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# The Seed Industry in Pakistan

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*Regulation, Politics and Entrepreneurship*

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## ACRONYMS AND ABBREVIATIONS

AARI	Ayub Agricultural Research Institute
ADA	Agriculture Development Authority
ARI	Agricultural Research Institute
ARM	Agricultural Reform Movement
CCRI	Central Cotton Research Institute
DUS	distinctiveness, uniformity, and stability
EDV	essentially derived variety
FSC&RD	Federal Seed Certification and Registration Department
GB	Gilgit Baltistan
GM	genetically modified
GMO	genetically modified organism
IBC	Institutional Biosafety Committee
Ibd	Islamabad
IP	intellectual property
IPO	intellectual property organization
IPRs	intellectual property rights
KPK	Khyber Pakhtunkhwa
MNCs	multinational corporations
MNFS&R	Ministry of National Food Security and Research
NBC	National Biosafety Committee
NIBGE	National Institute for Biotechnology and Genetic Engineering
PAEC	Pakistan Atomic Energy Commission
PARC	Pakistan Agricultural Research Council
PBR	Plant Breeders' Right
PCCC	Pakistan Central Cotton Committee
PSC	Punjab Seed Corporation
R&D	research and development
SSC	Sindh Seed Corporation
TAC	Technical Advisory Committee
TRIPS	Trade-Related Aspects of Intellectual Property Rights
UAF	University of Agriculture, Faisalabad
VCU	value in cultivation and use
WPADC	West Pakistan Agricultural Development Corporation

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## I. INTRODUCTION

Seed provision in Pakistan is characterized by tensions between archaic regulation and entrepreneurs in a growing market. All key aspects of the system—licensing of seed producers, variety release procedures, access to public germplasm, quality control, intellectual property rights (IPRs), import and export—are governed by laws and rules framed several decades ago for a system dominated by public-sector enterprises. The failure of this governance framework to evolve along with growth of the private seed business since the early 1980s has rendered much of it obsolete, redundant, and irrelevant. The tension between the imperatives of complying with the law and doing business in an increasingly competitive market has occasionally pushed most actors, including public-sector enterprises, to the informal sector,<sup>1</sup> at least for part of their business.

Reform of such archaic governance framework is long overdue. Local and international seed providers, research institutes, development agencies, and government departments have been calling for a more enabling regime that facilitates market-led transactions of seed and its associated knowledge between providers and growers. However, these calls have so far not been strong enough to overcome official inertia and resistance from actors who benefit from a continuation of the existing framework. Therefore, any meaningful reform effort must involve identification of key actors, their interests, and how they are served or affected by existing and proposed legal and institutional arrangements. Unfortunately, seed provision is an under-researched area, and much-needed systemic documentation and analysis have not been carried out in the recent past to inform the reform process.

This paper is an effort to fill this gap. It critically examines the legislative and institutional framework that governs seed provision in Pakistan, underscoring the need for policy reform in key areas of variety release procedures, IPRs, and quality control. The paper also systematically documents the current state of seed provision for various major and minor crops. It provides up-to-date data—insofar as these are available in the public domain—on variety development, seed requirement, production, and sale for various crops; identifies various actors in the public and private sectors; and examines their political and economic interests in continuing or changing the existing system.

This paper is divided into seven sections. Section 2 identifies data sources for this study. Section 3 provides a brief history of the development of seed business in Pakistan to provide context for subsequent discussion. Section 4 overviews seed sector laws and rules, describes the existing institutional infrastructure to regulate seed provision, describes variety approval and seed certification procedures, and identifies gaps in those procedures that constrain the private sector. Section 5 identifies key actors in the sector, explores their respective interests in and capacity to influence potential reform, and briefly discusses important professional networks to identify resources that these actors can deploy to pursue their interests. Section 6 discusses recent efforts to reform the legal framework, which it contends have so far been unsuccessful, largely because the proposed legislation merely extends regulatory oversight over the working of the private sector without offering anything in return. In conclusion, section 7 observes that the boundary between the formal and the informal is more blurred in Pakistan than is often recognized.

## 2. DATA SOURCES

This paper uses data from the following three sources: (1) the Federal Seed Certification and Registration Department (FSC&RD), (2) academic papers and industry reports, and (3) key informants. There is no tradition of independent industry surveys, such as those conducted regularly by Francis Kanoi in India (e.g. Francis Kanoi 2013). In the absence of such surveys, FSC&RD remains the only source of quantitative data on the seed industry in Pakistan.

As the sector's principal regulator, FSC&RD is supposed to maintain up-to-date records on variety releases; operations of seed providers; and seed requirements, certification, import, and export. However, significant gaps in FSC&RD's data, especially for the past 3–4 years, along with the complete absence of the informal sector from its records, have resulted in similar gaps in academic papers and reports, which rely principally on FSC&RD data.

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<sup>1</sup> The informal sector includes farmers and private and public seed enterprises operating without legal sanction.

Rigorous policy work in the seed sector is scarce, as this area has not attracted much academic interest in Pakistan. Most of the recent work focuses on specific aspects, such as the spread of *Bacillus thuringiensis* (Bt) cotton<sup>2</sup> (e.g., Ali et al. 2007), rather than on the governance framework that enables or impedes this spread, or it focuses on a particular crop (e.g., Rana et al. 2013) instead of examining the seed sector holistically. Nevertheless, these papers and industry reports provide useful insights into specific aspects of seed provision. Articles and reports about seed provision in other developing countries are also useful, as they explain how regulatory frameworks have evolved in these countries.

The third source—officials from the seed corporations, the federal Ministry of Food Security and Research, provincial agriculture departments, seed companies, and farmers—is a particularly valuable source for understanding the nuances of the political economy of seed sector regulation in Pakistan. However, only a few interviews with these key informants were possible, as time and resource constraints did not allow a wider and deeper engagement with a representative stakeholder sample.

### 3. DEVELOPMENT OF THE SEED INDUSTRY

The Pakistani seed industry has passed through four different phases. The first phase—1947 to late 1950s—was characterized by small-scale research and development (R&D) in the public sector and a continuation of the colonial focus on a few major crops in the rich alluvial plains of Pakistan’s two agricultural provinces, Punjab and Sindh. The second phase—late 1950s to mid 1970s—was characterized by state-led development of an elaborate network of agricultural research institutes, extension departments and procurement and supplies agencies in the public sector. The third phase—mid 1970s to mid 1990s—was the period of legal and institutional development. The fourth phase – mid 1990s to date – has seen rapid growth of the private sector and a gradual shift of several seed supply functions to seed companies and other actors in formal and informal markets. A brief discussion of each phase follows.

#### 3.1 Phase I

Upon its independence in 1947, Pakistan inherited only one institute for agricultural research and education—the Punjab Agricultural College and Research Institute, Lyallpur<sup>3</sup> (Sarwar 2007). Among the Institute’s several crop-specific stations and sections for R&D activities, the most prominent were the Cereal Station, the Rice Farm at Kala Shah Kaku, the Vegetable Research Section, and the Sugarcane Research Station, which bred new planting material for cultivation in the province.

Since there was no formal system of variety approval and registration, these varieties were simply handed over by breeders to the provincial agricultural department.<sup>4</sup> The department had established a Seed Wing in 1929 to produce seed on government farms and to distribute the seed through its officials. While seed certification was not an entirely unknown concept, it could not formally be put into operation in the absence of an appropriate legal and institutional infrastructure. Overall, these public-sector stations and sections played a small role in seed provision, and farmers remained dependent mostly on their own seed production (Ali and Ali 2004).

#### 3.2 Phase 2

Economic development in the 1950s necessitated the establishment of more elaborate arrangements for agricultural research and seed production. In 1961, the government took two major initiatives. One was the bifurcation of the Lyallpur College and Institute into an Agricultural University at Lyallpur and the Ayub Agricultural Research Institute (AARI), and the other was the establishment of the West Pakistan Agricultural Development Corporation (WPADC).<sup>5</sup> These organizations

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<sup>2</sup> Insect-resistant genetically modified cotton. Bt is a common soil bacterium that produces toxins for specific bollworms. Bt cotton contains the toxin-producing gene from this bacterium.

<sup>3</sup> Lyalpur (now Faisalabad) is a large city in Central Punjab. The College was established in 1909.

<sup>4</sup> As per FSC&RD records, two rice varieties were released in 1933, another rice variety was released in 1958, and a cotton variety was released in 1959. Three of these varieties were registered with FSC&RD in 1983, and one in 1986. It is quite likely that the number of varieties developed during this period was larger, but FSC&RD has data only on those varieties that it later registered.

<sup>5</sup> Punjab, Sindh, Balochistan, Northwest Frontier Province (now Khyber Pakhtunkhwa), and tribal areas were merged in 1954 into one unit called West Pakistan. The one unit was dissolved in 1970.

grew quickly and emerged as dedicated institutional hubs for agricultural research and teaching, variety development, and seed production, respectively. Given the nature of these activities, overlaps were inevitable. The University at Lyallpur started academic programs in multiple disciplines, including plant breeding, veterinary sciences, and agricultural economics. AARI upgraded existing stations and sections, and established several new sections that carried out research on new varieties and farming practices. And WPADC established seed farms and developed a system of seed certification.

When the Norman Borlaug's Institute for International Agriculture in Mexico and the International Rice Research Institute in the Philippines developed improved varieties of wheat and rice, AARI and WPADC provided a convenient conduit for transmitting these new varieties and allied technologies to farmers in Pakistan. Therefore, they can rightfully claim some credit for the transformation initiated by the Green Revolution.

The establishment of AARI and WPADC, however, resulted in an inadequate arrangement for seed provision, for three reasons. First, they operated in a legal vacuum, as the procedures and protocols of variety approval were yet to be developed. Second, having started from a low baseline, it took them several years to scale up operations and even then they were able to serve only a small proportion of farmers in Pakistan. Their focus for most part was limited to irrigated areas in Punjab and Sindh to the exclusion of other provinces that now comprise Pakistan. Third, capacity constraints – mainly shortage of skilled manpower – forced these organisations to concentrate their R&D on a few major crops. AARI continued to grow in the third and the fourth phase, but WPADC was wound up in 1972 after dissolution of West Pakistan as a single administrative unit. The function of seed production and marketing was assigned to provincial organizations, namely, the Punjab Agricultural Development and Supplies Corporation and the Sindh Agricultural Supplies Organisation. Balochistan and Khyber Pakhtunkhwa (KPK) continued to rely on seed produced by Punjab- and Sindh-based organizations and on farmers' seed saving.

Another important development of the 1960s was the promulgation of Pakistan's first seed law—the West Pakistan Seeds and Fruit Plants Ordinance, 1965. The Ordinance was a very basic instrument that provided for the registration of growers for production of certified seeds and establishment of nurseries. Registered growers could voluntarily apply for certification. Certified seed was to be sold to the government, while only leftover certified seed could be sold in the open market. The Ordinance did not prohibit production of uncertified seed (other than the seed of fruit plants), which meant that seed producers could develop seed for the market, but had to register with the government and to maintain standards if they wished to have their seeds certified.

### **3.3 Phase 3**

The third phase started in 1973 when the Pakistan government sought help from the World Bank to review its seed provision system and formulate recommendations for comprehensive reform (Salam 2012; Ahmad and Nagy 1999). This was the beginning of Pakistan's first large-scale seed industry project under which wide-ranging legal and institutional reforms were undertaken to improve seed provision to farmers.

