

## MARKETING OF IMPROVED SEED OF WHEAT IN THE PUNJAB PROVINCE

Hassnain Shah<sup>\*</sup>, Qamar Mohy-ud-Din<sup>\*\*</sup>, Waqar Akhter<sup>\*</sup> and Muhammad Ansar<sup>\*\*\*</sup>

### ABSTRACT

A detailed investigation was carried out to analyze the marketing of improved seed of wheat in the Punjab Province. Different government, semi-government and private organizations of seed sector were approached for secondary information. Wheat seed production and distribution by public and private sector for last 8 years upto 2004 was collected from these secondary sources. In spite of a mushroom growth of private companies and more than 548 seed companies in the country the seed supply of wheat remained around 13 percent of total requirements in the country. Farm level inquiry is based on the primary data collected from three districts namely Faisalabad, Vehari and Rawalpindi during 1999. In each selected district two villages and from each village 28 farmers were selected at random. Data was also collected from 10 registered seed growers, 6 seed dealers of PSC and 10 private seed dealers. The use of quality seed by the average farmers purchased from seed dealers remained about 16 percent in the study area while 4 percent seed was purchased from village fellow and 5 percent from progressive grower and 1 percent from research institutes and directly from seed depots while remaining 74 percent wheat seed was used from own last year produce.

**Keywords:** Agriculture, Improved Seed, Pakistan, Punjab, Seed Agencies, *Triticum aestivum* L., Wheat

### INTRODUCTION

Agricultural sector being the linchpin of the country's economy continues to be the single largest sector and a dominant driving force for the development and growth of national economy. It accounts for 24 percent of the GDP and employs 48.4 percent of the total work force. The livelihood of almost 67.5 percent population living in rural areas is linked with agriculture (GOP 2003). Wheat is the main staple food of the country's population and largest grain crop of the country. It contributes 12.5 percent to the value added agriculture and 3.1 percent to GDP (GOP 2003). Quality seed of improved varieties is the key to enhance agricultural productivity. Seed has the unique position among the various agricultural inputs because the effectiveness of all other inputs mainly depends on the production potential of the seed.

The strength and efficiency of support services such as extension, credit, and input supply can condition the effectiveness of research results emanating from experiment stations. The role of improved varieties of crops, particularly wheat and rice, in alleviating poverty has been widely debated (Dasgupta 1977; Singn 1990). Ellis (1993) outlined the social and economic impact of improved varieties in countries where they have been widely grown, and it is commonly observed that the dissemination of improved seed and complementary inputs has removed the shadow of famine from the lives of millions of poor farmers. According to Jaffee and Srivastava (1992), improved seed embodies the genetic potential of a plant; it determines the upper limits on yield and even the productivity of other inputs.

Today self-sufficiency in food grains, especially in wheat, is the major goal of our country. One of the

causes of stagnation on agricultural output has been the inadequate supply of improved seed. The use of improved seed can serve as backbone of development in agriculture leading to break through for self-sufficiency. Just as productive agriculture is essential to our success and prosperity of the nation, quality seed is essential to productive agriculture. It was lately realized that improved seed is essential pre-requisite to attain maximum productively from the investment made in water supply, fertilizer and farm mechanization etc., and without it the potential growth rate in farm sector can never be achieved.

The requirements of improved wheat seed as compared to distributed, are very high. Therefore, it is high time to act before it is too late. There is a dire need to organize the seed production and marketing in such a manner that maximum quantity of quality seed of improved varieties is made available to the farming community so that Pakistan could meet the goal of self sufficiency on sustainable basis.

The above given assumptions gave rise to the idea of conducting the present study with the objective to study the existing marketing channels of wheat seed, to appraise the role of public and private seed agencies in the production and distribution of wheat seed, to identify the constraints in seed distribution and suggest recommendations.

