
| 7. | Pulses | 41 | - | 41 |
| 8. | Rice | 29 | - | 29 |
| 9. | Sugarcane | 22 | - | 22 |
| 10. | Vegetable | 32 | - | 32 |
| 11. | Wheat | 78 | - | 78 |
| | **Total:** | **356** | **8** | **364** |

## 1.8 CURRENT AND FUTURE TRENDS

Seed Industry of Pakistan is developing very fast. In future, it will not be so easy to give 100 per cent services by the government. Moreover international flow of material will be increased many times. So it is urgently, needed to develop basic infrastructure to handle new situation. FSC&RD which is the focal point of Pakistan seed industry, has already initiated good work under the supervision of Ministry of Food, Agriculture and Livestock. The following steps are being taken for further improvement of seed industry.

### 1.8.1 Plant Breeder's Rights (PBRs)

This system deals with the protection of plant variety against their commercial exploitation. There are merits and demerits of this system but private sector especially, the multinational seed companies are strongly in favour of its early introduction. It is also an obligation of WTO/TRIP to make such rules to facilitate the international trade. The department has prepared the draft of the Plant Breeder's

Rights for enactment. It will help both the public and private sector to accelerate their breeding programmes. It will also help generating revenue for public sector research institutes through commercialization of their protected varieties.

### 1.8.2. Training and authorization of seed technicians in private sector

Seed production itself is a very technical profession. Therefore, seed professionals both from public and private seed sector need continuous training and refresher courses. More over huge volume of private sectors need special training for their internal quality control system. Department is planning to work on regular basis for training of Seed Inspectors/Seed Analysts in private sector so that they may be allowed to carry out controlled certification and seed testing work under the authorized license to be given by the department on behalf of the MINFAL, but it will depend on the infrastructure, expertise, research and development level of private sector industry as in practice in developed world.

### 1.8.3. Seed technology research and training centre

Present setup of Pakistan seed industry in the international scenario, needs sound research backup. It must be linked with research and development and educational institutions. Unfortunately, there is no broad based research programme in seed technology. FSC&RD has to get the training of its professionals from abroad. Although more than 100 scientific publications have been contributed by different workers of the department (Hussain and Bhutta, 1999) but still, there is acute shortage of literature on different aspects of seed technology. Therefore, it is the present and future requirement to establish seed science and technology training and research centre under the umbrella of the FSC&RD.

### 1.8.4. Amendment proposed in Seed Act, 1976

Although, there was provision to include private seed sector in to seed industry but this act predominantly supports to the public sector. Penalties regarding violation of Seed Act by the unscrupulous seed distributors, became meager with the passage of time. In addition to these, many other new requirements cannot be fulfilled especially in line with the WTO/TRIPs and UPOV convention. Therefore, department has proposed some amendment in the act which is actively under consideration by the government.