

Possibilities Of Agricultural Practices For Climate-Supported Investments (On The Example Of Soybean Glycine Max. (L.) Merr.)

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Abstract

This research identifies several promising methods and technologies for CSA for Kyrgyz Republic. These practices can contribute to the diversification of farming systems and income sources, as well as help to overcome the difficulties caused by climate change in attracting investments for the development of the agricultural sector. Long-term investment in agricultural infrastructure, building the capacity of farmers and value chains, and implementing CSA policies and programs are important elements in promoting sustainable agricultural development in Kyrgyz Republic.

Keywords: Agriculture investments, financing, soybeans, length of the growing season, parameters of soybeans, yield, climate optimization, sustainable development, economic feasibility.

Introduction

Agriculture is of great importance for Kyrgyz Republic, acting as a source of livelihood for the vast majority of the country's population. Its share in the structure of the total gross domestic product (GDP) of the republic is 15%, while

providing 30% of jobs for the economically active population. Climate change will affect both crop and livestock production, but production systems will face different impacts. Scaling up climate-smart agriculture initiatives hereinafter CSA.

CSA is key to making the agricultural sector more resilient. However, widespread adoption of CSA practices such as conservation agriculture and drip irrigation continues to be limited despite their many benefits. This is due to limited access to seeds and other agricultural inputs, lack of affordable long-term loans, and insufficient training opportunities for farmers. Many institutions in Kyrgyz Republic promote sustainable agricultural development. In addition, the country is a party to numerous international treaties and conventions in the field of environmental protection and plays an active role in the implementation of measures aimed at adapting to the effects of climate change in the Central Asian region. Due to the limited state funding, the implementation of the strategies is planned for the future.

Despite the absence of a targeted climate change policy in Kyrgyz Republic, government departments, international organizations and NGOs are actively including climate change measures in sectoral strategies and strategies and sustainable development programs [11]. The National Strategy for Sustainable Development of Kyrgyz Republic (NSSD for 2013-2017) describes the main priorities for a long-term vision of the country's situation. It also sets out the main guidelines for measures and methods in the field of environmental protection. Issues related to CSA outlined in it include strengthening the regulatory framework for energy conservation practices, improving product quality and agricultural production efficiency, and improving natural resource management mechanisms. The NSSD also sets out the intention to create an enabling environment for the application of environmental ("green") technologies and investments in the field of adaptation to the effects of climate change. The result of this intention was the development of various programs in relevant areas, the attraction of investments in the agricultural sector, as well as the establishment of a dialogue with various international organizations.

Various institutions and non-governmental organizations provide services related to the implementation of CSA, including weather forecasting, capacity building and

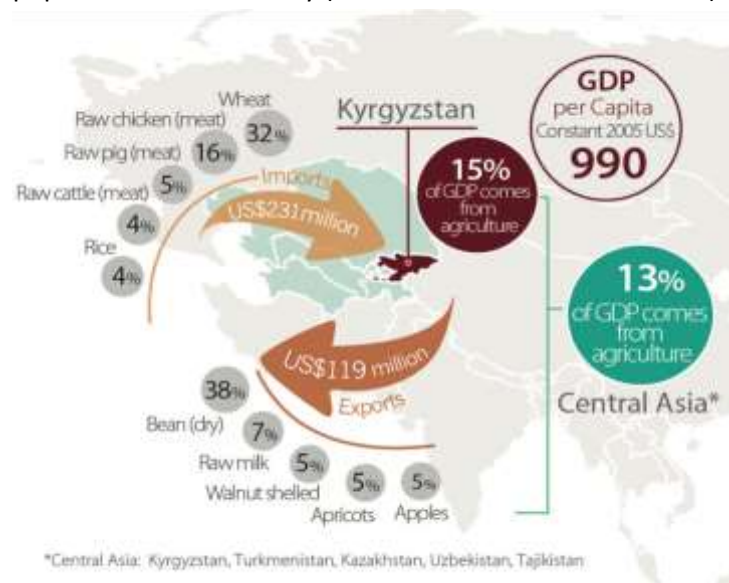
outreach to stakeholders. However, additional measures are needed to disseminate technical knowledge among farmers. Limited access to finance, due to high interest rates and short repayment periods, is a major barrier to farmers' application of CSA principles. In addition, farmers typically have limited financial management skills and unstable incomes, further limiting their access to finance.