### MATERIALS AND METHODS

The study was conducted in the Punjab Province, as it is the largest wheat producing area both in terms of area and production. The average of first half of the 1990 decade show that out of the total wheat area 8306.6 thousand hectare of the country, the share of Punjab in terms of area was 72 percent while in terms of production it was 73.36 percent in terms of total

---

\* Social Sciences Institute, National Agricultural Research Center, Islamabad - Pakistan  
\*\* Department of Business Management, University of Agriculture, Faisalabad - Pakistan  
\*\*\* Department of Agronomy, University of Arid Agriculture, Rawalpindi - Pakistan

country production. The share in second half of 1990s remained almost same (72 percent) while in terms of production its share rose to 75 percent (GoP 2001-02).

Both secondary as well as primary level information relevant to the scope of the paper was compiled. To collect secondary level information, Federal Seed Certification and Registration Department, (FSC & RD) Islamabad, Regional Seed Testing Laboratories Lahore, Faisalabad, Khanewal and Multan, Punjab Seed Corporation (PSC), Lahore, PSC Sale Depot Fatah Jang (Texila), Jhang & Vehari, PSC Seed Farms Khanewal, District Cooperative Supply and Marketing Federation Rawalpindi, Faisalabad and Vehari, Directorate of Agriculture (Crop reporting services) Punjab, Lahore, Ayub Agricultural Research Institute, Faisalabad, Barani Agri. Research Institute, Chakwal, Jhandeer Seed Corp. (Pvt.) Ltd., Melsi and Zaheerabad Seed Corp. (Pvt.) Ltd., Burewala were approached. Wheat seed requirement, procurement and distribution by public and private seed companies from 1996 to 2004 was collected from secondary sources.

Farm level data was collected from three districts namely Faisalabad, Vehari and Rawalpindi representing central, southern and northern Punjab during 1999. These regions were purposively selected because they represent the three ecologies with different cropping patterns. In each selected district two villages were selected at random. From each village 8 small (owning less than 5 ha of land), 4 medium (owning 5-10 ha) and two large (owning more than 10 ha of land) farmers were selected at random. In total 84 wheat growers were interviewed to evaluate the use of improved seed of wheat by the farmers. In addition to it twelve non-registered progressive farmers of wheat, two from each sample village were selected and interviewed. Ten registered growers from the list of PSC registered growers of wheat were selected from Vehari, Jhang and Khanewal district to collect information about production and marketing of improved seed by these farmers. Six registered wheat seed dealers of PSC; two from each region were selected and interviewed. Ten private seed dealers selling seed of private seed companies two from northern, 4 from central and 4 from southern region were interviewed to collect the relevant information. Data was collected on separate formats for each category. Averages and percentages were calculated through cross tabs and used for tabulation and interpretation of data. Compared t-test was used for comparison of mean yield from seed of different sources.

## RESULTS AND DISCUSSION

### *Existing Wheat Seed Distribution Systems*

Despite the crucial importance of improved seed in bettering the welfare of small-scale farmers, access to this invaluable technology can be constrained by many factors, including an undeveloped seed industry. A seed industry essentially consists of all enterprises that produce or distribute seed (Pray and Ramaswami, 1991), and at a minimum the industry has four components: 1) plant breeding research, 2) seed production and multiplication, 3) processing and storage, and 4) marketing and distribution.

The industry's overall performance depends on the efficiency of each component, and each component possesses different economic and technical characteristics that determine the roles that public and private organizations will play in the seed industry. These characteristics include economies of scale, externalities, excludability, and problems of information or quality (Alemu *et al.* 1998). In the context of the present paper, marketing of improved seed of wheat is defined as the process of transferring the improved wheat seed to the farmers. There are two subsystems of seed distribution; a) Farmer based or informal system consisting of farmer to farmer exchange, farmers keep own seed and farmer buy seed from local market and b) Formal system consisting of public seed agencies and private seed companies. The main agencies involved in seed distribution operations under formal seed system are:

### *Federal Government*

For controlling imports and distribution of foreign originated seeds, enforcement of seed act and registration of new varieties through Federal Seed Registration Committee (FSRC)

### *Provincial Governments*

For fixing targets for seed production and distribution and implementation of the programmes through Agriculture Research Institutes, Punjab Seed Corporation, Agricultural Extension Department and approval of new varieties through provincial seed councils.

