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The Kyrgyz Republic's Seed Industry in the Context of the Country's Membership in the Eurasian Economic Union

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Executive Summary

The history of **the seed sector** in the Kyrgyz Republic is similar to that of the other post-Soviet countries. Prior to the disintegration of the USSR, its seed farming was based on public procurement contracts and sufficient funding. The disruption of traditional economic relations with other regions of the former USSR, along with its economic decline and agrarian land reform, changed the institutional framework of the seed sector as well as its regulatory and legal framework.

The Kyrgyz Republic has now established a **regulatory and legal framework** that is in line with international standards for the protection of breeders' rights, crop variety testing, seed certification, and quality control. Involved public sector organizations now have better physical infrastructure and equipment. This situation has enabled the country to receive more foreign varieties of key agricultural plant species for testing and to have these varieties registered in the Kyrgyz Republic.

The development of the seed sector has an impact on the agricultural sector in the Kyrgyz Republic, which involves more than half (65 percent) of the country's population. For this reason, the following **state and nongovernmental organizations** are interested in the sustainable development of the seed sector in the Kyrgyz Republic: the Ministry of Economy; the Ministry of Agriculture, Food Industry and Melioration of the Kyrgyz Republic, along with its subordinate entities—the Department of Agricultural Plant Inspection and the Department of Plant Health Protection and Plant Quarantine; the Ministry of Finance; and the National Intellectual Property Service of the Kyrgyz Republic (Kyrgyzpatent), as well as breeding and educational institutions, the processing industry, and the Kyrgyz Seed Association (KSA).

All registered varieties of agricultural plants have high potential yield and are of good quality. At the same time, the actual average values of seed indus-

try performance indicators are twice as low as the officially reported variety testing data as a result of low standards of crop farming. Failures to use crop farming technology in the right way are a consequence of the **lack of financial resources for procuring up-to-date equipment and other inputs**. That is why, in last 25 years, wheat, potato, and maize outputs have not risen above 2.5 metric tons, 18.0 metric tons, and 6.0 metric tons per hectare, respectively.

In spite of the seed industry's declared focus on exporting its products, the domestic market experiences an **acute deficit of certified seeds of most agricultural plants**. For example, the availability of certified maize and potato seeds comprises about 40 percent and only 20 percent of the needs for these crops, respectively, with about 25 percent of supplied winter wheat seeds remaining unconsumed.

In the Kyrgyz Republic, the breeding of new varieties of cereals and forage plants is declining: its development is constrained by the **absence of a royalty collection system**.

The existing legal framework of seed farming should be substantially revised because there is an inconsistency in the documents in connection with membership in the Eurasian Economic Union (EAEU).

Background

The Kyrgyz Republic is located in the northeastern part of Central Asia. It occupies the western part of the Tien Shan mountain system and the northeastern part of the Pamir-Alay mountain system. It is bordered by Uzbekistan to the west (the border is 1,099 kilometers long), Kazakhstan to the north (with a border of 1,051 kilometers), Tajikistan (870 kilometers) to the south, and China (858 kilometers) to the southeast. The Kyrgyz Republic is a country with high mountains and difficult terrain; half of its area is 3,000 meters above sea level. Its inland climate is characterized by high summer temperatures and

aridity while winters bring about strong anticyclones with abrupt changes in air temperatures. Significant diurnal, monthly, and annual temperature fluctuations are observed: in arable valleys, summer air temperatures reach 45–48°C, and winter temperatures fall below –30°C with scarce snow cover; night temperatures are usually lower than day temperatures by 12–15°C.

The country's average annual precipitation rates never exceed 500 millimeters, although it varies by region and the bulk of precipitation falls in springtime. But some regions have higher precipitation rates; in particular, the high-altitude Issyk Kul Lake affects the precipitation level in the Issyk Kul basin, which is therefore higher than it would be otherwise.

The country's area comprises about 20 million hectares, including 10.6 million hectares of agricultural land, of which 1.2 million hectares is arable land with a total of 0.8 million irrigated hectares. The environ-

mental and climatic conditions favor the cultivation of many crops, including almost all vegetables. Over 60 percent of the population is rural, and their livelihoods depend on agriculture.

In the Kyrgyz Republic, the ownership pattern of agricultural assets is dominated by small private farms (there are over 380,000 of these farms, with an average land area of about 3.0 hectares; see Table 1). They have emerged as a result of the privatization of *kolkhozes'* and *sovkhozes'* land and property.¹ Most farms do not have adequate financial resources for effective farming based on advanced technology, up-to-date tractors, or other modern agricultural machinery. A direct consequence of this shortage is low labor productivity and low capital/labor ratios, high shares of fixed costs and high operation risks, unstable and low revenues from crop farming.

A comparison of Kyrgyz cropland areas before (in 2011) and after its accession to the Eurasian Eco-

Table 1: Average Cropland Areas and Yields

Crop	Average area (1,000 hectares)	Yield (100 kilograms per hectare)	Average area (1,000 hectares)	Yield (100 kilograms per hectare)
	2011		2016	
Wheat	377.4	21.4	270.4	17.0
Barley	123.3	19.2	184.6	22.5
Grain maize	74.4	59.0	101.7	62.4
Grain legumes	46.2	16.5	56.5	17.2
Sugar beet	8.1	197.1	11.3	623.2
Oil-bearing crops	54.2	10.4	41.3	10.2
Cotton	37.4	27.2	16.6	31.4
Tobacco	4.1	21.2	0.2	24.5
Potato	84.9	160.8	82.1	166.3
Vegetables	42.8	182.0	51.2	194.4
Gourd fields	7.0	213.3	10.6	219.4
Fodder crops				
Grasses	257.2		343.4	

Source: National Statistical Committee of the Kyrgyz Republic 2016.