Climate-smart agriculture (CSA) is agriculture that has undergone some transformation and reorientation to promote development and food security in the face of climate change. CSA is designed to solve three main tasks: sustainable increase in the productivity of the agricultural sector and farmers' incomes, adaptation and ensuring resilience to the effects of climate change, as well as the reduction and / or complete prevention of greenhouse gas emissions in accordance with national development priorities [1,3]. The CSA approach can help identify and exploit synergies and trade-offs in achieving these three objectives by addressing food and nutrition security and environmental, social and economic aspects of sustainable development across diverse agricultural landscapes. This approach synchronizes the needs and priorities of various stakeholders in order to achieve more sustainable, equitable and sustainable food systems. Although the concept of COS is still in its infancy, many of its methods and technologies are already being successfully applied around the world [4,5,6]. The widespread application of CSA principles in the Kyrgyz Republic will require consistent identification of CSA practices that are effective in the local context, identification of barriers to their implementation, assessment of strategies to overcome such barriers, and ensuring that favorable institutional and financial factors and conditions are in place. The CSA Country Profile describes the risks posed by climate change to agriculture in Kyrgyz Republic and highlights possible entry points for investment in CSA on a broad scale.

Economic feasibility of agriculture Kyrgyz Republic is a mountainous country in Central Asia with a total area of 199,951 km². It is ranked 120 out of 188 countries in the 2020 Human Development Index and is a lower middle income country by World Bank. Over 64% of the country's six million people live in rural areas. Agriculture is the backbone of Kyrgyz economy and an integral part of the traditional way of life for most citizens. The leading agricultural products are vegetables, fruits, cotton, tobacco,

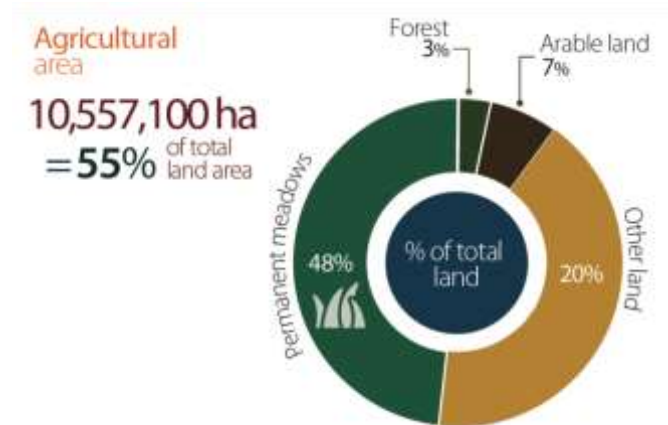
as well as meat and dairy products. The main imports into Central Asian region include wheat, meat, prepared foods, tea and alcoholic beverages. The development of the national economy, in which agriculture has played a leading role since late 1990s, has recently been affected by a negative foreign trade balance, political instability, economic shocks and frequent natural disasters.

About 3.8 million citizens of Kyrgyz Republic live in rural areas, while the rest of the population is scattered in towns and cities. The agricultural sector currently provides employment for about 30% of the economically active population of the country (40% of women and 60% of men)



Pic. 1. Economic feasibility of agriculture in the Kyrgyz Republic

The share of land used for agricultural purposes is 55.4% of the total land area of Kyrgyz Republic. About 48% of the total area of agricultural land is meadows and pastures of long-term use, 7% are arable land and 3% are forest zones.



Pic. 2. Land use in Kyrgyz Republic

In the state development programs of Kyrgyz Republic, agriculture is considered a key sector on which state support should be focused. Kyrgyz Republic is in a very favorable position for the development of the agricultural sector due to its favorable climate, agricultural products grown in natural conditions. The territory of Kyrgyz Republic is divided into regions that have clear geographical and climatic conditions, which gives comparative advantages. For example, in the Chui region, the dominant agricultural product is sugar beet; Issyk-Kul region is famous for apples and pears; in the Batken region, farmers grow apricots (dried); Osh and Jalal-Abad oblasts are the largest producers of cotton and walnuts, Naryn oblast is famous for animal husbandry; Talas region is the largest exporter of kidneys and soybeans. [7].