### *Agriculture Research Institutes*

Ayub Agricultural Research Institute (AARI), Faisalabad along with its substations in the province, Nuclear Institute of Agriculture and Biology (NIAB), University of Agriculture, Faisalabad and National Agricultural Research Centre, Islamabad, evolves the new varieties of wheat in the Punjab Province. These institutions produced pre-basic seed for public and private seed corporations.

### *Federal Seed Certification and Registration Department (FSC & RD)*

The registration of new varieties along with quality control services is performed by the FSC & RD. Four seed testing laboratories at Lahore, Faisalabad, Khanawal and Multan were included in the survey. Seed Testing Laboratories at Lahore, Khanawal and Multan were established in 1976 and at Faisalabad in 1984, under the Seed Act, 1976. These laboratories were involved in the inspection of the farms of seed crop for seed agencies and their registered growers and certification of seed for sale. Out of the four laboratories, the seed testing laboratory at Faisalabad was not fully equipped, the samples were sent to the seed testing laboratories at Sahiwal or Sargodha for testing. Other laboratories also lack modern seed testing equipment and face shortage of technical staff and were unable to cope with the needs of the growing seed industry. No seed company or dealer can sell seed without the certification tag attached with a seed bag, provided by the seed testing laboratories to the seed companies. The Deputy Director or Seed Certification Officer inspects the crop once or twice at flowering maturity and harvesting stage. After harvesting sampling from the stores of seed companies is done. Sometimes field samples are also taken even after certification.

#### ***The District Cooperative Supply and Marketing Federation***

Offices at Rawalpindi, Faisalabad and Vehari were consulted to collect relevant information about Agricultural Cooperative Societies for the purchase and sale of improved seed of wheat. The federation had stopped the purchase of inputs since Kharif 1997-98 and now only credit is disbursed to all the cooperative societies according to their demand. The credit is disbursed well in time and members of the cooperative societies purchase inputs now on their own.

#### ***Punjab Seed Corporation (PSC)***

It was constituted in 1976 under the new seed industry project funded by IBRD for production, procurement, processing, storage and marketing of certified seed on scientific lines in the Punjab Province. The earlier attempts to establish a seed industry had not been successful. It was in 1976, when the Punjab Seed Corporation was constituted under the new Seed Industry Project funded by the IBRD. According to the project appraisal report (World Bank, 1976; PSC, 1977), the use of improved seed alone can cause an increase in yield by 10-20 percent.

To establish commercial identification of PSC seed among growers, it has also started the marking of seeds of every crop with a trade name "SHAHZORE". To ensure the availability of different crops' seed at the door steps of the farmers, the PSC has established about 2001 sale points with a combination of public and private sector,

comprising of PSC marketing network including 1750 seed dealers, 30 Cooperative Banks, 15 Sale Points and 206 others. It is note worthy that the PSC is not only fulfilling the seed requirements of Punjab, but is also taking care of seed requirements of Sind, N.W.F.P., and Baluchistan Provinces. During the last few years, PSC has also exported wheat seed in limited quality to, Srilanka, Myanmar, Iraq, Bangla Desh and lastly a great achievement was made to sign a contract with Food and Agriculture Organization to supply wheat seed for their relief programme.

Besides developing its own seed at multiplication farms the PSC also registered more than 600 progressive growers to multiply all minor and major crops seeds at large scale. To maintain quality control of various crops seeds, the PSC has established its own seed testing laboratories with each seed processing plant. But the final certification of seed is being ensured by the laboratories of FSC & RD, as per standard fixed by the government.

The results of the data collected from sale depots illustrate that the whole-wheat seed was sold at all the depots during 1999 the year of survey. At all the four depots there was a problem of lack of storage as all the stores were hired and seed was to be stored for 3-5 months. The unsold stock of seed was auctioned at end of the season. About 95 percent of wheat seed was packed in 100 kg bags and only 5 percent was packed in 50 kg bags.