The most salient feature of this project was the enactment of the Seed Act, 1976, which specified procedures for variety registration and seed certification. The Act also created elaborate institutional infrastructure for its implementation, which included the National Seed Council, provincial seed councils, and two separate agencies (under the federal Ministry of Agriculture) for variety registration and seed certification. These agencies were merged in 1998 to constitute the FSC&RD as it stands today. The mandate of Punjab and Sindh corporations for agricultural supplies was redefined, and these were converted into Punjab and Sindh Seed Corporations, respectively. In KPK, an Agriculture Development Authority was established, which was mandated to produce seed for local consumption. In Balochistan, no separate institutional arrangements were made, and the provincial agriculture department continued to provide seed on a limited scale.

A characteristic feature of this phase was the leadership of public-sector organizations and the marginal role of the private sector. The Seed Act did not provide for the registration of private seed companies. The only role it assigned to the private sector was seed multiplication on farmers' fields. The Act assigned all other functions in the seed development chain to

the public sector—variety development; production of breeder nucleus seed, pre-basic seed, and basic seed;<sup>6</sup> seed testing; and certification. Such exclusive focus reflected broader economic policy, which pursued broad-spectrum nationalization in the 1970s. Several projects carried out in the 1980s to strengthen the public sector involved establishing seed production farms, setting up seed-testing laboratories, installing seed processing plants, and training seed technologists.

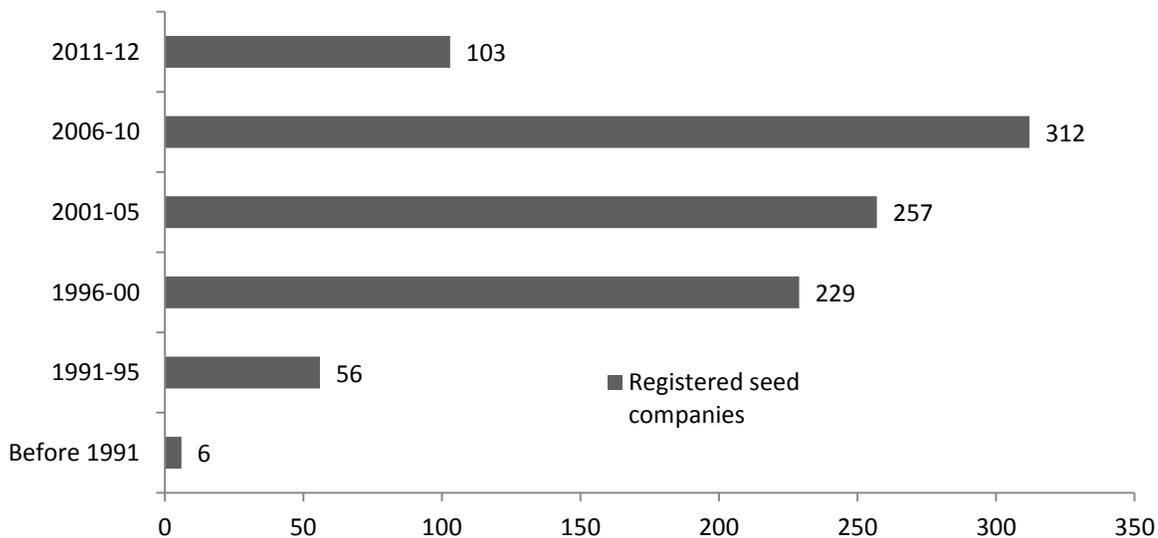
### 3.4 Phase 4

Changes in macroeconomic policy in the 1980s led FSC&RD to proactively seek the private sector’s induction into the seed business. This was the beginning of the fourth phase in the seed industry’s development. The first seed company was formally registered in 1981. Another eight seed companies—all based in Punjab—launched their business in the next few years (Sarwar 2007).

The pace picked up in the 1990s. In 1994, the seed business was formally categorized as an industry (Ali and Ali 2004) and was granted privileges associated with that designation. By 2000, 291 private seed companies had registered with FSC&RD (Ali and Ali 2004). Sindh, KPK, and Balochistan had their first seed companies in 1996, 1996, and 1998, respectively. Four multinational corporations (MNCs) also established their Pakistan affiliates during the 1980s and 1990s: Monsanto (1984), Pioneer Seeds (1989), Syngenta (1991), and ICI Pakistan (1998). The number of seed companies continued to grow during the last decade, and by 2012, 963 companies had registered with FSC&RD (Figure 3.1).

Initially, Pakistani seed companies were limited to multiplication of basic seed obtained from seed corporations. Very quickly, however, they established their own variety development programs and were able to bring a number of new crop varieties in the market during the last decade. As their operations grew, they started to displace public-sector corporations from the market. Several companies also started to import and export planting material. Gradually, they became the lead provider in several crops—cotton, vegetables, oilseeds, maize, and fodders. The leadership of the Pakistani seed industry had quietly shifted to the private sector.

**Figure 3.1—Registration of seed companies (1981–2012)**



<sup>6</sup> Breeder nucleus seed is the purest seed of a variety prepared by the breeder. Its progeny, called pre-basic seed, is also produced by a breeding institute or a seed company. Basic seed is the progeny of the pre-basic seed. Under the Seed Act, 1976, basic seed may be produced *only* by a public-sector organization (e.g., a seed corporation). In practice, however, seed companies also produce basic seed of their own varieties. Two additional seed categories are certified seed and truthfully labelled seed. Certified seed is the progeny of basic seed, produced by registered growers of seed-producing entities and certified by the government. Truthfully labelled seed is (local or imported) uncertified seed sold under the Seeds (Truth-in-Labeling) Rules, 1991 (discussed in Section 4).

Source: Author's compilation from FSC&RD data.

## 4. LEGAL AND INSTITUTIONAL FRAMEWORK

The Seed Act, 1976 and rules developed under the Act provide the framework for the operation of Pakistan's seed industry. The Biosafety Rules and Guidelines of 2005 are another important component of the seed sector legal framework. Their salient features are examined below.

### 4.1 Seed Act, 1976

The Seed Act's objective is "controlling and regulating the quality of seeds." To achieve this objective, the Act establishes a set of institutions, specifies procedures for registering new varieties and producing seed, specifies breaches of the laws, and specifies penalties for committing them.

The Act creates three institutions: (1) the National Seed Council, (2) provincial seed councils, and (3) FSC&RD. Chaired by the federal Minister of Agriculture, the National Seed Council is required to perform a range of regulatory and advisory functions.<sup>7</sup> These include specifying seed standards, regulating the interprovincial movement of seed, guiding the administration of seed quality standards, advising the government in general on seed policy, and ensuring and protecting investment in the seed industry. The Act does not pursue the private investment function in subsequent sections, nor does it specify the functions of provincial seed councils. It leaves it to the federal government to assign functions in consultation with the provincial governments.

The Seed Act authorizes the federal government to prescribe seed quality standards (germination, purity, etc.) and the information to be printed on a label, along with the varieties it has approved for production in a province. The Act prohibits the sale, offer for sale, holding in stock, etc., of seed of a notified variety,<sup>8</sup> unless it conforms to seed quality standards and bears a label describing the required information. Such restrictions apply *only* to seed of notified varieties. The Act allows a person intending to produce seed of a notified variety to have the seed certified by FSC&RD, but stops short of mandatory certification.

FSC&RD has been assigned two functions: (1) registration of new varieties and (2) certification of seed. As the secretariat of the National Seed Council, FSC&RD is required to support the Council in discharging its functions. Broadly, FSC&RD is mandated to perform the following five types of roles:

1. Conduct preregistration checking of varieties for assessing their eligibility for registration (i.e., meeting distinctiveness, uniformity, and stability (DUS) standards) and for meeting seed quality standards
2. Maintain a register of notified varieties containing information on their botanical description
3. Register seed growers and maintain their records
4. Control seed quality based on inspections during the seed production stage
5. Build the capacity of seed technologists

The Act allows the federal government to appoint seed analysts, seed certification officers, and seed inspectors, and specifies their powers and the process to be followed in discharging various functions. Violating any provision of the Act or preventing a duly appointed person from performing his or her functions is declared an offense punishable with a fine not exceeding Rs 1,000. Repeat offenses may be punished with a fine or with imprisonment for up to 6 months, or both.

The Act assigns no role to private seed companies, and does not provide for their registration or regulation (Box 1). The only role assigned to the private sector is seed multiplication, for which FSC&RD is required to register seed growers. The

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<sup>7</sup> Both national and provincial seed councils are composed principally of officials. Farmer representation is limited to one farmer nominated by the respective government in each case.

<sup>8</sup> i.e., a variety approved by the government and notified in the official gazette.

Act applies certain restrictions to the sale, etc., of notified seed varieties, but none to the production, storage, or sale of varieties not notified (i.e., either rejected or not presented for registration). There is no provision to ban a variety on any grounds or to prohibit its cultivation. Further, variety registration with FSC&RD does not confer any right upon the breeder. The Act also does not restrict or regulate farmer seed saving or non-commercial exchange of seed of notified or other varieties.

### **Box 1: Registration of seed companies**

The 1976 Seed Act is silent on registration of seed companies. However, in its December 31, 1979, meeting, the federal government's Economic Coordination Committee constituted an Inter-ministerial Working Group to register or deregister new seed companies (Hussain 2011). Chaired by the Agriculture Development Commissioner of the federal Ministry of Food Security, the Group includes the Director General of FSC&RD, secretaries of provincial agriculture departments, Managing Directors of the Punjab and Sindh Seed Corporations, and a representative of the Planning Commission of Pakistan.

Since the Working Group is not a statutory body, it may not create a new organization. Thus, seed companies are established under other instruments (e.g., the Companies Ordinance, 1984), and then must apply to the Working Group for registration, and attach a detailed feasibility statement of their proposed seed business.

The legality of requiring already registered companies to register again with the Working Group is questionable. Also, the double registration and the feasibility statement impose a restriction on seed business operations, as a duly registered company may normally carry out the business for which it was originally registered.

## **4.2 Rules developed under the Seed Act, 1976**

Three sets of rules have been framed to implement the Seed Act: (1) Seed (Registration) Rules, 1987; (2) Seeds (Truth-in-Labeling) Rules, 1991; and (3) Pakistan Fruit Plants Certification Rules, 1998. Each is briefly discussed below.

The Seed (Registration) Rules of 1987 establish a Federal Seed Registration Committee to be chaired by the Secretary of the Ministry of Agriculture and comprised of various high-level officials from public-sector research organizations. The Rules require the Committee to evaluate candidate varieties for compliance with variety registration standards. These rules are subordinate legislation carried out by the government without recourse to the Parliament (or the provincial Assembly). They elaborate and explain—rather than add to or contradict—the parent 1976 Seed Act.

Rule 7 of the Seed (Registration) Rules of 1987 requires a new variety to be both (1) superior to existing varieties in at least one important aspect, and (2) at least satisfactory in other major characteristics. Rule 9 specifies the effects of non-registration of a variety, and prohibits any seed of an unregistered variety included in a Schedule to the Rules<sup>9</sup> from being produced or certified in Pakistan, unless the variety is validly registered with FSC&RD.<sup>10</sup> This is unusual because such rules are meant to be subordinate legislation carried out by the government without recourse to the Parliament (or a provincial assembly). They are meant to elaborate and explain, rather than add to or contradict the parent legislation. But by prohibiting production of seed of unregistered varieties, Rule 9 is effectively an unlegislated addition to the Seed Act which is silent on the production of seed of unregistered varieties.

Read alone (which was definitely the case between 1976 and 1987), the Act indicates that if a breeder wants to register his variety with FSC&RD, he may apply in the prescribed form and the variety will be registered if it meets the criteria. Once the variety has been notified, he may seek certification of its seed. But both are optional for the breeder. If he does not seek

<sup>9</sup> The schedule is an extensive list and includes all major and minor crops.