Investment Opportunities:

- Stable demand for agricultural products, which is a resource base for the food industry. Thus, its growth is closely related to the growth in the agricultural industry;
- Access to the market of the Eurasian Economic Union;
- GSP + status of Kyrgyz agricultural products in the European market;
- Processing of primary agricultural products using new technologies;
- Development and strengthening of small producers of environmentally friendly products with high export potential;
- Investment in a niche market using high quality raw materials with low operating costs;

Development of valuable and sustainable food products

In addition, the taxation regime for the agricultural sector is the most favorable in comparison with other sectors of the economy. The government pays great attention to the development of the sector through increasing production, improving quality, food security, and capacity building.

A fairly large number of different species of leguminous crops are grown in the world. In terms of its economic importance and growing area, soybean occupies the first place among legumes. Their importance as a source for meeting protein requirements is higher in regions where, for ethnic or religious, as well as economic reasons, the population consumes little or no meat products. The seeds of leguminous plants have, in comparison with all cereals, due to their symbiosis with nodule bacteria, whichable to fix nitrogen from the air, the highest content of crude protein. It is two to four times higher than in bluegrass grains. Possibleprotein yields in major pulses can be twice as high as in bluegrass, and rawtheir protein is almost entirely real protein.

Soybean is one of the most popular crops in crop production, but not in Kyrgyzstan. Soybean belongs to the leguminous family, has a high yield and grows on almost any type of soil, with the exception of sandy ones. We have studied how interesting soybean cultivation is for farmers, what are the prices and costs of growing at a time when there is adaptation and ensuring resilience to the effects of climate change in Kyrgyz Republic. Soybeans contain a large amount of vegetable protein. They have the widest application: they are used for cooking various dishes and in food production, as well as as feed for farm animals.

It became known that Kyrgyzstan already has a soybean processing plant with an annual capacity of 15,000 tons. Although soybean is not such a popular crop in Kyrgyzstan, it is an interesting and promising direction for the development of the agricultural sector.

Soybean is a short day plant and its growing season varies depending on the type of variety. We propose an increase in soybean sowing from last year's 400 hectares to 5,000. This is a crop related to beans, but the yield of the latter is a ton, a maximum of two, and soybeans - up to 3.5 tons. The price reaches 100-120 soms per kilogram, which is very profitable. The cost of seed material per hectare is 5,000 soms. The average harvest is 2 tons, or an income of 52,000 soms. Plus the cost of fertilizers, machinery and more. The price is economically justified and most of the soybeans are

grown in those regions where sugar beet is popular. Soybeans are best grown where there are no problems with watering. Researches have shown the water-holding capacity of soybean leaves.

Diagram 1. Soybean leaves water holding capacity, % (June, 2022).