¹ A *kolkhoz* is a collective farm; a *sovkhoz* is a Soviet farm.

conomic Union (in 2016) reveals an upward trend in the areas under maize, barley, and fodder grasses at the expense of the reduction of wheat fields by 100,000 hectares. The outputs of sugar beet, vegetables, and grain maize have been also evidently growing owing to improved cultivation technology for the cultivation of new high-yield varieties and hybrids of these species, whereas the yield of wheat remains very low even though it occupies the largest arable areas.

It is noteworthy that all varieties of spiked cereals officially tested and included in the Kyrgyz National Registry of Plant Varieties and Hybrids have high potential yields (at least 60 hundred kilograms per hectare).²

The development of crop farming in the Kyrgyz Republic is, to a great extent, dependent on the availability of agricultural machinery for Kyrgyz farms. But this availability is less than 50 to 60 percent of the machinery that is needed (in addition, over 90 percent of all machines have been in operation for more than 25 years) in spite of the agricultural equipment modernization programs that have been adopted over the last five years. Despite the efforts made by the Government of the Kyrgyz Republic to implement leasing packages, the number of those who would want to acquire machines offered on a leasing basis is limited because, working on small parcels of land, it would be difficult to repay the expenses on acquired machines.

In 2015, upon the accession of the Kyrgyz Republic to the Eurasian Economic Union, Kyrgyz producers of agricultural products had to compete with producers of wheat, barley, and flour and other products from other member countries of the Eurasian Economic Union. This need for competition has affected the cropland structure, changing it to increase outputs of more intensively managed field crops, fruit and vegetables.

² Spiked cereals include wheat, rye, triticale, barley, and oats.

The Current Situation in the Kyrgyz Seed Sector

Prior to 1991, Kyrgyz seeds for domestic consumption and export to other regions of the USSR were supplied by 45 seed farms (both state-owned and community farms, each occupying at least 4,000–5,000 hectares on average), and by the *Sortsemovoshch* enterprise and fruit tree nurseries. All these entities had had full-fledged government support based on a scheme of bonuses for high quality and marketing of all outputs. Currently, as a result of agrarian land reform, agriculture has only a limited number of producers that still have operational and human resource capacity; most of these producers focus on cereal seed production (see Table 2).

Owing to its geography and implementation of seed production projects, and supported by the World Bank, the European Union, the Swedish International Development Agency (SIDA), USAID, and the United Nations Food and Agriculture Organization (FAO) from 1997 to 2014, the Kyrgyz Republic has untapped unique potential and comparative advantages in the region to produce seeds of many agricultural plant species. These advantages include:

- ✓ A good regulatory and legal framework that complies with international standards
- ✓ Opportunities for international seed certification of cereals, beet, legumes, and grasses based on the Organisation for Economic Co-operation and Development (OECD) Seed Schemes and International Seed Testing Association (ISTA) Rules
- ✓ Membership in the International Union for the Protection of New Varieties of Plants (UPOV) since 2000
- ✓ Membership in the Asia and Pacific Seed Association (APSA)

Table 2: Needs of Kyrgyz Agricultural Producers in Seed and Planting Stock

Crop	Sowing area (1,000 hectares)	Need (1,000 metric tons)	Domestic (certified) seeds (%)	Share of imports	Average cost (US\$, millions) (US\$1 = KGS 70)
Cereals (wheat, barley)	500.0	100.00	50%	—	30.0
Potato	80.0	240.00	30%	10 % imported	100.0
Sugar beet	10.0	20.00	10%	90 % imported	1.0
Perennial grasses (alfalfa, sainfoin)	300.0	3.50	25%	10 % imported	9.0
Vegetables	50.0	1.15	—	90% imported	15.0
Maize	100.0	2.20	15%	40 % imported	8.00
Cotton	25.0	2.00	40%	30% imported	1.5
Oil-bearing plants (sunflower, safflower)	50.0	0.75	70%	20 % imported	1.0
Fruit	50.0	1,500,000 young plants	—	25 % imported	3.0

Source: The Kyrgyz Seed Association (KSA) Annual Report 2016.

Note: — = not available.

As of 2017, the country has over 150 farms that have the status of seed production facilities, designated to produce seeds of various agricultural plants; their total sowing area is under 50,000 hectares.

The Ministry of Agriculture, Food Industry and Melioration of the Kyrgyz Republic regularly furnishes official reports on the availability of seeds of main agricultural plants. According to these reports, the demand for seeds is 100 percent satisfied. At the same time, there is a deficit in certified seeds; this deficit is covered by farmers on their own—that is, through using non-graded seeds. This testifies to the existence of an informal sector in seed industry.

Recent years have seen a rise in agricultural seed and other imports from member countries of the Eurasian Economic Union—in particular, from the Russian Federation and Kazakhstan. This increase is driven not only by the removal of earlier existing customs barriers, but also by the devaluation of the Russian and Kazakhstan national currencies.