<sup>10</sup> "9. Effect of non-registration—No variety of the crop specified in Schedule 1 shall be eligible for seed production and certification in any Province of Pakistan or part thereof unless the said variety has been registered and the necessary certificate to that effect has been obtained from the National Registration Agency."

registration of his variety, he may market it at his own risk and cost. Read with the Seed (Registration) Rules, 1987, the Seed Act indicates that if a breeder does not register his variety or his application fails, seed of such variety cannot be produced.<sup>11</sup>

The Seeds (Truth-in-Labeling) Rules of 1991 deal with labelling seed packets and containers. These rules require all seed offered for sale in Pakistan or for export to carry a label to be affixed prominently on the packet or container showing basic information about the seed, such as the names of the variety and producer and its purity percentage, germination percentage, production month, expiration date, and packet weight. Similar information is also required for imported seed.

The Pakistan Fruit Plants Certification Rules of 1998 specify procedures for registering plant nurseries, certifying fruit plants, and tagging certified rootstock.

### 4.3 2005 Biosafety Rules and Guidelines

The Pakistan Biosafety Rules and National Biosafety Guidelines of 2005 are other important components of the seed sector legal framework. Framed under the Pakistan Environment Protection Act, 1997, these rules regulate various aspects of the import, export, manufacture, trial, and sale of genetically modified organisms (GMOs). They prohibit the import, export, sale, purchase, or trade of GMOs and their products without obtaining a license from the federal government. They also provide for the establishment of three committees—a National Biosafety Committee (NBC) and a Technical Advisory Committee (TAC) at the federal level as part of the Ministry of Environment (see Box 2 for recent developments), and an Institutional Biosafety Committee (IBC) at all public or private institutes undertaking manipulation of living organisms at the molecular level.

Accordingly, all major research institutes and leading seed companies have established IBCs to oversee biosafety aspects of their R&D programs. These IBCs comprise the institutes' head, a subject matter expert, a social scientist, and a representative of the public. IBCs are the first point of biosafety regulation and perform a range of functions. Their assessment reports are forwarded to the TAC along with their recommendations.

TAC is chaired by the Director General of the Environmental Protection Authority and comprises 12 officials and 2 members of the public. Its role is to evaluate IBC applications and IBC assessment reports, monitor field activities, and collect data that may be required for biosafety purposes. Its recommendations are submitted to the NBC, which is the highest forum for biosafety regulation.

NBC comprises 12 officials representing various ministries and research organizations. Its functions include granting or refusing approvals for the import, export, trial, and commercial release of cultivated varieties. So far, NBC has only approved commercial release of Bt cotton, although it has allowed limited trials for a range of genetically modified (GM) crops, including drought-tolerant wheat and herbicide-tolerant and insect-resistant maize.<sup>12</sup>

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<sup>11</sup> Since this rule prohibits seed production, rather than sale or offering for sale, technically, farmer seed saving should also be problematic. Because not all farmer-saved seed varieties are registered or notified, at least theoretically, farmers will violate Rule 9 when they produce traditional seed varieties. However, this strictly legal interpretation is unlikely in practice.

<sup>12</sup> Developed by the National Institute of Biotechnology and Genetic Engineering and Monsanto, respectively.

## **Box 2: The 18<sup>th</sup> Constitutional Amendment and devolution of functions**

Under the 1973 Constitution of Pakistan, agriculture is a provincial subject, with provincial governments responsible for establishing the parameters of conducting seed business within their jurisdictions. However, in 1976, Pakistan prevailed upon its provincial governments to delegate their legislative powers to the federal government in the interest of legislative harmony. As a result, the 1976 Seed Act was enacted, and FSC&RD was created.

When several federal functions and powers were decentralized to provinces in 2010 through the 18<sup>th</sup> Amendment to the Constitution, this issue of re-delegation of powers resurfaced. The federal government dissolved the Ministry of Food and Agriculture, so that its functions could be transferred back to the provinces. However, the federal bureaucracy was able to make a successful case for re-creating the dissolved Ministry into the new Ministry of National Food Security and Research (MNFS&R) (Rana 2013).

FSC&RD, whose responsibilities were initially expected to be delegated to provinces, was first assigned to the Ministry of Science and Technology and later to the MNFS&R in 2011. Similarly, the Ministry of Environment was dissolved, only to be quickly replaced by the Ministry of Climate Change. The transfer of the environment function to provincial governments has resulted in widespread confusion regarding jurisdiction for administering biosafety rules.

## **5. KEY ACTORS IN THE SEED PROVISION SYSTEM**

This section critically examines the role of key actors in seed provision. It discusses both formal and informal sector actors, as the latter—farmers and private/public seed enterprises operating without legal sanction—are as much a part of the seed industry as the former. Such a broad construction is necessitated by large-scale, informal-sector operations in a loosely regulated system.

### **5.1 Public-sector research organizations**

Pakistan has one of the larger agricultural research systems among developing countries, with an estimated 3,513 full-time-equivalent researchers (Flaherty et al. 2012). Most of these researchers are employed in public-sector research organizations, which play an important role in several seed sector activities, such as maintaining germplasm, importing exotic material from international research institutes for local adoption, developing varieties, and training workers for the seed industry. Three sets of institutes and universities are important: federal institutes, provincial government institutes, and agricultural universities.

#### **5.1.1 FEDERAL INSTITUTES**

The most prominent federal institutes are the Pakistan Agricultural Research Council (PARC), Pakistan Central Cotton Committee (PCCC), and agricultural research institutes of the Pakistan Atomic Energy Commission (PAEC). We briefly discuss each below.

Established in 1981, the Pakistan Agricultural Research Council (PARC) is the federal government's leading research outfit with a diverse portfolio. PARC carries out R&D for all crops, except cotton. It manages the National Agricultural Research Centre and nine area- and crop-specific research centers and institutes. Research is organized under four divisions: Plant Sciences Division, Animal Sciences Division, Natural Resources Division and Social Sciences Division. Scientific and technical staff members in these divisions conduct traditional breeding and agronomic research, as well as modern genomic and biotechnology research. PARC also runs an institute for preservation of plant genetic resources, which holds in its gene bank more than 27,000 accessions of different crop species (PARC 2013).

Established in 1948, the Pakistan Central Cotton Committee (PCCC) is the federal government's dedicated organization for research on cotton, and has developed several popular cotton varieties. PCCC is funded by federal grants and a small cess on the textile industry under the Cotton Cess Act of 1923. Formerly administered by the Ministry of Textile Industry, in 2012, the PCCC's management control was transferred to the All Pakistan Textile Mills' Association, which has nominated one of its leading members as PCCC's Vice-president and Chief Executive Officer. The Central Cotton Research Institute (CCRI) is the leading Pakistani organization for cotton R&D, and falls under the control of the PCCC.

The Pakistan Atomic Energy Commission (PAEC) also runs several research institutes that carry out important seed sector activities. Most notable are the National Institute of Biotechnology and Genetic Engineering (NIBGE) and the Nuclear Institute of Agricultural Biology (both located in Faisalabad). These institutes use modern techniques and tools in agricultural biotechnology to support the breeding of new plant varieties. NIBGE has successfully developed GM varieties of cotton and is actively pursuing development of GM varieties of other crops (including drought-tolerant wheat).

### 5.1.2 PROVINCIAL GOVERNMENT INSTITUTES

The largest provincial government institute is the Punjab government's AARI in Faisalabad. AARI has several crop-specific research institutes and stations throughout the province, which develop new crop varieties, find novel and effective ways of countering pests and pathogens, and suggest appropriate farming practices to boost production and reduce costs.

There is extensive overlap and duplication among the federal and provincial variety development programs. Perhaps the most obvious case is PCCC's CCRI, which is located in Multan, a large agricultural district in South Punjab. CCRI has elaborate plant-breeding facilities, and has developed several popular cotton varieties. Situated across the road from CCRI is AARI's premier Cotton Research Station, which pursues the same mandate and has similar facilities. Yet the two institutes exist as separate entities and rarely communicate.

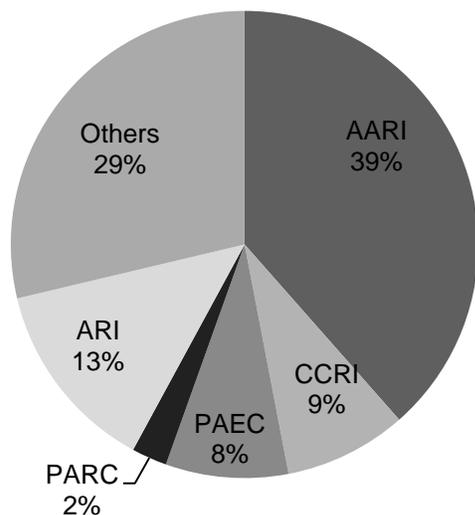
### 5.1.3 AGRICULTURAL UNIVERSITIES

Five major agricultural universities in Pakistan carry out research leading to variety development: the University of Agriculture, Faisalabad (UAF); the University of Arid Agriculture, Rawalpindi; the Agriculture University, Peshawar; the Sindh Agriculture University, Tando Jam; and the Lasbella University of Agriculture, Water and Marine Sciences, Lasbella. Their academic programs—Bachelor of Science, Master of Science, Master of Philosophy, and Doctor of Philosophy (PhD)—provide a trained workforce for the seed industry and other agribusiness. Current total enrolment is estimated at 27,000 (Flaherty et al. 2012). UAF is the largest agricultural university and has a current enrolment of about 12,000 students (UAF 2013). It employs 593 faculty members, of whom 288 (49 percent) hold a PhD from a foreign or a local university. Since its founding, the UAF has conferred 916 PhDs (i.e., only 17 per year on average).

### 5.1.4 NOTABLE TRENDS IN PUBLIC-SECTOR RESEARCH ORGANIZATIONS

Developing new varieties is one of the several seed sector activities these research organizations undertake. By far, AARI has been the most productive (Figure 5.1), accounting for 39 percent of the total varieties released to date, followed by KPK's Agricultural Research Institute (ARI), with 13 percent of the total.

**Figure 5.1—Shares in variety release**



Source: Author's calculations from FSC&RD data.

Tables 5.1 and 5.2 contain segregated data on the release of varieties. Four important trends are noticeable. First, public-sector institutes and universities account for 96 percent of all varieties released to date. The private sector has only recently started developing its own varieties for commercial release, and this effort is restricted to a few crops. Cotton varieties—all are Bt varieties—account for more than half of all variety development in the private sector. It is suspected that the proportion of varieties released by the private sector is larger than what is reported here, but these additional varieties have been released in the informal sector and, thus, are not included in FSC&RD data sets.

Second, most variety development is concentrated in a few crops. Cotton and wheat, in particular, account for a disproportionately large share—40 percent of all varieties released so far. Third, Punjab has developed almost half of all varieties and hybrids, which is in line with its share of agricultural production. However, this also means that the agricultural requirements of other provinces are not being adequately met. Balochistan and Sindh seem to depend upon germplasm development in agro-ecologically different regions of Punjab.

Finally, the release of new crop varieties and hybrids peaked during the 1990s and 2000s, which was also the period when most seed companies were established. Although these new varieties and hybrids were still coming from the public sector, the private sector's growing participation seems to have played a key role. It not only enlarged the market, but also (and more important) created an appetite for nominally different varieties, so that companies could differentiate their products in an emerging market. In other words, existing varieties were being repackaged to meet an ever-growing demand from new companies. This also shows that companies were competing on germplasm, rather than on seed quality. Thus, a high rate of varietal change—albeit fictitious—emerges as a prominent feature of the past two decades.