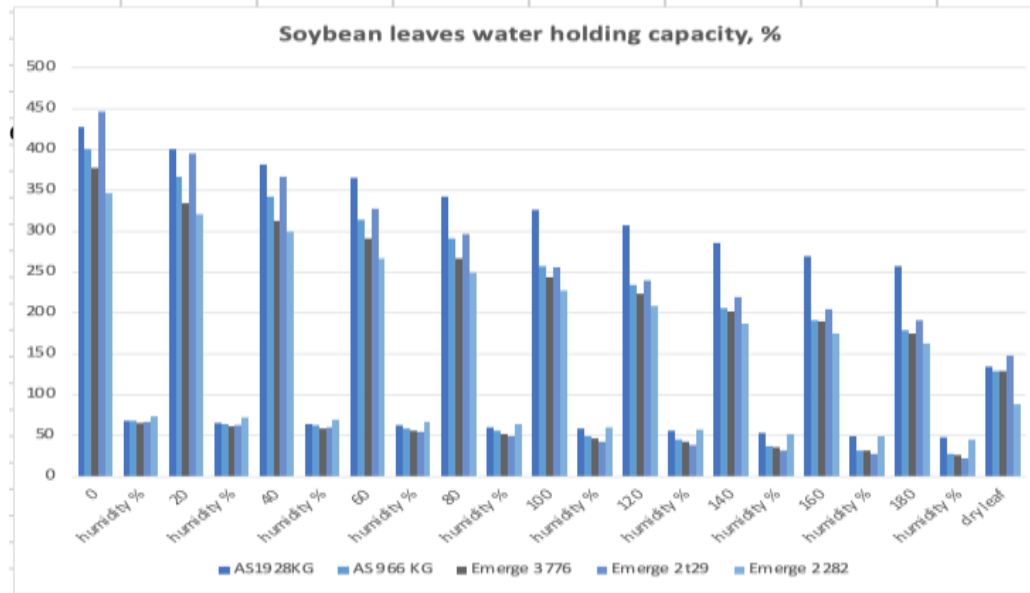
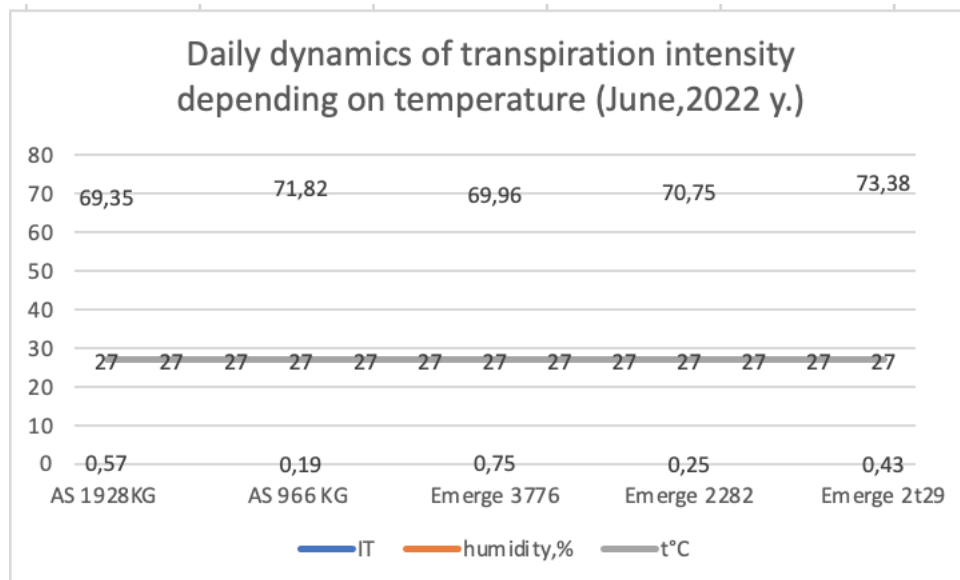


Diagram 2. Daily dynamics of transpiration intensity depending on temperature (June, 2022 y.), g/g.



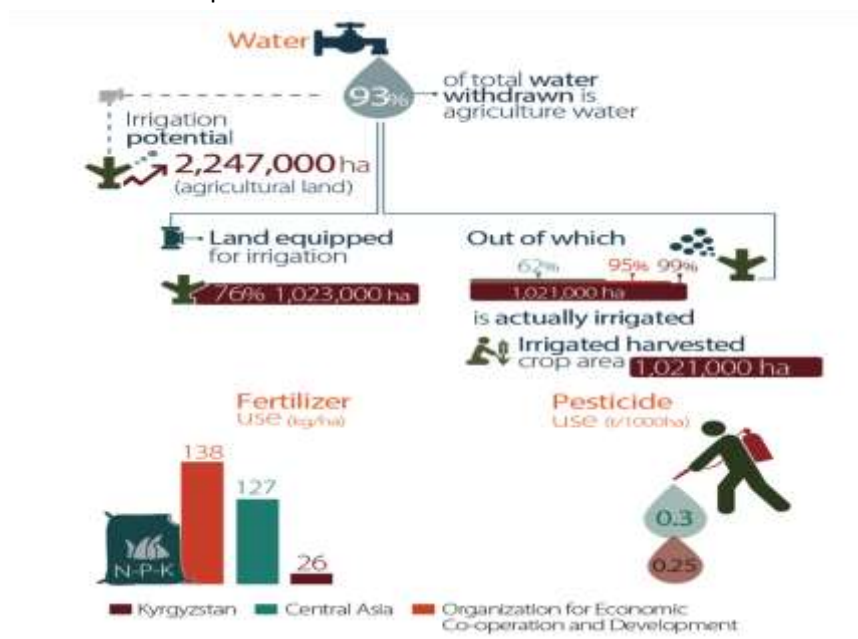
The studies were carried out in 2022 in Kant city, Chui Valley from April to October. We took American varieties Emerge 2t29, Emerge 2282, Emerge 3776 and local varieties- AS1928KG, AS966KG.