It must be noted that, even with the well-developed institutional and regulatory frameworks of

the Kyrgyz seed sector, domestic demand for certified seeds of most agricultural plants is not met. For example, domestically produced seeds cover no more than 50 percent of the needs for spiked cereals, 15 percent for maize, 25 percent for potatoes, and 10 percent for fodder grasses (alfalfa and sainfoin). Ninety percent of the seeds used to grow vegetables and sugar beets are imported, as well as 40 percent of maize seeds, with part of these seeds (maize and vegetables) illegally imported from China.

The existing deficit of seeds (mainly seeds of spiked cereals) arises primarily from:

- ✓ high sowing rates due to the poor quality of seeds, non-observance of optimum sowing time, and worn-out machinery for soil preparation and seeding as well as for seed processing, and
- ✓ low harvests from seed crops of cereals.

It should be also noted that the Kyrgyz Republic had been a Soviet center of seed production for sugar

beet, maize, and alfalfa, but, by 2007, it had lost its status as a regional seed production and export center for these agricultural plants (Table 3).

Regulatory and Legal Framework

The existing laws and regulations on agricultural plant seed breeding and production provide a legal framework for sustainable development of the sector. Most laws were adopted during the implementation of seed industry development projects and were based on recommendations of international

consultants. However, there is an acute problem with their enforcement and it is necessary to align them with other bylaws, taking into account the current economic situation in the country as a whole and in agriculture, in particular.

The Ministry of Agriculture, Food Industry and Melioration of the Kyrgyz Republic makes amendments to the following laws and regulations on seed farming, but without consultation with all stakeholders:

- ✓ The law “On Seeds” was adopted in 1997 and finally amended on February 15, 2017

Table 3: Seed Outputs for Export and Export Earnings, 1998–2006

Year	Unit	Maize	Sugar beet	Alfalfa	Total
1998	Metric tons	30.0	174.5	22.0	226.5
	Kyrgystani soms, 1,000	34.0	19,937.2	385.0	20,356.7
1999	Metric tons	40.0	167.1	29.6	236.7
	Kyrgystani soms, 1,000	80.0	28,373.7	523.3	28,977.0
2000	Metric tons	20.0	91.9	5.0	116.9
	Kyrgystani soms, 1,000	70.0	14,502.3	25.0	14,597.3
2001	Metric tons	12.5	61.8	0.2	74.5
	Kyrgystani soms, 1,000	62.5	11,062.6	18.2	11,143.3
2002	Metric tons	70.9	112.1	24.0	207.0
	Kyrgystani soms, 1,000	558.6	34,515.8	686.6	35,761.0
2003	Metric tons	—	123.7	—	123.7
	Kyrgystani soms, 1,000	—	36,557.7	—	36,557.7
2004	Metric tons	—	84.7	—	84.7
	Kyrgystani soms, 1,000	—	18,569.8	—	18,569.8
2005	Metric tons	—	12.4	7.0	19.4
	Kyrgystani soms, 1,000	—	2,798.8	62.7	2,861.5
2006	Metric tons	—	7.0	5.0	12.0
	Kyrgystani soms, 1,000	—	1,792.6	40.0	1,832.6

Source: The Kyrgyz Seed Association (KSA) Annual Report 2016.

Note: — = not available.

- ✓ The law of the Kyrgyz Republic “On Legal Protection of Seed Breeding Achievements” was adopted on May 26, 1998, and amended on March 31, 2005
- ✓ The Administrative Code of the Kyrgyz Republic
- ✓ Resolution of the Government of the Kyrgyz Republic # 697 of October 25, 2006, to approve the regulation “On Seed Farms in the Kyrgyz Republic”
- ✓ Resolution of the Government of the Kyrgyz Republic #178 of March 13, 2009, to approve the list of seed farms in the Kyrgyz Republic

The law “On Seeds” refers to the Registry of Producers and Suppliers of Seeds and Planting Stock to be made by an authorized organization, but such a Registry does not actually exist.

The Strategy of Agriculture Development of the Kyrgyz Republic includes provisions concerning the promotion of organic products that should be associated with the use of genetically modified organisms (GMOs); however, the effective law “On Seeds” and other documents lack certainty with respect to the use of GMOs in the country.

The effective regulation “On Seed Farms” was adopted by the Ministry of Agriculture, Food Industry and Melioration of the Kyrgyz Republic in 2006 without consultation with the KSA. It is not consistent with the present-day conditions of the market economy; moreover, it is in conflict with the law “On Seeds”; in its formal nature, it is a tool of “hidden” licensing to be used by government entities and it should be revised as soon as possible.

Lack of harmony among the laws and regulations governing and influencing the seed sector (the Land Code, the Administrative Code, and so on) makes it necessary to review the law “On Seeds” and its

bylaws to assess their consistency with the current realities; to amend their main articles regulating import and export with due regard to proposals from all stakeholders, especially those from the real sector of seed and planting stock production and supply; and to assign the functions of statistic data collection to a specific organization as well as to address GMO importation and use.