**Table 5.1—Number of registered and released varieties**

Crop	Public sector*					Private sector	Total
	Punjab	Sindh	KPK	Balochistan	Ibd		
Wheat	59	24	40	8	3	–	<b>134</b>
Barley	3	–	3	4	–	–	<b>10</b>
Maize	11	–	12	–	–	2	<b>25</b>
Rice	16	13	06	–	–	–	<b>35</b>
Cotton	74	21	1	–	–	13	<b>109</b>
Sugarcane	14	8	16	–	–	1	<b>39</b>
Pulses	43	4	19	1	5	–	<b>72</b>
Oilseed	20	5	22	–	8	5	<b>60</b>
Fodder	27	–	7	1	–	2	<b>37</b>
Vegetables	36	1	12	8	–	–	<b>57</b>
Fruits	2	–	33	–	–	–	<b>35</b>
<b>Total</b>	<b>305</b>	<b>76</b>	<b>171</b>	<b>22</b>	<b>16</b>	<b>23</b>	<b>613</b>

Source: FSC&RD data.

Notes: "Ibd" denotes Islamabad; "KPK" denotes Khyber Pakhtunkhwa.

\* The geographic distribution in this table shows the location of the research institute that developed these varieties. Thus, Punjab-based institutes developed 305 varieties and hybrids.

**Table 5.2—Release of varieties and hybrids (1933–2013)**

Crop	Pre-1970	1970–1979	1980–1989	1990–1999	2000–2009	2010–2013	Total
<b>Wheat</b>	0	13	20	35	44	22	<b>134</b>
<b>Rice</b>	5	3	10	8	8	1	<b>35</b>
<b>Cotton</b>	2	9	11	28	32	27	<b>109</b>
<b>Maize</b>	0	5	2	9	5	4	<b>25</b>
<b>Sugarcane</b>	0	0	3	15	15	6	<b>39</b>
<b>Vegetables</b>	3	2	2	30	15	5	<b>57</b>
<b>Barley</b>	0	0	3	3	2	2	<b>10</b>
<b>Fodder and forage</b>	0	0	10	6	14	7	<b>37</b>
<b>Oilseed</b>	0	0	8	31	15	6	<b>60</b>
<b>Pulses</b>	0	0	8	26	32	6	<b>72</b>
<b>Fruit</b>	0	0	0	7	20	8	<b>35</b>
<b>Total</b>	<b>10</b>	<b>32</b>	<b>77</b>	<b>198</b>	<b>202</b>	<b>94</b>	<b>613</b>

Source: Author's compilation from FSC&RD data.

## 5.2 Seed Corporations

An important development of the 1970s was the establishment of seed corporations in Punjab and Sindh, and an Agriculture Development Authority (ADA) in KPK. The performance of the KPK ADA and the Sindh Seed Corporation (SSC) was disappointing, and their role in seed provision remained minimal over the years (Hussain and Hussain 2007). The KPK ADA and SSC were disbanded in 2001 and 2002, respectively. SSC was revived in 2006 (mainly under pressure from its retrenched employees), but has played an insignificant role in seed provision. For all practical purposes, Punjab Seed Corporation (PSC) is the only seed provider in the public sector.

### 5.2.1 PUNJAB SEED CORPORATION

PSC has an impressive infrastructure for seed production and distribution: seed farms on 7,303 acres, processing plants with a capacity of 72,000 metric tons, ginning capacity of 22.5 bales per hour, delinting capacity of 13,500 metric tons, storage capacity of 6,700 metric tons, and a marketing network of 1,136 dealers and 19 sales points in Punjab and 70 dealers in other provinces (PSC 2008). PSC produces seed of the following crops: wheat, cotton, gram, paddy, maize, fodder, pulses, oilseed, potato, and vegetables. In addition to producing seed on its own farms, PSC buys seed from more than 1,200 registered growers (PSC 2008).

Despite this infrastructure, PSC is now largely irrelevant to seed provision in Pakistan. Data in Table 5.3 show that PSC is unable to sell its seed stock every year, which shows poor demand for its seed and inadequate marketing mechanisms. It is also clear that PSC provides a very small proportion of the total seed requirement for various crops. Finally, PSC has also started to lose its farms: Since 2006–2008, tenants on PSC’s largest farm in Khanewal have illegally occupied a large part of the farm and have refused to grow seed or to pay rent; thus, more than 5,000 acres are effectively lost to PSC.

**Table 5.3—Seed provisioning by the Punjab Seed Corporation (2011–2012)**

Crop	Total seed requirement (metric tons)	PSC seed procurement and sale (metric tons)			Seed sold as % of total requirement	Price <sup>13</sup> (US\$/kg)
		Procured	Sold	%		
<b>Wheat</b>	1,085,400	57,280	12,958	23	1	0.39
<b>Rice</b>	42,480	2,334	2,333	100	6	0.95
<b>Maize</b>	31,914	87	80	92	0	0.73
<b>Cotton</b>	40,000	1,800	668	37	2	1.92

Source: PSC 2013.

PSC’s governance structure is a major factor in this poor performance. The Punjab Seed Corporation Act of 1976 vests PSC’s governance function in a Board. Although, the Act states that “the Board in discharging its functions shall act on commercial considerations and be guided by such directions as the Government may give to it from time to time” (Section 4(2)), the composition of the Board dictates that PSC work as an appendage of the Punjab Agriculture Department, rather than as a professionally managed seed provider operating under market conditions.

Chaired by the Punjab Minister for Agriculture, the Board comprises four senior officials of the Punjab Government, one representative of the farming community (to be nominated by the government), and one representative from the seed trade

<sup>13</sup> Prices vary for different varieties. The highest price charged in 2012–2013 is quoted. For cotton, the price of delinted seed is quoted. Other than the large endowment of farms that it has received from the government, PSC does not receive any subsidy from the government. Its seed prices are comparable with (or lower than) the prices charged by private providers for similar or the same varieties.

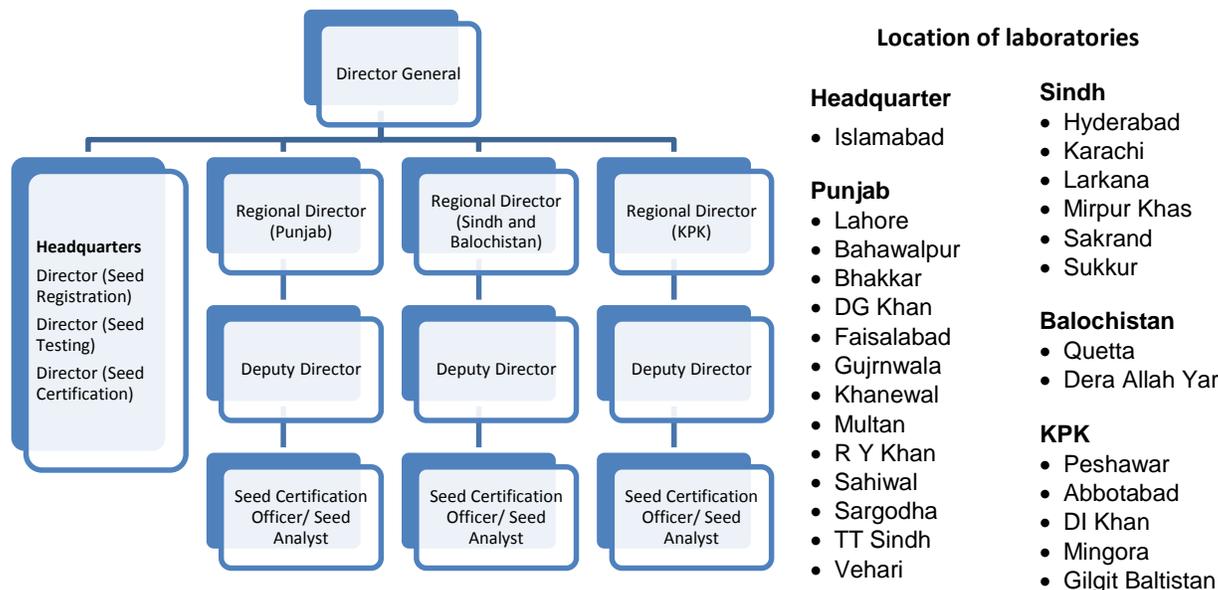
(also nominated by the government). The Managing Director—PSC’s Chief Executive Officer—is appointed by the government and is usually a civil servant. During 2002–2008, the position was occupied by two retired Brigadiers, whose only claim to this posting was their military background in the then military government.

### 5.3 Federal Seed Certification and Registration Department

FSC&RD is Pakistan’s premier agency for regulating seed provision. It is led by a Director General, who is assisted by professional staff in the Islamabad office and regional directorates for Punjab, KPK, and Sindh. Seed certification work in Balochistan province is handled by the Sindh Directorate, which FSC&RD manages a network of 28 seed-testing laboratories. Figure 5.2 presents an FSC&RD organizational chart.

FSC&RD employs a large number of seed professionals and support staff in the Islamabad office and field outlets. During the last 3 years, the cost of maintaining these employees has been about 80 percent of the total FSC&RD annual budget (about US\$6 million in 2009–2010) (FSC&RD 2009). This leaves very little for other activities, such as training, facilitation of seed providers, or development of databases.

Figure 5.2—Organization of FSC&RD



Source: FSC&RD 2009.

FSC&RD performs the following key functions: (1) registration of seed companies, (2) registration of varieties, (3) seed certification, and (4) enforcement of the Seed Act, 1976. A brief discussion follows.

**Registration of seed companies:** As discussed in Section 4, registration of seed companies by FSC&RD is sanctioned neither by the Seed Act nor by the rules develop under the Act. Rather, registration is carried out under a decision of the Economic Coordination Committee of the federal government. Seed companies submit their application on a prescribed form, which is accompanied by a detailed feasibility report and the registration fee. FSC&RD examines the feasibility report—essentially the applicant’s credentials and capacity to undertake seed business—and grants a certificate of registration. Since 1981, FSC&RD has registered 963 Pakistani seed companies (Figure 3.1), along with the Pakistan offices of five MNCs. FSC&RD occasionally publishes a National Directory of Seed Companies containing basic information on seed companies; the last Directory was published in 2007.

**Registration of varieties:** Applicants use a specific form to register a new variety with FSC&RD. The application must contain necessary information about the variety—a detailed description of its physiological and morphological characteristics and how it is different from existing varieties—and must propose a specific denomination.

The applicant also submits a sufficient quantity of seed to enable its evaluation. FSC&RD conducts various trials for two or more years to assess the seed's suitability for cultivation in specific areas. These trials are carried out on various federal and provincial research farms, where the performance of the applicant's variety is closely observed and recorded. Based on these trials, FSC&RD prepares its recommendations for the Federal Seed Registration Committee, which makes a decision on the registration application.

If the application is successful, the variety is granted a certificate of registration, which is valid for 10 years from the date of issue and may be renewed for a term not exceeding 5 years. For horticultural plants, the validity of the registration certificate may be extended for another term of five years. Upon the seed's registration, the name of the variety is entered into a register maintained by FSC&RD, at which point the variety may be sold only under its assigned name. Applicants who are aggrieved by any decision of the Committee may appeal their case to the National Seed Council.

This variety approval procedure has effectively discouraged many breeders in the public and private sectors from registering their new varieties with FSC&RD. In 2013, Rana et al. reported that 10 out of 14 varieties currently under large-scale cultivation in Sindh were not registered with FSC&RD.

**Seed certification:** FSC&RD carries out this core function through a system of field inspections during the production of seed at farms. Genetic purity is assessed through crop inspection, and physical purity is assessed through analysis in laboratories. Based on these inspections, various categories of seeds are provided identification labels. Imported seed is not certified by FSC&RD, but the import must be accompanied by a certificate showing that the seed has been inspected and approved in the producing country.