#### ***Private Seed Industry***

The Government also encourages the participation of the private sector and enacted the 'Truth-in-Labeling (Seeds) Rules, 1991' which allows marketing of seed by declaring and correct labeling of quality attributes and related information. Moreover, the seed business was declared as a 'seed industry' in 1994 providing concessions and privileges given to other sectors. The policy has encouraged the development of the private sector and several companies have been granted permission to produce and market seed in the country. The free market economic policy adopted by the government also promotes privatization (Hussain and Bhutta, 2002). About 548 private seed companies including five multinationals have been allowed for certified seed production, processing and marketing in the country (Hussain *et al.* 2005). Although it is envisaged that the private sector will play an important role in the seed industry in the future, as we have mentioned, the contribution of private firms in supplying seed of the major food grains remains small (Hailu, 1992).

#### ***Seed Supply Situation in the Punjab Province***

During the year of survey 91936 m. tonne of wheat seed was distributed in the Punjab province. Out of total (15.62 percent) seed distributed 11.0 percent of

wheat seed was distributed in the province by PSC and only 4.62 percent of wheat seed was distributed by the private seed agencies. No improvement in the distribution of improved seed of wheat is observed as 14.36 percent of the total seed required was distributed in the province during 2002-03 in which the share of PSC and private seed companies was 8.34 percent and 6.01 percent respectively. The total seed requirement, procurement and distribution of improved wheat seed in Punjab Province is given in Table I.

#### **Prices of Improved Wheat Seed**

The sale price of quality seed is always higher as compared to grain because quality seed production is a highly technical and institutional activity. The seed pricing system is not a very systematic in the country. Various seed agencies both public and private work out seed prices differently based upon their specific seed production, procurement circumstances, competition among each other and demand and supply basis. The cost of production, processing, marketing, incidental charges and other overhead expenses are reflected in the price. The price of improved wheat seed of PSC and private seed companies along with grain and seed price ratio is given in Table II. The seed/grain price ratio for PSC remained less overtime depicting low seed prices than the private companies seed providing a good competitive environment.

#### **Seed Dealers**

The share of seed in total business of PSC registered dealers was 11 percent while the share of seed in total business of other private seed dealers was 8 percent of total business. The PSC dealers had to carry seed at 100 percent cash while the other private dealers were supplied seed by the private agencies at 50 percent credit. PSC Seed Dealers sold 90 percent seed of Inqilab 91, 6 percent Parwaz 94, 4 percent Punjab 96 and the remaining 0.5 percent Wattan variety while other private seed dealers sold 58 percent, 23 percent, 14 percent and 4 percent of Inqilab 91, Punjab 96, Parwaz 94 and Wattan variety seed respectively during the survey period. The margin of PSC dealers between the purchase and sale price was 40 Rs/100 kg bag while it was 87 Rs/100 kg for seed dealers of private seed companies. About 87 percent of the dealers recommended 100 kg bag of wheat seed and 13 percent recommended that wheat seed bag size should be of 50 kg.

#### **Progressive Growers**

##### **Registered Growers of PSC**

The sampled registered growers had land holding of 92 ha on an average and all of them were educated, 90 of them were graduates and 10 percent intermediate. Each sampled registered grower produced 73 percent Inqilab 91, 21 percent

Punjab 96 and 6 percent Parwaz 94, out of the total produce 77 percent, 69 percent and 71 percent was purchased by PSC respectively. Out of the total production of wheat about 75 percent was purchased by PSC for seed distribution. About 25 percent less quantity of seed of wheat was purchased by PSC from the registered growers because of precautionary measures to purchase only good quality seed. Only 2.1 percent own wheat seed was used by the sample registered growers and the remaining 97.9 percent was purchased from PSC. Rupees 15/40 kg premium above the support prices of wheat was given by PSC.

##### **Non-registered Progressive Growers**

The average land holding of the sample non-registered progressive growers (who were using recommended level of inputs and getting good yield in their area) was 28 ha. As regards education 30 percent of them were graduates, 20 percent intermediate, 20 percent matric, 10 percent middle, 10 percent primary pass and 10 percent were illiterate. The sample non registered growers used 54.65 percent of their own improved wheat seed and 45.35 percent purchased seed from PSC seed dealers. About 40 percent of these growers wanted to become registered growers of PSC, 20 percent liked to be the registered growers of other private seed companies and remaining farmers did not like to become the registered growers because of their low level of seed production.