Stakeholders

The Ministry of Agriculture, Food Industry and Melioration of the Kyrgyz Republic and its subordinated entities

This ministry is in charge of the seed industry and is striving to promote efficient and sustainable development of seed production with a view to meeting the needs of farms for the seeds of agricultural plants cultivated in the country. Its functions include the systematic analysis of the economic situation in agriculture, water management, food and food processing industries, and agricultural export/imports and the identification of strategic priorities for the development of these sectors on the basis of such analysis. It is the executive authority responsible for food security and implementation of respective programs in this area. The ministry operates with two departments:

- ✓ **The Department of Agricultural Plant Inspection.** This department was established by merging the National Centre for Plant Species Variety Testing and Plant Genetic Resources, the Kyrgyz National Seed Inspectorate, and the Centre of Grain Inspection. Its key objectives are to:
 - monitor varietal and sowing characteristics of agricultural and other plant seeds and planting stock;

- undertake field inspections of seeded and planted areas, and testing of seed lots on the ground;
 - assess sowing characteristics of agricultural seeds and planting stock, the quality of grains, and their processing products; and
 - assess and monitor the quality of grains from agricultural crops and their processing products (such as flour, bran, and milling offal) supplied to recipient enterprises and other managing entities regardless of their ownership.
- ✓ **The Department of Plant Health Protection and Plant Quarantine.** This department is designated to:
- develop and regularly update plant quarantine safeguards;
 - prevent the penetration and/or spread of quarantined hazardous organisms in the country;
 - prevent damage from the spread of quarantine pernicious organisms;
 - cause the commitments of the Kyrgyz Republic to be met under the quarantine-related international treaties made effective in accordance with the established procedures.
- The Ministry of Economy of the Kyrgyz Republic**
- This ministry's responsibilities are:
- ✓ to forecast, review, and evaluate social and economic development in the Kyrgyz Republic;
 - ✓ to develop and implement the country's economic policy, including methods and tools for macroeconomic stabilization;
 - ✓ to develop and implement the country's policy with respect to direct investment based on economic development priorities;
 - ✓ to develop and take export control measures;
 - ✓ to ensure continuous optimization of the regulatory and legal framework of entrepreneurs' activities;
 - ✓ to prepare proposals related to the development and implementation of the country's policy with respect to technical regulation and assurance of measurement uniformity;
 - ✓ to develop and implement the country's foreign and domestic trade policy, including policy measures to promote Kyrgyz goods into international markets;
 - ✓ to design measures to improve foreign trade performance, and to develop and encourage the export of products and to build up export capacity of the country;
 - ✓ to develop proposals on how to align foreign trade with the requirements and rules of the World Trade Organization (WTO), commitments to partners from the Eurasian Economic Union, and negotiations about accession to the Customs Union and Common Economic Space;
 - ✓ to develop proposals on customs and tariff and non-tariff regulation of foreign trade;
 - ✓ to maintain the Integrated Registry of Public Services provided by executive authorities and their structural units; and
 - ✓ to draft regulations on the accumulation, release, and lending of tangible assets from the government reserves, on the annual proceeds of tangible assets to the government reserves, and on amounts of their financing out of the budget.

The Ministry of Finance of the Kyrgyz Republic

This ministry's responsibilities are as follows:

- ✓ to develop the national policy of public finance management and non-tax payments;
- ✓ to improve the laws and regulations on internal audit, accounting, and financial reporting in public administration and public procurement; and
- ✓ to manage domestic and foreign sovereign debt of the Kyrgyz Republic.

In particular, according to the Resolution of the Government of the Kyrgyz Republic (of March 15, 2017) "On Measures to Support Seed Farming Development and Dissemination of High-Yield Varieties of Fruit and Berry Crops in the Kyrgyz Republic," the Ministry of Finance was instructed to earmark funding for governmental grants to Kyrgyz seed farms in the national budget for 2018–2022, after the approval of a law/regulation, providing for the introduction of a system of governmental grants.

At the same time, the Government of the Kyrgyz Republic encourages local self-government bodies to increase the period of land lease for seed farming to 20 years.

The Population of the Kyrgyz Republic Engaged in Agriculture

As a reminder, 65 percent of the country's population lives in rural areas, and agriculture accounts for about 15 percent in the total GDP. Livestock breeding is an important rural industry that depends on the supply of fodder, which in turn depends on seed supply to cultivate fodder crops.

A big share of livestock outputs, vegetables, fruit, and berry products comes from private farmsteads,

and the seed industry should be developed with due regard to the needs of this stakeholder.

National Intellectual Property Service of the Kyrgyz Republic (Kyrgyzpatent)

This stakeholder is in charge of all matters related to the protection of varieties. It is responsible for protection of new varieties included in the Registry upon official variety testing.

Processing Industries

These are represented by the Association of Fruit Processors, which brings together over 30 processing enterprises producing fruit and vegetables, meat and dairy products, flour mills and beer production facilities that are keen to have a well-developed national seed industry as a basis for the production of crop farming products in sufficient quantities. In view of this, seed breeding and seed production for industrial crops (such as cotton, sugar beet, tobacco, and so on) should be always agreed upon and sponsored by processing enterprises, procuring outputs from cultivation of these crops.

Kyrgyz Seed Association (KSA)

This is an independent body established to represent and pursue the interests of all actors in commercial seed production, including marketing and trade companies. The KSA helps promote high standards of behavior among its members, in particular concerning compliance with the requirements set forth in contracts and licensing agreements.

Breeding Institutions

These institutions comprise another important stakeholder. The Kyrgyz Research Institute of Ar-

able Farming, Kyrgyz Research Institute of Livestock Breeding and Pastures, OAO MIS Company, and private breeders are responsible for breeding agricultural plant species varieties and for their promotion and maintenance breeding.