Although certification is voluntary, several seed companies prefer to obtain certification tags from FSC&RD to be able to sell seed to government programs that often purchase only certified seed and to avoid field inspections by FSC&RD officials, which they are authorized to carry out for any seed production facility, regardless of whether certification is sought.

**Enforcement of the Seed Act, 1976:** FSC&RD employs 27 Seed Inspectors to carry out field inspections and to enforce provisions of the Act. If they observe a violation, they may confiscate the seed stock and impose a fine. However, the current workforce is too small to effectively inspect seed production activities in various parts of the country. Consequently, seed production mostly takes place without regulatory oversight.

### 5.3.1 AVAILABILITY OF CERTIFIED SEED

Tables 5.4, 5.5, and 5.6 present data on the availability of certified seed. Table 5.4 presents crop-wise data on total seed requirement and availability for 2012–2013. Table 5.5 compares availability of certified seed over the past 4 years to identify any trends. Table 5.6 presents time-series data for selected crops.

**Table 5.4—Availability of certified seed (2012–2013) (metric tons)**

Crop	Total estimated seed requirement	Total certified seed availability					
		Pakistani public and private sectors			Imported	Total certified seed	
		Public	Private	Total		Metric ton	% of requirement
<b>Wheat</b>	1,085,400	72,112	187,792	259,904	–	259,904	24
<b>Rice</b>	42,480	5,068	40,699	45,767	3,725	49,492	116*
<b>Maize</b>	31,914	245	3,460	3,705	10,303	14,008	44
<b>Cotton</b>	40,000	801	3,829	4,630	–	4,630	12
<b>Potato</b>	372,725	34	29	63	4,558	4,621	1
<b>Pulses</b>	47,496	24	892	916	–	917	2
<b>Oilseed</b>	10,582	134	448	582	1,284	1,866	18
<b>Vegetables</b>	5,070	4	237	241	5,177	5,418	107*
<b>Fodder</b>	40,138	12	14	26	21,253	21,279	53
<b>Total</b>	<b>1,675,804</b>	<b>78,434</b>	<b>237,400</b>	<b>315,834</b>	<b>46,300</b>	<b>362,137</b>	<b>22</b>

Source: Constructed from FSC&RD data.

\* This means that either total seed requirement for rice and vegetables is more than what FSC&RD estimates, or some of the certified seed remains unused.

**Table 5.5—Comparison of availability of certified seed (2010–2013)**

Crop	2009–2010		2010–2011		2011–2012		2012–2013	
	Availability		Availability		Availability		Availability	
	Metric tons	% of re-quire-ment						
<b>Wheat</b>	284,344	26	319,023	29	259,904	24	259,904	24
<b>Rice</b>	22,253	57	28,895	68	34,528	81	49,492	116
<b>Maize</b>	9,785	33	9,041	28	12,550	39	14,008	44
<b>Cotton</b>	18,645*	47	7,366	18	5,446	14	4,630	12
<b>Potato</b>	7,834	2	4,441	1	5,541	1	4,621	1
<b>Pulses</b>	1,365*	3	1,285	3	1,229	3	917	2
<b>Oilseed</b>	2,023*	60	716	22	1,256	12	1,866	18
<b>Vegetables</b>	5,533	100	6,775	134	5,453	108	5,418	107
<b>Fodder</b>	9,230*	13	6,300	16	13,326	33	21,279	53
<b>Total</b>	<b>361,012</b>	<b>22</b>	<b>383,841</b>	<b>23</b>	<b>339,234</b>	<b>20</b>	<b>362,137</b>	<b>22</b>

Source: Constructed from FSC&RD data.

\* Data for 2008–2009; data for 2009–2010 were not readily available.

**Table 5.6—Certified seed availability for selected crops, 1996–2013**

Years	Wheat			Paddy			Maize		
	Require- ment	Avail-ability	%	Require- ment	Avail-abil- ity	%	Require- ment	Avail-abil- ity	%
1995–96	1,005,180	78,929	8	30,265	1,848	6	18,774	1,854	10
1996–97	973,092	73,618	8	31,515	1,378	4	18,554	1,961	11
1997–98	1,002,552	78,544	8	32,442	2,047	6	18,652	1,498	8
1998–99	987,588	104,213	11	33,930	2,281	7	19,244	3,028	16
1999–00	1,015,560	106,379	10	35,216	3,845	11	19,234	2,564	13
2000–01	981,708	159,220	16	33,272	2,106	6	18,882	2,119	11
2001–02	966,900	134,954	14	29,599	3,541	12	18,832	2,636	14
2002–03	964,068	120,610	13	31,153	4,678	15	18,710	4,040	22
2003–04	985,944	135,499	14	34,448	7,547	22	18,942	5,321	28
2004–05	1,002,960	173,557	17	35,274	9,840	28	19,456	8,867	46
2005–06	1,013,748	166,627	16	36,700	12,157	33	20,840	9,063	43
2006–07	1,029,384	203,837	20	36,137	10,727	30	20,338	8,647	43
2007–08	1,025,976	188,879	18	35,216	11,474	33	21,034	9,951	47
2008–09	1,085,520	196,029	18	41,476	22,688	55	21,042	12,380	59
2009–10	1,095,792	284,344	26	40,363	22,253	57	18,702	9,785	33
2010–11	1,085,400	319,023	29	42,480	28,895	68	31,914	9,041	28
2011–12	1,085,400	259,904	24	42,480	34,528	81	31,914	12,550	39
2012–13	1,085,400	259,904	24	42,480	49,492	116	31,914	14,008	44

Sources: Salam 2012 and FSC&RD data.

Several observations can be made from the data presented above:

1. Certified seed is a small proportion of the total seed requirement, ranging between 20 and 23 percent during the last 4 years. The rest of the seed requirement is provided by the informal sector—farmer-saved seed and uncertified seed supplied by agricultural input dealers and seed companies.
2. There is substantial variation from crop to crop. The range is as large as 1 percent for potato seed and 116 percent for rice seed.
3. The private sector provides a much larger share of certified seed than does the public sector. The latter now occupies a marginal position in several crops, such as maize, fodder, and vegetables.
4. While the share of certified seed has substantially increased over time in several crops (e.g., wheat, paddy, and maize), it has declined in others (e.g., cotton and oilseed).

Although, certified seed is only 20 percent of the total seed market, quality seed may comprise a much larger share. It should be emphasized that quality seed and certified seed are not the same thing: certified seed is a subset of quality seed. Being quality-tested seed of notified varieties, certified seed definitely qualifies as quality seed. But pure seed of non-notified

varieties *may* also be quality seed, despite being uncertified. Similarly, seed of a notified variety not presented for certification for any reason *may* also fall in this category. Bt cottonseed cultivated large scale during 2005–2010 is an example of quality uncertified seed. The key concept here is seed quality, rather than official sanction.

## 5.4 Seed companies

In all, 963 Pakistani seed companies have registered with FSC&RD since 1981. Over the years, 213 companies were deregistered after they were found to be involved in irregularities (Salam 2012). Currently, 750 Pakistani seed companies are registered (Table 5.7). Several of these companies were started by contract growers of a provincial seed corporation with sufficient experience in producing seed for the public sector, or by successful farmers who had been providing seed in the neighborhood and wanted to formalize the arrangement. Other companies were established by members of the value chain (e.g., a ginning factory, an exporter, or an agrochemical company) seeking to diversify their business portfolio.

It is common for seed companies to sell the seed of one set of crops for a few years and then move to another set. It is also common to enter and exit the seed business. Hence, not all registered seed companies may be currently active. In 2003–2004, FSC&RD circulated a questionnaire to update its database: only 73 companies responded (Hussain and Hussain 2007). In the absence of a rigorous survey and regular updating of the FSC&RD database, it is difficult to estimate the actual number of seed companies dealing in various crops.

**Table 5.7—Number of registered seed companies (2013)**

Type of company	Punjab	Sindh	KPK	GB and Ibd	Balochistan	Total
<b>Public sector</b>	1	1	1	–	–	4
<b>Private (national)</b>	621	98	23	3	5	750
<b>Private (multinational)</b>	4	1	–	–	–	5
<b>Total registered</b>	626	100	24	3	6	759
<b>Deregistered</b>	182	23	5	–	3	213
<b>Total</b>	<b>808</b>	<b>123</b>	<b>29</b>	<b>3</b>	<b>9</b>	<b>972</b>

Source: FSC&RD data.

Notes: “GB” denotes Gilgit Baltistan; “Ibd” denotes Islamabad; “KPK” denotes Khyber Pakhtunkhwa.

Data presented above show two important trends. First, seed business is concentrated in Punjab, with 82 percent of companies having their registered offices there. Most of these companies are located in Southern Punjab, which enables them to also serve the markets in Sindh and Balochistan. Second, the number of companies is large and growing (see Figure 3.1), which shows that the seed industry has yet to start consolidating. (In comparison, the Indian seed industry, worth US\$1.5 billion, had 410 local and 6 multinational companies (Kumar 2010, cited in Spielman et al. 2011).

Five MNCs are also involved in the seed business in Pakistan: (1) Monsanto Pakistan Agritech (Pvt.) Ltd.; (2) ICI Pakistan Ltd.; (3) Pioneer Pakistan Seed Ltd.; (4) Bayer CropSciences; and (5) Syngenta Pakistan Ltd. None of them has a significant local R&D component. They mostly import hybrid seeds of maize, sunflower, fodder, canola, alfalfa, and sorghum (Hussain and Hussain 2007).

MNCs have played a key role in introducing hybrid seed in Pakistan. Monsanto and Pioneer were central to introducing hybrids of maize and sorghum, whereas ICI introduced a canola hybrid. Pioneer’s modern plant in Sahiwal processes seeds for cereals. It was very successful in its wheat seed business during the early 1990s, but has since abandoned wheat seed procurement and distribution, saying that it is no longer profitable (Hussain and Hussain 2007).

During the 1990s, Monsanto produced cotton, wheat, and rice seed for local sale as well as for export to Afghanistan. Since 2002–2003, it has stopped producing seed for these crops. Syngenta and Bayer have also been in the seed business on a limited scale, but now they mostly focus on their agrochemical business. Both, however, are carefully watching developments regarding commercialization of GM crops, as they want to commercialize their GM seeds in Pakistan.

Seed companies have formed several associations to lobby for favorable policy decisions. These include the Seed Association of Pakistan, All Pakistan Private Seed Association, Seed Companies Association of Pakistan, Chambers of Private Seed Industries, All-Sindh Private Seed Companies, and All Pakistan Seed Merchants Trade Association (Agricultural Reform Movement (ARM) 2008; FSC&RD 2001). The most active of these associations, the Seed Association of Pakistan, has effectively used the platform to present seed companies' perspective on seed legislation in Pakistan. MNCs have their own small association.

Pakistani and multinational companies are important seed providers in Pakistan, playing a lead role in several crops. No longer limited to multiplication of basic seed from the public sector, these companies are now developing varieties. For example, 10 out of 17 Bt cotton varieties approved for commercial cultivation in Pakistan were developed by (and are registered with FSC&RD in the name of) Pakistani seed companies. The actual number of Bt cotton varieties developed by the private sector may be larger, given that companies often enter the market directly without recourse to FSC&RD. Similarly, the import of seed is almost entirely carried out by the private sector.

Table 5.8 presents data on private sector's share in provision of certified seed of selected crops. These data show that seed companies dominate the certified seed market. For important crops listed above, their share (local production plus import) ranges from 72 percent for wheat to 100 percent for vegetables and fodders. Quite clearly, they have reduced the public sector seed providers (viz. the seed corporations) to a small role in the certified seed market.