The study analyzed soybean varieties in Kyrgyz Republic with their breakdown by groups – some parameters of

water balance (regime) and financial viability. Conservation agriculture brings co-benefits in terms of mitigation and adaptation by reducing GHG emissions, increasing agricultural production and increasing crop resilience through improved soil quality. Climate-smart technologies and practices offer opportunities to address climate change challenges, stimulate economic growth, and improve the sustainability of food and agricultural systems in Kyrgyz Republic.

The country traditionally has sufficient water resources and can meet the needs of irrigated lands. According to Food and Agriculture Organization of the United Nations (FAO) [8], the proportion of agricultural land with the necessary conditions for irrigation is 76%. According to 2020 data, almost all irrigation systems are managed by 481 water user associations (WUAs), which are public organizations that manage and provide maintenance of irrigation systems at the local level [9,10]. However, during dry and dry seasons, inefficient and unsustainable irrigation practices can lead to severe water shortages.

Use of agricultural production factors in Kyrgyz Republic is shown on pic. 3.



Pic. 3. Using the agricultural production factors in KR.

Under existing climate change legislation, there are opportunities to raise funds for CSA activities from, but not limited to, the following sources: the Green Climate Fund and the Global Environment Facility. In this regard, the main partner organizations are actively involved in the

preparation of project proposals on the subject of the agricultural sector. Thus, while seeking funding, national and local programs and projects should be developed in accordance with the main elements of CSA, which in turn contributes to the sustainable development of agriculture in the country as a whole. One of the difficulties faced by Kyrgyz Republic is the reliance on NGOs to fund activities under the CSA, as well as limited support at the local government level. The situation is aggravated by the lack of a clear legal framework and administrative mechanisms for cooperation between the government and civil society. Such mechanisms are essential to ensure proper access, management and use of available and potential funds for agricultural development and to maximize the impact of programs implemented in the relevant sectors.

Conclusions

Finally, it should be noted that from an environmental point of view leguminous crops have ecological positive property. It consists in the possibility: reduce the use of chemical means of protection in the crop rotation plants; in the application of soil-protecting methods of plowless tillage after their cultivation; reducing the application of doses of mineral fertilizers due to nitrogen fixation from the air by nodule bacteria. They are not only provide themselves with the necessary nitrogen, but leave its reserves in the soil, which are used by subsequent culture.

Kyrgyz Republic needs to transform its traditional farming model to include CSA methods and start moving towards the development of a sustainable agriculture sector. Certain measures are particularly important to support such a transformation. Ensuring access to finance is a central issue, and work is needed to ensure the sustainable provision of loans with minimum interest rates and appropriate repayment periods throughout the country. Private sector investment in creating more efficient conditions, developing precision agriculture, drip irrigation, conservation agriculture and improving the quality of products with higher returns and shorter payback periods. Financial support in the form of parity grants or concessional lending should focus on those technologies that are less attractive from a purely private sector perspective, despite their significant mitigation and adaptation benefits.

Providing substantial public support to stimulate agricultural finance, innovation and knowledge management, as well as public investment in agricultural research, and further exploring the barriers to the adoption of these technologies, will identify opportunities for improving policy measures.

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