Kyrgyz Agrarian University

The university is keen to meet the demand of farms for high-level specialists with technology and management skills.

Policy Issues

Currently the Kyrgyz seed sector, with its 150 seed farms, fails to produce sufficient seed outputs to meet the needs of its agriculture even though there is an accredited ISTA (International Seed Testing Association) Laboratory in the country. And even though the sector participates in the OECD Seed Schemes,³ seed imports prevail over seed exports for many agricultural plants. Such a situation is accounted for by the following factors:

- ✓ There is no national seed policy that would envisage a fundamental role for the private sector in seed production, supply, and trade with clearly defined (1) species priorities in seed production both domestic and for importing, (2) implementation timeframes, and (3) functions of all key actors in the seed sector.
- ✓ The government does not offer mechanisms to provide incentives for the consolidation of individual producers into up-to-date seed production companies.
- ✓ Chances to attract long-term investments in seed production are limited because of the

lack of affordable and long-term credit opportunities as well as limited and uncertain periods for leasing land from the Agricultural Land Redistribution Fund.

Sector-Specific Issues

Policies could also address several sector-specific issues in the following areas:

Insufficient and low quality of arable land for seed farms. Although the regulation “On Seed Farms” sets minimum area requirements for land parcels, 38 percent of seed farms have parcels smaller than 50 hectares and only 30 percent have parcels larger than 100 hectares. This is statistical evidence of seed farms’ problems with land areas.

Human resource deficit in seed farming. Most seed industry entities suffer from a lack of skills in the workforce arising primarily from the aging of staff, the nonexistence of a system of sector-specific vocational training, and low remuneration.

Seed and planting stock exportation and importation. The financial sustainability of Kyrgyz seed producers is deeply affected by imports and smuggling. The seed markets for maize (with a total demand estimated at 2,200 metric tons and an average cost of about US\$10.0 million) and for sugar beet (with an average cost of US\$2.0 million) are gradually being taken over by foreign companies, which already supply over 80 percent of vegetable seeds.

For example, in recent years the devaluation of the ruble resulted in increased imports of cheap, unregistered varieties of seeds and hybrids of some agricultural plants from the Russian Federation, which impairs the sales of seeds of both domestic and foreign producers.

³ For more information about the OECD Seed Schemes, see <http://www.oecd.org/tad/code/abouttheoecdseedsschemes.htm>

In addition, another issue emerged related to laws and regulations governing seed importation and trade: according to the law “On Seeds,” seeds of varieties and hybrids not authorized for cultivation in the country may be imported if the Ministry of Agriculture, Food Industry and Melioration has issued such a permit with its existence to be checked by the customs officers at the border.

To remove the customs barriers at the inner frontiers of the Customs Union and the Eurasian Economic Union, it is necessary to revise the functions of certain services and public sector organizations in order to control and regulate imports as well as to have an effective system of recording/reporting for seed and planting stock importation and exportation.

Counterfeit. Counterfeits are a major obstacle for the development of agricultural seed industry and the production of a planting stock of fruit and berry species. The country has no legal framework for addressing counterfeit-related disputes.

For this reason, the first priority to be addressed to protect rights of all consumers of seeds and planting stock is to introduce a system of obligatory marking/labeling and tracing of sold seeds and planting stock. This would require amendments to regulations and laws, including those defining the liability for offences in connection with counterfeits.

Issues with protection of new varieties. In the Kyrgyz Republic, the protection of new varieties of plant species is governed the law “On Breeding Achievements” (1998). In 2003, this law was amended to streamline the procedures of restoring rights that had been lost as a result of failures to pay. As of 2017, *Kyrgyzpatent* had issued 21 patents to protect the rights, primarily for wheat varieties bred by local breeders. The “royalty” is payable for the use of a proprietary variety. However, only four of these patented rights were “reserved” by making annual payments, and none of them was used as the basis for licensing agreements or collecting

royalties. Some duties, related to protection of varieties, were substantially reduced, but this failed to motivate breeders to protect their rights. So, although the plant variety protection system has been in place for over 20 years, breeders do not use it except to have patents for their varieties issued. Potential revenue from a properly organized collection of royalties for the use of locally bred varieties of wheat and barley is estimated at 30 million Kyrgyz soms per year. This is six times more than the public funds allocated by government and covers only the spending on remuneration for staff of the Kyrgyz Research Institute of Arable Farming as the holder of patents for respective varieties of cereal species. In addition, the small size of the seed market acts as a disincentive for foreign breeders to protect their rights in the Kyrgyz Republic (Table 4).

Thus the identified problems of seed farming make it rather difficult for the seed sector to operate and constrain its development. For this reason, it has become necessary to overhaul the strategy, key principles, and legal framework of the seed sector.