**Table 5.8—Shares of private and imported seed in certified seed (2013)**

Crop	Certified seed as a proportion of total seed requirement (%)	Private sector's share of total certified seed (%)		
		Local production	Import	Total
Wheat	24	72	0	72
Rice	116	82	8	90
Maize	44	25	74	99
Cotton	12	83	0	83
Potato	1	0	99	99
Pulses	2	97	0	97
Oilseed	18	24	69	93
Vegetables	107	4	96	100
Fodder	53	0	100	100

Source: Constructed from Table 5.4.

Companies compete on germplasm as well as seed quality. Table 5.9 presents data on Bt cottonseed prices in Sindh, showing that companies sell seeds of the same varieties of Bt cotton at substantially varied rates. This also indicates that farmers are willing to pay a premium for quality, and that brand names have started to emerge. It is noteworthy that although

not all of these varieties are registered with FSC&RD, their seed is sold openly under company labels. Even registered varieties are not exclusion goods—at least not yet, as their seeds are sold by multiple companies.

**Table 5.9—Cottonseed price (Rs/kg) in Sindh, 2012**

Name of variety	Jalandhar Seed Co.	Thakkar Seed Co.	Al-Karam Seed Co.	Manthar Seed Co.	Shahbaz Seed Co.	Paradise Seed Co.	Rabanni Seed Co.	Summer Seed Co.	Tawakkal Seed Co.
<b>Bt-121</b>	145	90	115	98	90	250	100	95	100
<b>Bt-886</b>	175	100	130	100		250	90	95	
<b>IR-901</b>	140	90	135	110	100		100	90	100
<b>IR-3701</b>		95	110		100			100	100
<b>Bt-702</b>	135							95	
<b>Vip333</b>			120			500			

Source: Rana et al. 2013

In the absence of data on individual companies' sales, it is difficult to comment on the seed sector's size (see Box 3), or the extent of horizontal and vertical integration across companies. However, anecdotal evidence suggests that both types of integration are taking place, though the process may have just started recently. Several agrochemical companies are venturing into seed sales and are quickly emerging as important players. Examples are Auriga Chemicals and M/s Four Brothers, both of which expanded into seeds from an agrochemical base. Similarly, several seed companies are developing brand names and emerging as lead players in selected crops, such as Neelum Seeds Ltd. of Multan. Starting from a small (cotton ginning and farming) base in late 1990s, Neelum Seeds has grown into a large company, with a diversified portfolio (cotton, wheat, maize, rice, pulses, fodder, and vegetables) and a marketing network in three provinces. However, the time has not yet come for corporate buyouts, mergers, and acquisitions.

### Box 3: Estimating the size of the seed market

Hussain (2011) estimated the total size of the Pakistani seed market in 2008–2009 at US\$845 million. More recent estimates are not available.

Estimating the size of the Pakistani seed market is problematic for two reasons. First, the total seed requirement for various crops is a function of area under cultivation, seed application rate, and seed replacement rate. In the absence of regular censuses and surveys, approximations are made for each of these variables. Second, seed prices vary significantly for various varieties and providers. Companies compete on seed quality and price for the same variety. Often, the prices of certified seed supplied by the Punjab Seed Corporation are used, which are less than the prices charged by companies. For example, Hussain (2011) estimated the cottonseed market was US\$37.16 million in 2008–2009, whereas Rana et al. (2013) calculated the same at approximately US\$97.7 million in 2012. A different set of approximations, rather than growth during 2008–2012, seems to cause such large variation in size estimation.

Financing of seed companies comes from a variety of sources. Since the declaration of the seed business as an industry in 1994, bank financing is available not only from the state-owned Agricultural Development Bank of Pakistan, but also from commercial banks. Small companies use their farm income or income from allied activity, such as cotton ginning, to invest in their seed business. Corporate data are not publicly available to estimate the respective shares of each type of financing.

Companies face several constraints in their operations. Perhaps the most salient is the inadequate, archaic, and inconsistent legislative and institutional framework. Another constraint is limited access to breeder seed from public-sector research institutes. The absence of IPR protection is also discouraging R&D, especially the development of open pollinated varieties. Companies participate more extensively in the hybrid seed market, which offers inbuilt intellectual property (IP) protection. The small size of the domestic market and barriers to seed trade with India, which could have developed a regional market, also push corporate investment into other segments of the production chain.

## 5.5 The informal sector

Data presented in Tables 5.4 and 5.5 show that uncertified seeds account for about 80 percent of the total seed requirement every year. These seeds are provided by a very large informal sector comprising (1) farmer-to-farmer seed exchange on a non-commercial basis, (2) small-scale farmer-to-farmer seed sale, (3) farmer-saved seed for planting in subsequent years, and (4) medium- to large-scale sale of seed in brown bags. Farmer-to-farmer exchange on a non-commercial basis and small-scale sale are not rare, but the volume of such exchange or sale is negligible as a proportion of Pakistan's total seed requirement. The third and fourth categories constitute the bulk of the informal sector.

The tradition of saving seed is old and well established in Pakistan. The proportion of farmer-saved seed varies from crop to crop. Wheat seed, for example, may not be replaced for 3–4 years, but rice may be replaced more frequently. The amount of saved seed depends upon several factors, including type of seed (varietal or hybrid), size of farm, ease of storage, disease and pest complex, and farmer's expertise. Farmers save seed for a variety of reasons, such as low cost, familiarity, performance under local conditions, and preferred attributes other than yield. Usually, farmers will purchase new seed from the market if they want to replace their variety or the seed stock has deteriorated as a result of contamination, etc.

Sometimes, seed companies also sell uncertified seed—usually because the variety is unapproved. Companies sell uncertified seeds through their own outlets, as well as through the vast network of input dealers. The undocumented character of such transactions places them in the informal, rather than the formal, category. Sometimes these seeds are sold in company packaging bearing a company label. Weak enforcement of seed laws allows companies to conduct their operations in the informal sector. Usually, however, uncertified seeds are sold in brown bags.

In addition to seed companies, several other seed providers—e.g., farmers, agricultural input dealers, and other members of the value chain (e.g., cotton ginners and sugar mills)—provide seed in brown bags. In providing uncertified seed, these providers operate without official sanction—sometimes in violation of an express injunction. The key concept here is official sanction, rather than seed quality.

The case of Bt cotton is instructive. Bt cottonseeds first reached farmers' fields in Sindh in 2002–2003. They were brought by enterprising farmers from abroad and planted on a small scale. As the seeds provided effective protection against bollworms, their popularity grew. In the meantime, several seed companies had successfully crossed exotic Bt material with local cotton varieties to produce Bt varieties of their own. By 2005–2006, several companies were marketing their Bt varieties on a large scale. By 2007, Bt varieties accounted for 80 percent and 50 percent of the arable area under cotton cultivation in Sindh and Punjab, respectively (Ali et al. 2007). Soon cultivation of non-Bt varieties was limited to pockets of land. Since the government had not approved any of the Bt varieties by then,<sup>14</sup> all of this large-scale spread occurred in the informal market.

The spread of Bt cottonseeds in the informal sector was the result of three factors: First, none of the Bt varieties was approved by the government, which did not approve seed for considerations other than quality.<sup>15</sup> Second, FSC&RD or provincial agriculture departments did not have the capacity to monitor or check the spread. Third, seed companies did not feel disadvantaged in the absence of the official notification that changed the status of their Bt varieties from unapproved to approved—they had discovered that the market did not care.

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<sup>14</sup> Bt varieties of cotton were approved for commercial cultivation in Pakistan in 2010.

<sup>15</sup> There was some confusion in those days on Monsanto's IPRs on the transformation event used in Bt varieties. Since the government did not want to appear to violate Monsanto's IPRs, it withheld approval. See Rana (2010) for details.

Not wanting to be bypassed, public-sector research institutes and seed producers had also joined the fray early on. At least two research institutes—the Centre of Excellence in Molecular Biology and NIBGE—developed cotton varieties containing local genetic transformation events.<sup>16</sup> Not only had AARI and other breeding organizations developed Bt varieties, but their breeders were also marketing Bt seeds in the informal sector. PSC was also openly producing and marketing Bt seeds in 2008–2010, while their production and sale were still illegal in Pakistan (Rana 2010). In short, the entire ensemble of seed providers—research institutes, breeders, seed corporations, and seed companies—had become part of the informal sector, at least to the extent of their cottonseed business.

In 2010, the situation changed with official approval of nine Bt varieties. One of these belonged to NIBGE, and eight to seed companies. Official approval hardly conferred a market advantage on these varieties, but it enabled providers to market seeds under their label. This improved quality, as brand names started to emerge. Since official approval did not confer IPRs, they were fair game for all. Companies conveniently produced and marketed under their own label seeds of whichever variety they preferred. This forced them to compete on seed quality as well as germplasm (see Table 5.9).

Several of the approved varieties quickly disappeared from the market and were replaced by new varieties, not all of which were approved by FSC&RD. Rana et al. (2013) found that only 4 out of 14 varieties under large-scale cultivation in Sindh were notified. They calculated the respective shares of various providers as follows: seed companies, 69 percent; breeders, 15 percent; other farmers, 8 percent; farmer-saved seed, 6 percent; and others (ginning factories, non-commercial exchange), 2 percent. In other words, 69 percent of cottonseed was being sold in properly labelled packets—i.e. it could be traced to its producer—and 31 percent was either farmer-saved seed or seed in brown bags.

Compare these results with data in Table 5.4, which say that certified seed is only 12 percent of the total cottonseed requirement. Certification is an important indicator of seed quality, but so is brand name. This 57 percent of uncertified but branded seed is not necessarily of low quality. Moving from the current regime to voluntary registration of varieties readily transmogrifies into truthfully labelled seed. Thus, the distinction between formal and informal is somewhat amorphous.

## 6. REMOVING CONTRADICTIONS BETWEEN THE LAW AND THE MARKET

When the Seed Act was enacted in the 1970s, all important aspects of seed provision—variety development, evaluation trials, control of germplasm, import, and export—occurred within the public sector, as the private sector was virtually nonexistent then. The Act reflected this reality and sought to strengthen the existing system, rather than replace it with something new. As a result, the Act and its subordinate legislation addressed only notified varieties and certified seed. IPRs, brand names, and similar other concepts were less relevant in the given context.

However, by the mid-1990s, the private sector had an established presence in all aspects of seed provision. New seed companies and MNCs were not only selling seed of public-sector varieties, but were also developing their own varieties and importing germplasm formally and informally (Section 5 above). As the private sector's operations grew, it gained confidence and started to find the existing legal regime stifling and archaic. In contrast, the public sector—principally FSC&RD—lacked the resources needed to oversee private-sector activities in various areas.

The following two examples illustrate the growing dissonance between the market and the legislative framework.

- Under the existing procedures, a new variety was tested for at least 2 years for DUS as well as for Value in Cultivation and Use (VCU) at various research stations and farmers' fields. As long as only the public sector was developing varieties, the system worked well. But when companies entered into variety development, they were reluctant to hand over their germplasm for testing at competitor institutes. They also found varietal evaluation procedures to be time consuming and bureaucratic. Since approval of a variety did not bring any value to their

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<sup>16</sup> A transformation event is the process of inserting genetic material into the genome of an organism using modern tools of genetic modification.

business—it did not create IPRs—several companies started releasing their varieties directly into the market—i.e. without recourse to FSC&RD approval.

- For its part, FSC&RD felt that seed companies were releasing varieties of dubious quality that were unstable, had poor germination, and were susceptible to pests and diseases. FSC&RD was also critical of the growing practice of introducing exotic germplasm without proper testing and adaptation. Clearly, the companies and FSC&RD were at odds in one important aspect: the companies thought they were operating in an over-regulated environment, whereas FSC&RD thought the regulation lacked the necessary safeguards for meeting its quality control objective. Albeit for different reasons, both agreed that the legal framework was archaic.