##### **Farm Level Distribution and Use of Wheat Seed**

The sampled farmers were grouped into three categories that is the small, having below 5 ha of land, the medium farmers owning 5-10 ha of operational holding and the large farmers cultivating more than 10 ha of land. The average land holding of the small farmers was 3.4 ha, the medium farmers 7.43 ha and of large farmers 23 ha. The education level of the sample farmers was also explored during the survey and the results depict that large farmers were highly educated as compared to the small ones, which shows that the education level was dependent upon the resource of the farmers. Among the sample farmers 24 percent were illiterate, 21 percent middle, 19 percent matric, 9 percent F.A and 6 percent graduate.

Area under wheat crop of the small, medium and large farmers was 62.56 percent, 58.82 percent and 54.11 percent respectively of the total operational area. On overall basis 57.26 percent of area was under wheat. According to Alemu *et al.* 1998, farmers with more land had a higher probability of adoption, probably because they are wealthier and have more land to experiment with improved wheat varieties. The adoption of new seed was more common among relatively large growers as small farmers purchased only 20 percent improved seed,

medium farmers 23 percent and large farmers used 38 percent purchased seed. On overall basis farmers used 83 percent seed from informal sources (74 percent own farm, 4 percent from fellow farmers, 5 percent progressive growers) and remaining 17 percent from the formal seed sector. The wheat seed marketing channel is given in the Figure 1.

The supply of seed is constrained by the inefficiency of public seed enterprises, poor seed promotion, poor transportation, and inappropriate agricultural and pricing policies. Moreover, because high-yielding varieties perform well with fertilizers, the limited availability of fertilizers constrains demand for improved seed. As a result, in the peasant sector most seed is still produced by farmers themselves (Hailu Gebremariam 1992). Similar results were obtained as 80 percent, 67 percent and 62 percent seed used by the small, medium and large farmers was of their own farm-produced seed.

According to Alemu *et al.* 1998, Ethiopian farmers have been practicing seed selection and preservation for centuries, and the bulk of the national seed requirement is still met through farmers' informal system of local seed maintenance and exchange. In general, farmers preferred informal seed sources because the seed price was lower, seed was available on time, and there was less bureaucracy compared to formal seed sources. Same preferences were found in the study area; particularly the small farmers tried to purchase or exchange the seed through informal sources. The farmer's sources of seed purchase analysis indicate that the small farmers purchased 6 percent seed from the village fellow, 3 percent from progressive growers and 11 percent from the seed dealers. This clearly indicates that in case of small farmers only about 11 percent seed was purchased from the formal seed sector while remaining 89 percent came through informal sector. In case of medium farmers 4 percent seed was exchanged from village fellow, 9 percent purchased from progressive and purchased 19 percent from private dealers and 1 percent from other sources (Research institutes and PSC sale depots) while remaining 67 percent was own farm produced.

The large farmers purchased only 3 percent seed from the progressive growers, 30 percent from private dealers and 5 percent from other sources. The second major source was the private seed sealers. This was because there was only one sale depot of PSC in a district while the private companies had hardly one or two sale depots throughout the province.

The comparison of the yield from the use of own farm produced seed and PSC improved seed,

reveals that the yield obtained from the common seed was much less than the farm produced improved seed and PSC improved seed. The compared sample 'T' test depicts statistically significant difference (0.033 sig. level with t. value 2.361) in yield with certified improved seed and common seed. The yield from own farm wheat seed was only 28 quintal/ha as compared to 33 quintal/ha from purchased improved seed respectively. This analysis shows the positive impact of the use of improved seed on the yield of wheat crop.

Brennan and Byerlee (1991) found that the weighted age (WA) of wheat varieties varied from less than four years in the Yaqui Valley in Mexico to over ten years in the Punjab of Pakistan, with a global average of seven years. Similar findings have been reported by Bishaw *et al.* (1994), who found that 21 percent of wheat farmers saved seed for 6-10 years and 14 percent saved seed for 11-15 years. In Pakistan, the useful life of a wheat variety before its disease resistance broke down averaged 5-6 years (Heisey 1990). The sample farmers reported that they change the seed after every 2 to 3 years yet they were little conscious about the new variety as it is clear from the analysis of the area under different wheat varieties. Out of the total wheat area Inqlab 91 was at 75 percent of area of the small farmers 65 percent of medium and 77 percent of large farmers on overall at 74 percent of wheat area. Out of the remaining area 7 percent planted was under Punjab 96, 11 percent under Wattan, 7 percent under Parwaz 94 and 2 percent under Rawal 87 variety.