General Conclusions

- ✓ Most agencies of the seed sector fail to contribute to successful development of the seed industry.
- ✓ Government funding for the seed industry development is used inefficiently.
- ✓ In spite of government funding, the country continues to experience insufficient wheat, barley, and maize seeds.
- ✓ There is a failure to achieve the overarching goal of government regulation and support for the seed sector—that is, a failure to provide crop farmers with high-quality, affordable and safe seeds, to build up the export capacity of

Table 4: Origins of Agricultural Plant Species Varieties/Hybrids, Authorized for Use in the Kyrgyz Republic with their Breeders' Rights Protected in 2017

Crop species		Origins of varieties						Protected varieties
Species	Total different species	Kyrgyz Republic		Republic of Kazakhstan	Russian Federation	Republic of Belarus	Other countries	
		Kyrgyz Research Institute of Arable Farming	Other breeding institutions					
Winter wheat	56	14	8	12	11	—	6	5
Spring wheat	14	5	2	4	1	—	2	—
Winter barley	15	6	2	—	2	—	2	—
Spring barley	30	9	—	4	6	—	7	—
Grain maize	40	4	—	5	1	—	30	—
Sugar beet	29	3	—	—	—	—	—	—
Potato	40	1	3	—	1	—	—	—
Fodder grasses	—	—	—	—	—	—	—	—
Alfalfa	11	6	—	—	—	1	4	—
Sainfoin	2	2	—	—	—	—	—	—
Soya	19	—	3	3	—	—	14	—
Sunflower	7	—	—	—	—	—	7	—
Safflower	3	—	—	—	—	—	3	—

Source: State Register of plant species varieties and hybrids authorized for use in the Kyrgyz Republic 2017.

Note: — = not available.

seed farms, and to create incentives for seed exportation.

Policy Options

There are four distinct areas that could benefit from specific policies. These are discussed below with explanations of both the need and a specific recommendation for addressing it.

1. Policy options for enhancing variety breeding, testing, registration, and protection of intellectual property rights to varieties

It is necessary to evaluate the performance of national breeding research institutes to improve the efficiency of their expenditures, to identify their priority

activities, and, at the same time, to encourage them to cooperate with other countries in the region.

It is necessary to preserve the existing fast-track procedure for the introduction of the best foreign varieties of all agricultural, vegetable, and fruit/berry species. The application of this procedure must be contingent on prior testing and registration of these foreign varieties at the National Seed Testing and Genetic Resource Centre, along with mandatory checks to exclude quarantine items. Such a decision should be formalized as a regulation.

Seeds, imported to the country for sale, must meet the minimum quality standards for germination, purity, and plant health as set forth in the established rules.

Strict statistical records of seed imports and exports must be maintained. This function could be assumed by the seed production units of the Ministry

of Agriculture, Food Industry and Melioration of the Kyrgyz Republic or by its Department of Plant Quarantine (this department is in charge of the issuance and checks of plant health certificates at the point of importation/exportation of seeds and planting stock).

A legislative requirement must be established to ensure that the agencies responsible for testing and registering new varieties are obliged to disclose (publish) the sources of information about the results of testing of new promising varieties and hybrids in order to assess their economic value in all the regions of the country, including their qualitative characteristics. The yearbook, called the *National Registry of Varieties and Hybrids Authorized for Use in the Kyrgyz Republic*, would be a good place to publish this practical and needed information for producers, but it fails to do so.

The breeding institutions, the KSA, and the seed certification and quality control authority should design royalty collection arrangements based on licensing agreements with the breeders.

To enhance contacts and cooperation with seed producers, breeders should become members of the KSA and actively participate in its work. Their membership in the KSA will be conducive to the collection of royalties and will enable them to receive feedback from users of the varieties.

2. Policy options for ensuring sufficient seed production

In view of the land area for the required crop rotations and production of certified seeds in adequate quantities, it is strongly recommended that producers practice contract-based production—this means that unprocessed seeds would be supplied by non-seed farms to registered seed companies contin-

gent on compliance with all the rules for the production process.

To register seed farms in accordance with the regulation “On Seed Farms” to justify public support based on their actual annual seed outputs, and to avoid abuse of benefits granted to seed farming enterprises, the eligibility criteria for registration must be revised.

Establishing facilities that can produce seeds of new varieties for agricultural crops, jointly with breeding institutions from the Eurasian Economic Union in the Kyrgyz Republic, would enable those facilities to obtain international OECD and ISTA certificates and to export the outputs to those third countries where the issuance of such certificates a mandatory requirement.

Profitability of seed production and trade can be ensured only if selling prices for seeds reflect the full cost of production and include the royalties to be reimbursed to the variety breeders.

3. Policy options for ensuring seed quality control

All standards related to seed certification and quality assurance must be aligned with those of the Eurasian Economic Union member countries, possibly on the basis of the OECD and ISTA rules. In particular, in the Kyrgyz Republic, an OECD member country may not assign the same seed material category to next-generation material in consecutive years, whereas this is not regarded as a violation in other countries of the Eurasian Economic Union.⁴

Agricultural seed farming standards applied in the country must be similar to such standards other countries to harmonize international trade.

⁴ The categories are *original seed material*, which is produced by the originator; *elite seed material*, which is derived from the original seed material; and *next field generations*, which come from the elite group.

It is necessary to evaluate, monitor, and check the usefulness of the Kyrgyz Republic's membership in international organizations (the International Seed Testing Association/ISTA, OECD Seed Schemes for sugar beet, cereals, legumes, and grasses), based on whether this membership has a favorable impact on respective subsectors of the seed industry.

4. Policy options for boosting human resource capacity building

A high-priority objective is to train young people to develop their sector-specific managerial skills for seed farming and agricultural business in general.

All academic and vocational training courses of agricultural education should include information about seed farming in the context of plant breeding and agricultural business management and governance.

It is necessary to obligatorily provide courses of vocational training in seed production, processing, and marketing to develop human resources for all levels and areas of the seed industry.