In another example, a key FSC&RD function was to certify seed, which was performed through field inspections during the production stage. FSC&RD field officials would periodically visit seed growers' fields to determine whether proper procedures were being followed. They would take samples from seed lots and examine them carefully to see if the seed met the specified quality standards. The process culminated with the issuance of tags, which seed distributors were required to display prominently as a mark of quality.

The private sector, however, viewed the whole paradigm differently. It felt that it had the necessary know-how on producing quality seed and therefore found FSC&RD inspections intrusive, time consuming, and uncalled for. Since a brand name, rather than a tag issued by an official, carried weight in the market, the private sector found seed certification of little value in its business. In any case, seed certification was possible only for notified varieties. As the number of unregistered varieties in the market grew, certification became even less relevant.

The Bt cotton saga brought the growing irrelevance of the existing legal and institutional regime to the fore. Clearly, a comprehensive reform was warranted to remove the growing dissonance between the law and the market. Two types of responses emerged: (1) a comprehensive reform proposal from FSC&RD to make regulation more effective and to include the private sector in its ambit, and (2) a proposal for a paradigm shift to truth-in-labelling-based quality control of seed. These proposals are discussed below.

## 6.1 Draft Seed Act Amendment

Several proposals have been put forth by various stakeholders during the past two decades to amend the Seed Act, 1976. The latest is the 2009 draft presented by FSC&RD to the Ministry of Food and Agriculture. Its salient features are discussed below.

The 2009 draft Bill proposes to amend the Act in three important aspects in addition to imposing stringent biosafety requirements for GM varieties (Box 4). First, it substantially adds to and modifies the Act's definitions. Basic Seed, which up to this point is defined as "seed produced by an organisation set up by a Provincial Government (Section 2(b) of the Seed Act, 1976)" is redefined as "progeny of the pre-basic seed produced by any public sector or private sector organisation and certified by the Federal Seed Certification and Registration Department." Seed business has also been defined as "any commercial operation, involving production, processing, conditioning, packaging, distribution, import and export of seed." Another important definition added is that of the misbranded seed—i.e., seed purporting to be what it is not. These definitions are significant, as they enable the private sector's formal entry into seed provision, including production of basic seed.

Second, the Bill requires anyone desiring to do seed business, to establish a seed-processing plant, or to work as a seed dealer to register with FSC&RD. Such registration will be valid for 5 years, and an application for renewal will be required to continue the seed business thereafter. This proposal extends FSC&RD's role—previously limited to registration of seed growers and plant varieties—into other aspects of the seed business.

Third, the Bill prohibits several activities including: (a) doing seed business without registration; (b) selling, importing, stocking, bartering, or otherwise supplying seed of an unregistered variety; and (c) selling, etc., misbranded seed. Any contravention may be punished by imprisonment for a term extending up to 3 months, or by a fine, or by both.

#### **Box 4: Registration of GM varieties**

Section 22(G) of the Bill proposes that no application for registration of a GM variety will be accepted unless it is accompanied by (1) an affidavit that it does not contain a gene involving terminator technology and (2) a certificate from the National Biosafety Committee that the variety will have no adverse effect on the environment, human, animal, or plant life and health.

Clearly, the Bill is an effort to extend regulatory oversight to all aspects of seed provision in Pakistan. It is a response to the current free-for-all environment in which FSC&RD finds itself severely handicapped in dealing with delinquency. If approved by the Parliament, the Bill will place the seed business—both public and private—firmly under FSC&RD’s regulatory control. Not only will a seed company require regulatory approval to start its operations, it will also have to report regularly on its activities to stay in the business.

In return, the Bill does not offer any incentives to the seed business. Notification of a variety will not create IP, and registration of a business will not confer a market advantage. Official seals of approval carry little weight in an increasingly competitive market, which is deeply sceptical of the government’s willingness and capacity to enforce its writ.

These amendments have not been passed yet. Despite several efforts to obtain approval from the Cabinet to move forward on the Bill, it is still pending within the Ministry.

## **6.2 Draft Punjab Seed Act of 2010**

The inaction of the federal government has frustrated Pakistan’s provincial governments. Punjab, in particular, felt that the inordinate delay in amending the Seed Act, 1976 was hurting its efforts to improve seed provision in the province. The devolution of functions carried out in the aftermath of the 18<sup>th</sup> Constitutional Amendment in 2010 (see Section 4) provided an opportunity to attempt amending the Seed Act or enacting a new law. The time had come for the Punjab government to take matters in its own hand.

Several drafts have been prepared since 2010–2011. Mostly, these adopt FSC&RD proposals as discussed above to the extent of Punjab province. They propose substituting federal procedures with provincial procedures and replacing the federal bureaucracy with a provincial version. Thus, the Punjab Seed Council will replace the National Seed Council, and the Punjab Seed Certification and Registration Department perform FSC&RD’s functions.

However, one proposal—the draft Punjab Seed Act, 2011—goes beyond this in at least four important respects. First, it cites as its objective “to regulate the quality of seed and to support the development of a vibrant seed industry in the province” (Government of Punjab 2011).

Second, it vests power in a broad-based Punjab Seed Council, which is to comprise government officials, seed experts and representatives of seed business, members of the public, and farmers. Interestingly, private individuals are to outnumber officials in the Council and are to be nominated by their respective institutions, rather than being nominated by the government. The Council may also elect its Chairperson and appoint a Chief Executive Officer on terms and conditions that it settles. The proposal also enhances Council’s role to include several support functions, such as building the private sector’s capacity and facilitating international collaborations.

Third, The proposal also divides crops into two categories—the ones listed in a Schedule and the rest—and proposes a different regulatory regime for each category. Although, all seed businesses are to be registered and their seed may be sold only by their authorized dealers, varieties of only scheduled crops are to be registered. Seed of crops not listed in the Schedule—which the government may amend from time to time—may be sold under a truth-in-labelling regime, which dispenses the requirement of variety registration. If only a few commercially important crops are included in the Schedule, the seed of

all other crops may be produced and sold with minimum interference from the government. Fourth, the proposal specifically protects farmers' rights to save and reuse seed from one season to the other.

The draft Punjab Seed Act, 2011 presents a paradigm shift. It proposes the regulatory function to be performed by a private-sector-led Council and some crops to be shifted to a truth-in-labelling-based regulatory regime, as long as minimum standards are met. However, the draft has not made much headway, and remains in the official files of the Punjab Agriculture Department.

### 6.3 Draft Plant Breeders' Rights (PBR) Act

Another important piece of legislation currently pending with the federal government is the draft PBR Act. The first draft was prepared by FSC&RD in 1999, and several versions have appeared since then. The one that went the farthest was presented to the Cabinet in 2007. Its salient features are discussed below.

The draft PBR Act, 2007 is based on the 1991 International Union for the Protection of New Varieties of Plants model law, which aims to create IPRs for development of new plant varieties. Toward this end, the draft law proposes the creation of a Plant Breeders' Registry to be attached to the federal Ministry of Agriculture. The Registry will perform several functions, such as registering new plant varieties, ensuring that the seed of registered varieties is available to farmers, documenting, and cataloguing. The Registrar will be appointed by the federal government, which may shift officials from FSC&RD to the Registry. The federal government will also establish an Advisory Committee, comprising 12 members (including the Chairperson) to be nominated by the federal government to represent various ministries and provincial governments. The role of the Committee is envisaged as purely advisory, and its advice will not be binding on the Registrar.

#### Box 5: Moving from VCU to novelty

The proposed PBR legislation not only drops the VCU requirement, it also redefines the notion of novelty to not having been sold, rather than the usual DUS criteria. This shift from utility to not having been sold is significant, in that it allows the breeder to create product differentiation by means other than utility. Thus, the breeder may effortlessly produce as many varieties as the market can believe to be new.

As a result of this, the menu of choices put before the farmer may increase, though these choices may be fictitious rather than real. But the reality is that the VCU criteria have already been meaningless for public-sector breeders in Pakistan who have successfully commercialized nominally different varieties over the past three decades. Therefore, the draft PBR Act only proposes to convert the *de facto* into the *de jure* and extends to the private sector a privilege previously available only to the public sector.

Any seed producer may apply to the Registrar for registration, if the variety is novel and meets the DUS criteria.<sup>17</sup> A variety qualifies to be new if it has not been sold in Pakistan for more than 1 year or in a foreign country for more than 4 years<sup>18</sup> before filing application for registration. Thus, the VCU criteria is dropped (Box 5).

An application for registration must be in the prescribed format and accompanied by a detailed description of the variety. For a GM variety, it should be accompanied by an affidavit that the variety does not contain terminator gene sequence, and a certificate from the Biosafety Committee that it will not harm human, animal, or plant health.

The application is to be advertised by the Registrar, and anyone may oppose the application within 3 months of its advertisement. The Registrar will adjudicate on the matter and issue a decision on the application (and opposition, if any). Anyone aggrieved by a decision by the Registrar may appeal the decision in the High Court.

<sup>17</sup> Since registration is not compulsory, technically breeders may market their new (or existing) variety without first presenting it to the Registrar. But once the Seed Act is amended, the sale, etc., of seed of unregistered varieties will be prohibited under the Act.

<sup>18</sup> Six years for trees and vines.

In addition to new varieties, an Essentially Derived Variety (EDV) may be registered. An EDV is defined by the draft Act as a variety derived from a registered variety that retains the essential characteristics of the original variety but is clearly distinguishable. The draft Act specifies neither how to determine whether an EDV retains essential characteristics nor the criterion for assessing whether the difference between two varieties is significant or cosmetic. A breeder of an EDV will enjoy all rights as are enjoyed by the breeder of the original variety. Theoretically, this opens the possibility of a breeder enjoying rights for the specified period, developing an EDV toward the end, and enjoying rights on the EDV for another term, etc.<sup>19</sup>

Registration confers several rights upon the breeder: (1) conditioning, multiplying, importing, exporting, selling, offering for sale, or marketing the registered (i.e., protected) variety; (2) carrying out any of these acts with respect to an EDV; and (3) authorizing another person to carry out any of these acts. These rights are valid for 25 years for trees and vines and for 20 years for other crops. Everyone other than the PBR holder is prohibited from performing any of these acts, except under authorization from the PBR holder or as provided in the Act. However, use of a registered variety is allowed for scientific research and plant breeding, and for use as an initial source for creating other varieties. Farmers' rights to save, sow, and re-use seed from one crop to another are also protected (though not as liberally as in the Indian PBR law (Box 6)).

While the breeder usually enjoys these rights, in case of breeders working in public-sector institutes, the institutes will enjoy such rights instead. However, the draft Act provides for creation of a Research Incentive Board that will incentivize public-sector breeders by entitling them to a minimum 20 percent royalty to be earned from a registered variety.

#### **Box 6: Comparison with Indian PBR legislation**

Comparison of Pakistan's proposed PBR legislation with Indian Protection of Plant Varieties and Farmers' Rights Act, 2001, is instructive. The latter is friendly to farmers in several ways. First, the Indian legislation creates a 15-member broad-based Authority to govern the Plant Varieties Registry, which has considerable flexibility to determine and perform its functions. The Authority includes representatives from farmers' organizations, tribal organizations, women's organizations, agricultural universities, the local seed industry, and the provinces (Section 3(5)). Second, the Registrar is appointed by the Authority, rather than by the government. Third, it not only enunciates farmers' rights to save and reuse seed in unequivocal terms, but also provides for compensation to farmers if a variety fails to perform according to the claims made by the breeder. Fourth, it protects farmers against innocent infringement as well as excludes farmers or local communities from payment of fees in proceedings before the Authority. Finally, it extends PBRs to 35 crops, of which 20 have been specified so far.