About 70 percent small 12 percent medium and 8 percent of the large farmers preferred 50 Kg bag of wheat seed while 30 percent small, 88 percent medium and 92 percent large farmers preferred 100 kg bag of wheat seed. As regard the sale point for seed availability 92 percent suggested that the seed should be made available at village level and 5 percent suggested at union council level while 3 percent suggested that the seed should be made available at Tehsil level. If the seed is made available at the nearest point the farmers were ready to pay 15 Rs/40 kg more than the market price of seed.

As regard the farmer's sources of information for the availability of superior seed 12 percent farmers reported Agriculture Extension, 14 percent radio, 12 percent TV, 7 percent newspapers, 16 percent private dealers, 34 percent considered fellow farmers and 21 percent private seed dealers as the main source of information for the availability of improved seed. About 74 percent of the sampled farmers did not know how to test the seed for purity (of variety etc), germination capacity and the presence of weeds etc. Giving reasons for not purchasing new improved

seed every year high price was ranked at first number followed by production of own seed from last year's purchased seed, seed not available at credit, low rainfall and not available in the village.

**CONCLUSION**

The conclusions of the study gave rise to certain implications crucial for policy makers intending to improve the seed distribution system. At government level effective changes have been made by declaring the seed business as seed industry. PSC has also made positive changes in the system of multiplication and distribution of improved seed and private sector is also growing at a faster rate but still the share of formal sector in improved wheat seed marketing remained almost stagnant. Therefore, the distributions network of PSC should be strengthened with sufficient marketing and field development staff that can supervise sales operations effectively. Also the sale of seed by PSC is on 100 percent cash basis and unsold stock is not lifted back by PSC. While the private companies are selling seed at about 50 percent credit and also unsold stock with the dealers is lifted back. All these factors restrict many dealers from lifting more seed, as they do not want

to block their working capital in a business where the rate of return is very low.

Most of the private seed companies are small in size with little seed production/procurement capacity along with limited sale promotion capability, which needs to be strengthened. Private sector should be strengthened to bridge the gap between requirement and actual distribution of seed. As farmers were willing to pay some additional cost for village level delivery of wheat seed hence its use can be increased if the seed is made available at village level or at least at union council level. High price of seed was reported as major reason for not using the improved wheat seed in spite of the fact that there was significant yield difference with improved wheat seed. Keeping in view the importance of wheat in the economy of Pakistan, prices of improved seed should be kept low in lieu of developmental aspect rather than commercial. As still majority of farmers use farm produced seed from last year purchased wheat seed the extension staff should advise the farmers in developing improved methods of seed selection and preserving practices to farmers when they keep their own seed.