Assignment

First, assess the current situation in the Kyrgyz seed sector to see the change in the seed flow pattern as a result of implemented agrarian land reform. In light of this assessment, evaluate the performance and opportunities of various policy options and propose adequate measures related to domestic seed sup-

ply and seed imports to ensure seed security in the period up to 2025.

It is advisable to conduct a SWOT analysis. SWOT is a strategic planning tool that aids in identifying various factors and grouping them into four categories: Strengths, Weaknesses, Opportunities, and Threats. See Annex 1.

Recommendations

- ✓ Review, finalize, and adopt a national seed policy as soon as possible.
- ✓ Amend laws and bylaws—including the law “On Seeds” and regulation “On Seed Farms” that currently in effect—on the basis of the regulatory impact evaluation of the laws and regulations governing the seed sector and recommendations on their harmonization.
- ✓ Amend laws to encourage the consolidation of farms as well as to attract foreign investment in the context of the Kyrgyz Republic's accession to the Customs Union, resulting in expanded markets for seeds produced in the country.
- ✓ Cause local government bodies to make available, as soon as possible, land parcels from the Agricultural Land Redistribution Fund for seed farming and long-term credit opportunities for seed production retrofitting (at least for 20 years) in order to attract domestic and foreign investment into the seed sector and put in place up-to-date seed companies.

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Annex 1

SWOT Analysis of the Seed Industry in the Kyrgyz Republic

Strengths	Weaknesses	Opportunities	Threats
<p>The country has all needed regulatory institutions and a legal framework to support an up-to-date seed industry.</p> <p>According to international experts, the Kyrgyz Republic is an advanced country in Central Asia (and maybe even in the Commonwealth of Independent States as a whole) in the area of seed farming.</p> <p>During the Soviet period, alfalfa seed exports were a major business for the country. Other significant seed outputs and exports were those of sugar beet, maize, and some vegetable species, owing to the relatively favorable climate as compared with other regions of the USSR. The Kyrgyz Republic was among the leaders not only in cattle breeding but also in seed production.</p> <p>Since 2000, the Kyrgyz Republic has been implementing reforms toward compliance with international performance standards, sustainability in the seed sector, and improved national seed certification with support from the European Commission (EC), the World Bank (under the Agriculture Productivity and Nutrition Improvement Project), and SIDA (the Swedish International Development Agency).</p> <p>Since 2003, the Kyrgyz Republic has been a member of the International Seed Testing Association (ISTA). Its Central Seed Laboratory (CSL) is authorized to issue the International Orange Certificate for seeds; this is an International Seed Analysis Certificate issued in accordance with the rules of the International Seed Testing Association (https://www.seedtest.org/en/ista-certificates_content---1-1080.html).</p> <p>In 2000, the Kyrgyz Republic became a member of the International Union for the Protection of New Varieties of Plants (UPOV, French abbreviation).</p>	<p>Structural problems of Kyrgyz agriculture have led to the following adverse developments:</p> <ul style="list-style-type: none"> • Fragmentation of land assets with consequent predominance of small-scale production capacities • Deterioration of irrigation infrastructure • Poor knowledge of agriculture among owners of small farms • Lack of investment and heavy dependence on credit even for seasonal operations <p>Seed farming was most severely affected by land reform because it requires large manageable fields to use appropriate technology and machinery. Land needs for seed farms are estimated at 100,000 hectares at a minimum, while the actual available land area is only 40,000 hectares for all seed farms—that is, there is an acute deficit of land (especially in the south).</p> <ul style="list-style-type: none"> • Ideally, a seed farm should have at least 300 hectares to adhere to rotation requirements (it would be desirable to have seven-course rotations) • In practice, only 17 percent of seed farms have sufficient land areas. • There is a lack of adequate storage facilities and equipment. • There is only one up-to-date seed processing facility in the country, in addition to 12 mobile Petkus seed cleaning units, supplied in 2014 under a credit line <p>The National (Interagency) Seed Council exists only on paper: it has no regular meetings and fails to play its role.</p> <ul style="list-style-type: none"> • There is still no national seed farming policy to guide the activities of the Council. <p>The domestic seed market is small.</p> <p>Funds from the public budget are used inefficiently.</p> <p>The production cost of domestically produced seed remains high.</p> <p>The system of protection of varieties was not able to bring about expected</p>	<p>The Ministry of Agriculture, Food Industry and Melioration of the Kyrgyz Republic and high-standing government officials view seed farming as a sector of top priority, which reflects a special status of the Kyrgyz Republic as a seed producer in the territory of the former Soviet Union. There is a will indeed to address challenges facing the seed sector both for the sake of increasing export earnings and to ensure food security in the country.</p> <p>The domestic demand for good-quality seeds is fairly high, which means that seed farms have opportunities to build up their production capacities and increase outputs to meet the needs of the domestic market.</p> <p>It is possible to study international (European, American, Russian, and Kazakh) best practices of licensing and royalty collection, which should be discussed as a way to address this issue.</p> <p>Seeds of agricultural plants, including vegetables, can be produced jointly with foreign companies and under contracts with them.</p> <p>Potato seed (tuber) production is a promising development area for farmers, particularly in view of the climatic advantages in the region.</p> <p>Preparation of a comprehensive catalogue of plant varieties for the region is highly needed, and the National Centre for Plant Species Variety Testing and Plant Genetic Resources, which</p>	<p>Frequent changes of Ministers impede efforts to support appropriate seed farming reforms in a consistent manner.</p> <p>Seeds from the Eurasian Economic Union member countries (Russia, Kazakhstan, and Belarus) can occupy a significant part of the seed market, especially for grain crops.</p>