## **6.4 Political economy of seed legislation**

The discussion above has highlighted inadequacies and contradictions of the legal regime for seed provision in Pakistan. Given that the current system is not working well, it is surprising that numerous attempts by the federal and provincial governments to update and upgrade the regime have not succeeded. This may be explained by a reference to the interests of key actors in legislative reform.

For FSC&RD (or its Punjab equivalent should the draft Punjab Seed Act, 2011, be pursued), the proposed amendment serves an important purpose: it extends regulatory oversight to the working of the private sector in seed provision. Henceforth, all important activities, especially production and marketing of new seed varieties, will be subject to official verification and approval. An increased role will bring more privileges and greater opportunities for rent seeking for officials entrusted with the regulatory authority. For farmers, the proposed amendments offer some protection against spurious seed and against false claims on performance. For the private sector, however, the amendment's implications are less clear. On one hand, the existence of a legal framework makes the seed business more predictable for the seed industry. It forces all breeders and seed producers to compete in the regulated market, rather than slip into the informal, unregulated segment of the

<sup>19</sup> The protection for EDV is not for the remaining term, but for a full term.

market. On the other hand, a legal framework also subjects the seed business to external oversight—something it has avoided for two important reasons: (1) it will require seed providers to meet minimum standards in equipment, human resources, and seed quality; and (2) it will limit its ability to bring “new” varieties to the market. The latter will be a restraint on artificial product differentiation, which has been a major marketing tool for seed providers in Pakistan during recent years (Rana 2010).

Since the proposed amendments do not offer anything in return, the seed industry has been lukewarm at best in its response. Neither registration of a variety with FSC&RD nor seed certification by its officials confers any right or places the seed provider in a position of competitive advantage in the market. Thus, the seed business views the proposed amendments to the Seed Act largely as an effort by the state to extend its control to the private sector without offering anything in return. Were it possible, FSC&RD would still push through the proposed legislation. But the seed business is now too powerful to be taken lightly.

A similar reference to the interests of various actors is required to understand the lack of progress during the last 14 years in moving forward PBR legislation. FSC&RD has been advocating for the legislation for two principal reasons. First, the legislation is part of Pakistan’s obligations under the agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). Under TRIPS, developing countries are required to provide patent or *sui generis* (i.e., unique) protection to plant varieties. Since the Pakistan Patents Ordinance, 2000 specifically excludes plants from protection under a patent, Pakistan is obligated to enact another form of protection for plant varieties. Second, the legislation extended FSC&RD’s portfolio of regulation and control. The draft legislation specifically mentions that the federal government may transfer as many officials from FSC&RD to the PBR Registry as are required. This means new positions, vehicles, and promotions.

FSC&RD has been less enthusiastic about the proposed amendments since 2007–2008, when the newly created Intellectual Property Organisation (IPO) of the federal government claimed that the PBR Registry should be housed in IPO, rather than in FSC&RD. It was argued that since patent, trademark, and copyright registries were housed in IPO, it was natural for the PBR Registry also to be housed in IPO. For its part, FSC&RD, considered it natural that the PBR Registry be established as a natural heir to its registration wing. It had the infrastructure, the expertise, the institutional knowledge, and the linkages with breeding institutes.

This turf war continued for quite some time. In 2007, the Cabinet approved the draft legislation for presentation to Parliament, but it decided that the PBR Registry would be housed in IPO (DG FSC&RD 2008). This decision was a serious loss to FSC&RD. Not only did it lose an opportunity to extend its portfolio, it was now required to redefine itself as a mere seed certification agency. Since the draft legislation is still pending, FSC&RD continues to pursue it, albeit less enthusiastically. IPO is also promoting the legislation however, being a new entrant to the regulatory framework, IPO may require some time to develop the necessary networks to finalize the legislation.

The other major group that has pursued PBRs is the seed companies. MNCs have been leading the campaign, but their number is small and their field operations are limited. Pakistani seed companies are generally supportive of the legislation, but are skeptical of the government’s willingness and ability to effectively enforce PBRs.<sup>20</sup> Also, there is some tension between seed companies’ desire to protect their germplasm through PBRs and their ability to use others’ germplasm in their variety development programs. They seek protection for their own material, but free access to others’ material. Thus, the Pakistani seed industry is unable to generate enough pressure to push the PBR legislation through routine official inaction.

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<sup>20</sup> Although an aggrieved party may initiate proceedings under the draft PBR Act, taking these proceedings to their logical conclusion assumes the existence of effective prosecution and adjudication frameworks and institutions.

## 7. FINDINGS AND RECOMMENDATIONS

Previous sections have presented several important findings. First, the Pakistani seed industry is large and diversified (see Appendix A for a summary). Although certified seed is only about 20 percent of the total seed requirement, quality seed—which is not the same as certified seed—may constitute a larger proportion (see Section 5.3.1). There is large-scale private-sector participation in the seed business by Pakistani seed companies and MNCs. The number of seed companies is still growing, but at the same time vertical and horizontal integration has started to take place, which shows that the industry may be emerging from its growth phase into its consolidation phase. However, the private sector's focus is limited to a small number of crops.

Second, the legal structure is archaic and internally inconsistent. Developed four decades ago to support a state-led provision of seed, it has long exhausted its potential to foster the growth of Pakistan's seed industry. The need to reform the legal and institutional regime is clear, but there are deep divisions on how to move forward toward this end. Various actors—the seed business, scientists, and regulators—deploy their professional networks to steer the reform process in their favor. The lack of internal agreement has hampered efforts to rewrite the regulations.

Third, farmers are almost entirely absent from the discourse. They appear to be the passive recipients of development within the seed industry. Farmers' lack of representation in important policy forums, such as the national and provincial seed councils or in the proposed PBR Registry, confirms that they play a limited role in setting agendas, determining priorities, and monitoring seed quality.

Fourth, conceptualization of the formal and the informal sectors is challenged by the above discussion. The formal may be understood as the sale of certified seed of approved varieties by registered seed companies through their licensed dealers. Or it may be understood as commercial distribution of seed under company labels. These represent two different paradigms. The former requires several permissions before a seed can legitimately reach the farmer—registration for the company, approval for the variety, license for the dealer, and certification for the seed. The latter relies almost exclusively on truth-in-labelling—i.e., a seed that meets quality benchmarks may be marketed so long as the provider is ready to associate its name with the product. The buyer, rather than the official, makes the decision regarding what stays in the market and what leaves.

The discussion in this paper shows that the former represents the *de jure* and the latter the *de facto*. If the formal sector is defined as the former, around 80 percent of the seed sector in Pakistan is informal. However, if it is defined as the latter—as this paper tends to define it—the entire segment being provided by seed companies under their labels will fall in the formal sector, regardless of whether the variety is approved or the seed is certified.

Fifth, the dichotomy between the two sectors emerges as less distinct than previously believed. This paper has documented how several companies, breeders, and even state enterprises have produced and marketed the seed of unapproved varieties in specific situations. Thus, neither the formal nor the informal sector emerges as a discrete entity. More pertinently, these are sectors across which seed providers move over time, or in which they may be multiply located for the same or different crops.

Several policy recommendations also emerge from the discussion in this paper. First, there is a strong and urgent case for reimagining the regulatory framework. When farmers have multiple providers to choose from in a functioning, competitive market, why not let them use their judgment to select the best seed they think best suits their site-specific agro-climatic conditions. The state should redefine its role from an entity that certifies, approves, registers, and licenses to an entity that defines benchmarks, enables accreditation services, and ensures compliance with benchmarks. Making variety registration voluntary and replacing certification by truth-in-labelling is not a call for a withdrawal of the state from seed regulation; rather, it is a call for strengthening regulation by making it reflect current seed business practices. The draft Punjab Seed Act, 2011 may be a good starting point to move forward in this direction. Its proposal to establish a private-sector-led, independent regulatory authority and to deal with scheduled and other crops differently merits consideration.

Second, variety release procedures should be simplified and made more transparent. In the current milieu, breeders find these procedures time consuming and unwarranted. They are also reluctant to submit their seed to institutes for evaluation because the two compete in the market with similar products. Ideally, variety registration should be voluntary. But even if an approval regime must be put in place for commercially important crops, it should aim at formalizing, rather than penalizing, the informal sector.

Third, the role of FSC&RD needs to be redefined. FSC&RD provides two services: registration of varieties and certification of seed. Given that registration benefits neither the breeder nor the farmer, why should it be required at all? Similarly, seed certification has become largely irrelevant, as much for the lax implementation regime as for farmers' reliance on their judgment, rather than a tag issued by an official displayed on the seed bag. Companies usually obtain these certification tags from FSC&RD to avoid unwarranted inspections, rather than for any value that the tags may add to their business.

Similarly, PSC also needs to develop a better business model, as the current model is flawed on several counts. PSC is unable to dispose of the seed it produces on its farms or procures from its registered growers. Thus, rather than being a mainstream seed provider, it struggles every year to offload its stocks. Further, PSC is providing commodities that are being supplied (more successfully) by several providers in the private sector. Why should PSC compete with these private providers in crops where it has neither a competitive advantage nor an established market share? There appears to be a case for either closing down PSC or shifting its focus to producing seed for niche and ignored markets.

Further policy research needs to be reoriented to the informal sector. Rather than investing in collecting and analyzing data on the provision of certified seed, which constitutes only 20 percent of the total seed requirement, investing in understanding the dynamics of the use and provision of uncertified seed will yield more productive results. Determining how seed providers compete on seed quality in a market with an unusually large number of providers will be instructive. It will also be useful to explore ways to support farmers in saving their seed, which will continue to be an important source for several crops.

## APPENDIX A: SUMMARY OF SEED PROVISIONING FOR VARIOUS CROPS

Crop	Area ('000 acres)	Average seed application rate (kg/acre)	Total seed requirement (metric tons)—FSC&RD estimates	Varietal or hybrid	Imported or locally produced	Major seed providers	Certified seed as % of total requirement	Price of seed sold by PSC (US\$/kg)
<b>Wheat</b>	22,341	50	1,085,400	Varietal	Local	PSC, Pakistani seed companies and farmers	24	0.39
<b>Rice</b>	6,694	Hybrids: 5–7	42,480	Fine types are hybrid; coarse types are mostly varietal	Local and imported	PSC, seed companies and farmers	116	0.95
<b>Maize</b>	2,626	Hybrids: 10 Varieties: 40	31,914	Both	Local and imported	PSC, seed companies and MNCs	44	0.73
<b>Cotton</b>	7,904	8	40,000	Varietal	Local	PSC, seed companies and farmers	12	1.92
<b>Pulses</b>	3,302	Mung: 10 Gram: 16 Mash: 8 Lentil: 4	47,496	Varietal	Local	PSC, seed companies and farmers	2	Mung: 0.96 Gram: 0.96
<b>Oilseed</b>	2,049	–	10,582	both	Mainly imported; very small locally produced	MNCs and seed companies	18	–
<b>Vegetables</b>	627	–	5,070	Both	Imported	PSC and seed companies	107	–
<b>Fodder</b>	4,797	–	40,138	Both	Local and imported	MNCs and seed companies	53	–

Source: Author's compilation from various sources. Cultivation area is from the Pakistan Economic Survey 2012–2013. Total seed requirements are FSC&RD estimates, which may be off the mark in the absence of regular surveys. The rest is from data presented in this report and information collected from key informants.

Note: Very high availability of certified seed for rice and vegetables shows that the seed requirement is more than FSC&RD estimates and/or some certified seed remains unused. Seed prices vary for different varieties; only the highest are cited.

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