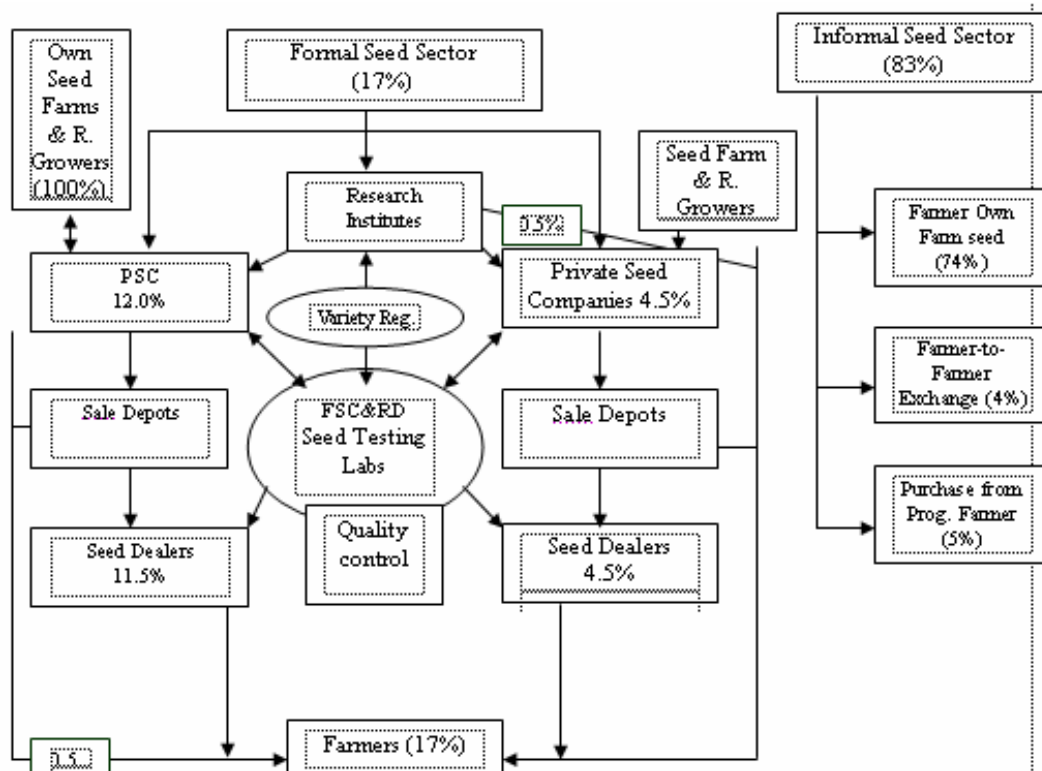


Fig. 1 Marketing Channels of Wheat Seed In Punjab Province Based on Survey Results. 1998-99

**Table I. Requirement, Procurement and Distribution of Improved Wheat Seed in the Punjab Province**

Year	Seed agency	Requirement (mt)	Procurement (mt)	%age	Distributed(m t)	% age
1996-97	PSC	531300	69081.00	13.00	54198.00	10.20
	Private	-	13976.50	2.63	13968.50	2.63
	<b>Total</b>	<b>531300</b>	<b>83058.00</b>	<b>15.63</b>	<b>68166.50</b>	<b>12.83</b>
1997-98	PSC	531300	61418.00	11.56	54940.00	10.34
	Private	-	12706.00	2.39	12550.00	2.36
	<b>Total</b>	<b>531300</b>	<b>74124.00</b>	<b>13.95</b>	<b>67490.00</b>	<b>12.71</b>
1998-99	PSC	531000	65037.60	12.24	64747.00	12.19
	Private	-	31596.00	5.95	26941.00	5.07
	<b>Total</b>	<b>531000</b>	<b>96633.00</b>	<b>18.19</b>	<b>91688.00</b>	<b>17.26</b>
1999-2000	PSC	618000	68200	11.04	57107	9.24
	Private	-	48644	7.87	37855.00	6.13
	<b>Total</b>	<b>618000</b>	<b>116844</b>	<b>18.91</b>	<b>94962.00</b>	<b>15.37</b>
2000-01	PSC	618000	73628.00	11.91	64428.00	10.43
	Private	-	79728.00	12.80	75533.00	12.24
	<b>Total</b>	<b>618000</b>	<b>152756.00</b>	<b>24.71</b>	<b>139961.00</b>	<b>22.65</b>
2001-02	PSC	608000	68236	11.22	59100	9.72
	Private	-	54293	8.93	51225	8.42
	<b>Total</b>	<b>608000</b>	<b>122529</b>	<b>20.15</b>	<b>110325</b>	<b>18.14</b>
2002-03	PSC	731676	68000	9.29	61000	8.34
	Private	-	55002	7.52	44019	6.01
	<b>Total</b>	<b>731676</b>	<b>123002</b>	<b>16.81</b>	<b>105019</b>	<b>14.35</b>
2003-04	PSC	745415	69000	9.26	55987	7.51
	Private	-	65240	8.75	47881	6.42
	<b>Total</b>	<b>745415</b>	<b>134249</b>	<b>18.01</b>	<b>103868</b>	<b>13.93</b>