Strengths	Weaknesses	Opportunities	Threats
<p>Wheat, barley, rye, oat, sugar beet, alfalfa, sainfoin, bean, grasses, and fodder greens are grown in accordance with the OECD schemes. These schemes do not impair seed production: on the contrary, observance of these rules helps to improve seed quality and promote seed exports.</p> <p>The regulatory institutions have a high human resource capacity to address seed farming matters and provide training to other Commonwealth of Independent State countries.</p> <p>In January 2007 the law “On Seed Farming” was adopted. A key provision of this law was to establish a national (interagency) seed council to coordinate and monitor the development of the seed sector.</p> <p>In 2000, the Kyrgyz Seed Association (KSA) was established to act as a catalyzer of seed industry development.</p> <p>In 2008 the law “On Food Security” was adopted.</p>	<p>benefits because of the high cost of protection compared with potential revenues from royalties.</p> <p>Land inspection and land use planning matters were moved from the jurisdiction of the Ministry of Agriculture, Food Industry and Melioration to the jurisdiction of the National Registration Service of the Kyrgyz Republic. In many countries, land inspection responsibilities rest with the ministries of agriculture.</p> <p>In the 1990s, the Agricultural Land Redistribution Fund was transferred to the jurisdiction of rural community boards (some experts deem it to be a mistake).</p> <p>Arable land is used inefficiently or for purposes other than those for which it is designated.</p> <p>The poor performance of the customs offices results in the smuggling of seeds (maize, vegetables) in great amounts.</p> <p>No licensing agreements have been signed and, hence, no royalties have ever been collected to support efforts to preserve and propagate respective varieties. The result is that:</p> <ul style="list-style-type: none"> • resources of Kyrgyz breeders remain very limited; and • there is neither a strong desire nor a good tool to protect the rights of breeders. <p>So far, the KSA fails to live up to the expectations that it would act as a catalyzer of seed industry development.</p> <p>Marketing is, as earlier, a major problem because seed farms (comprising the majority of the KSA members) have little experience of operating in the market economy environments.</p> <p>There is a critical need for a new generation of specialists, knowledgeable in technical and commercial issues in crop farming and seed production.</p>	<p>is part of the Department of Agricultural Plant Inspection, could play a key role in this process because it has the greatest experience with such work.</p> <p>Another opportunity is to participate in the implementation of regional initiatives to harmonize the trading rules for varieties and seeds.</p>	

Appendix

Suggested Teaching Methodology Based on the Cornell Case Study Approach

The case studies presented in this publication and others available at <http://cip.cornell.edu/gfs> were developed for use in graduate and undergraduate teaching at Cornell University and subsequently adopted by other universities in the United States, Africa and Asia, using a participatory social entrepreneurship teaching methodology developed by Professor Per Pinstup-Andersen, Cornell University. The overall objective of the methodology is to strengthen the analytical capacity of the students within the context of a simulated food policy context. Evaluations by students during the 12 years the methodology has been used have been consistently positive and enthusiastic. To be successful, the methodology requires preparations by both students and instructors prior to each class. The case(s) to be discussed should be made available to the students at least a week prior to the class and it is critically important that all students have read the case study prior to coming to class and be prepared to discuss the pros and cons of various policy options from the point of view of each stakeholder group identified in the case study.

The class should be run as a simulated role-playing meeting of stakeholder group representatives interested in the particular food policy issue to be discussed. One or two students, who should simulate the role as external consultant(s), should give a 10 to 15 minute overview presentation of the case, with emphasis on the policy options identified in the case study and a policy recommendation. Each of the remaining students should be assigned the role of a stakeholder group representative. The assignment may be made a week ahead of the class session or at the beginning of the class session. Then follows a debate moderated by the instructor in which each stakeholder representative expresses his/her position about the various policy options and the consultants' recommendation.

The moderator should guide the debate by following up on the points made and seek the response from other stakeholder groups. The moderator should call on specific representatives as needed to maintain an exciting, cohesive, and fast-moving debate. Attempts should be made to arrive at a consensus around the consultants' recommendation or one or more policy options. In cases when no consensus can be obtained (likely to be the majority of cases), a brief discussion should be held on the relative power of each stakeholder group and which one is likely to make the final decision about the policy option to be pursued. The length of the debate section of the class depends on the length of the class session. In a 50 minute class session, the debate portion should be limited to 25 minutes, leaving the last 10 to 15 minutes of each class session for the instructor to pull the findings of the debate together and relate them to the broader food policy issue within which the case study belongs. Such a "mini-lecture"—in which the students' experience from the debate and the written version of the case study is placed in a broader food policy context—is critically important.

In order to ensure that all students participate actively, it is recommended that the class size be limited to 20–25 students. Although the methodology was developed for real-time classroom instruction, it could also be used in online distance learning, particularly if real-time video-based interaction among the students could be included. While the above-mentioned mini-lectures would help ensure a cohesive food policy course, experience at Cornell University indicates that the integration of a few lectures based on a textbook would further strengthen the cohesiveness of the course. The textbook used at Cornell is *Food Policy for Developing Countries* by Per Pinstrup-Andersen and Derrill Watson, Cornell University Press, 2012.