Source: Hussain and Bhutta, 2003 &amp; FSC&amp;RD 2004 unpublished data

**Table II. Sale Price of Improved Wheat Seed and Seed/Grain Price Ratio**

Year	Prices of wheat seed (Rs./kg)		Seed/Grain price ratio	
	PSC	Privet sector	PSC	Privet sector
1996-97	7.45	8.71	1.24	1.45
1997-98	9.80	10.19	1.63	1.70
1998-99	9.80	11.21	1.63	1.87
1999-00	10.40	11.05	1.39	1.47
2000-01	11.75	11.90	1.57	1.59

Source: Hussain and Bhutta, 2003

**Table III. Distribution of Wheat Seed Used by the Sample Farmers by Source of Seed (percent)**

Farm Category	Own farm	Purchased seed			
		Village fellow	Progressive Grower	Seed dealer	Other
Small	80	6	3	11	0
Medium	67	4	9	19	1
Large	62	0	3	30	5
Overall	74	4	5	16	1

**REFERENCES**

- Alemu, H., H. Verkuijl, W. Mwangi and A. Yallew. 1998. Farmers' wheat seed sources and seed management in the Enebsie Area, Ethiopia. Mexico, D.F. Instt. Agric. Res. and CIMMYT.
- Bishaw, Z., A.J.G. Van Gastel, K. Shawel and Y. Sahl. 1994. Seed survey in Ethiopia, Seed Unit Annual Report, Int. Center for Agric. Res. in Dry Areas (ICARDA) Aleppo, Syria.
- Brennan, J.P. and D. Byerlee. 1991. The rate of crop varietal replacement on farms: Measures and empirical results of wheat. *Plant varieties and seeds*. 4: 99-106.
- Dasgupta, B. 1977. Agrarian change and the new technology in India. Geneva, Switzerland: United Nations Res. Instt. Social Dev.
- Douglas, J. E. 1980. Successful seed programs: A planning and management guide. Boulder, Colorado: West view Press.
- Ellis, F. 1993. Peasant economics, farm households and agrarian development. *Wye Studies in Agric. and Rural Dev.* UK: Wye College.
- GoP. 2002. Agric. Statistics of Pakistan, 2001-02, Economic Wing, MINFAL
- GoP. 2002. Economic Survey 2002-03, Govt. of Pakistan, Finance Div. Economic Advisory Wing, Islamabad.
- Hailu Gebremariam. 1992. Availability and use of seed in Ethiopia. Addis Ababa, Ethiopia: Program Support Unit, Canadian Int'l. Dev. Agency (CIDA).
- Heisey, P.W. 1990. Accelerating the transfer of wheat breeding gains to farmers: A study of the dynamics of varietal replacement in Pakistan. CIMMYT Res. Report No. 1. Mexico, D.F. Mexico.
- Hussain, A. and A. R. Bhutta. 2002. Focus on seed programs, the Pakistan seed industry. Series of country reports WANA Seed Network Secretariat, Seed Unit, ICARD, Aleppo, Syria.
- Hussain A. and A. R. Bhutta. 2003. Seed industry of Pakistan. Federal Seed Certification and Registration. Deptt. MINFAL, Islamabad, Pakistan.
- Hussain, A. Tajamal, M.A. and Naz, N. 2005. National Directory of Seed Companies. Federal Seed Certification and Regist. Deptt. MINFAL, Islamabad, Pakistan.
- Jaffee, S. and J. Srivastava. 1992. Seed system development: The appropriate roles of the private and public sectors. Washington, D.C. The World Bank.
- Pray, C.E. and B. Ramaswami. 1991. A framework for seed policy analysis in developing countries. Washington, D.C. Int'l. Food Policy Res. Instt. (IFPRI).
- Singh, I. 1990. The great ascent: The rural poor in South Asia. Baltimore, Maryland: John Hopkins Univ. Press.
- World Bank. 1975. Rural development sector policy paper. World Bank, Washington, D.C.
- World Bank. 1976. Appraisal of seed industry in Pakistan. World Bank, Washington, D.C.
- World Bank. 1995. A workshop organized by World Bank on easing barriers to movement of plant varieties for Agric. Dev. Agric. Tech. Notes, World Bank, Sep. 1995.