

Agrobiotechnoparks integratability in the popular-scientific tourism system

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Abstract. This paper was devoted to the scientific rationale of necessity of agrobiotechnoparks development in the region as a way to force agriculture economic growth. Based on experts' opinions and customer insights it was shown the opportunity of agrobiotechnopark integration in the popular-scientific tourism system. It has been proved that basic characteristics of innovative for national economics agrobiotechnopark concept can drive the agriculture and touristic spheres development. List of positive effects for local agriculture sphere and popular-scientific tourism system was defined. Conducted during research analysis has shown number of issues, which is possible to resolve by the scientific and practical opportunities of agrobiotechnopark. The unique positioning of agrobiotechnopark in the subtropical area can be a valid argument of its competitive abilities, as well as it can be involved in the tourist system. There were shown the variety of specific tourists' activities, which can attract a numerous visitor to the city resort Sochi and federal territory Sirius. Factors of socio-economic efficiency achievement for this project were presented.

1 Introduction

The agricultural industry development in the Russian Federation amid global challenges is becoming a strategically important national mission. Studies showed that there are numerous implemented in Russia regulatory documents. They have been developed at various levels of government authority to achieve prescribed objectives.

The Federal Scientific and Technical Program for the Agriculture Development for 2017-2025 is in force. It was approved by Decree of the Russian Federation Government: «On approval of the Federal Scientific and Technical Program for the Development of Agriculture for 2017-2025» (from 25.08.2017 by № 996). The operation of this law is responded with Decree of the Russian Federation President: «On measures to implement state policy in the interests of agricultural development» (from 21.07.2016 by № 350). The main program goal is to ensure stable production of competitive agricultural products growth due to modern technologies application in the planting material, feeds, agrochemicals, manner of agricultural products storage.

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The initiative «Export of Agricultural Products», which is a part of national project «International Cooperation and Export», is being actively implemented by strengthening economic ties with Asian, African and Middle East's countries.

Ensuring food security under sanctions policy has become a top-priority task. For the purposes of national food security in February 2019 in the Federation Council of the Russian Federation Federal Assembly took place a round table discussion. Subject matter of this meeting was devoted to the current issues in the state policy implementation in the agro-industrial complex in the context of import substitution policy. The experts' resolution was about transition needs to accelerated development rates in the agro-industrial complex.

As a tool of high-tech agricultural sector development in the Russian Federation can be considered the establishment of agrobiotechnoparks. This goal is outlined in the national project «Science and Universities». According to this project, it is planned to establish at least five agrobiotechnoparks all over Russian Federation territory. New agrobiotechnoparks infrastructure will be facilitated the development of the real sector of the economy and science. This initiative will receive state support in the near future, as indicated in the Resolution of the Russian Federation Government «On the approval of the rules for providing grants in the form of subsidies from the federal budget for the provision of state support for the creation and development of agro-industrial technoparks (agrobiotechnoparks)» (dated from 20.06.2023 by № 1007).

According to experts from the scientific community and representatives from the real sector of the economy the agrobiotechnopark placement in the unique wet subtropical zone of the Sochi resort city will enable the expansion of operational capabilities for agricultural enterprises. This expansion will be achieved through the more comprehensive utilization of existing land plots. As well it will be possible to focus on serving tourists who are interested in modern agricultural technologies, breeding methods, crop cultivation and harvest collection, processing methods. Thus, the implementation of the agrobiotechnopark project will help to solve two important objectives: preserving the strategically important agricultural enterprise for the resort city of Sochi by transitioning to a new economic model and expanding the range of services in the sphere of scientific and popular tourism to attract additional visitors to the region.

The objectives of the current study were to prove the social-economic viability of agrobiotechnopark project and to suggest integrative ways of this project into the local popular-scientific tourism system.

2 Materials and Methods

The study was based on such materials as monographs, articles, reports from scientific-practical conferences devoted to relevant issues in the agriculture development, which is based on the implementation of technological innovations, including the format of city farms. The study materials also encompassed data from the Federal State Statistics Service and statistical materials from the Department of the Federal State Statistics Service for Krasnodar Region and the Republic of Adygea. There were used data from annual analytical notes of the Sochi Administration, financial and economic reports of operating in the resort area agricultural enterprises, proposes of the national project «Science and Universities». Strategic agriculture development documents data and state support measures were also included. Other sources involved government standards and requirements for technoparks, representing expert opinions on innovative development in agricultural enterprises and their integration into the tourism service sector media press releases. The study presents the results of public opinion research of tourists' agrotourism interests. During this August and September of 2023 survey more than 500 people were polled on the territory of resort city Sochi and in the Sirius federal territory.

The presented research results were performed with interdisciplinary methods, including a system approach to evaluating the feasibility of developing agrobiotechnoparks based on the existing agricultural enterprise at Sochi, the integration opportunities of agrobiotechnopark into the sphere of scientific and popular tourism to increase the enterprise's revenue on one hand and provide the opportunity for diversification of the regional tourism offering on the other hand. The next methodology method was the analysis of fundamental strategic documents, examination of statistical data, and the results of expert surveys. Generalization method was used to formulate logically substantiated conclusions.

Specialized methods were applied during the research, such as surveying potential clients to identify their consumer preferences and expectations. Additionally, expert opinions were analyzed. The study also included a comparative analysis of the resource capabilities of the Sochi agricultural enterprise «Russia» to justify the feasibility of developing based on it agrobiotechnopark and utilizing it as an attractor of tourist interest.

3 Results

The results of the statistical data analysis were the basis for formulating important conclusions and reasons (see table 1).

Table 1. Agro-industrial complex of resort city Sochi, 2018-2022

Conclusion	Reasons	Information graphics																								
The share of the agricultural sector in the city's economy has decreased	From 2018 to 2022 the share of the agricultural sector on shipment decreased from 6,5% to 2,4%	<p>ON SHIPMENT, MLN P</p> <table border="1"> <tr><th>Year</th><td>2018</td><td>2019</td><td>2020</td><td>2021</td><td>2022</td></tr> <tr><th>Value (MLN P)</th><td>6892</td><td>6776</td><td>6502</td><td>6146</td><td>4318</td></tr> </table>	Year	2018	2019	2020	2021	2022	Value (MLN P)	6892	6776	6502	6146	4318												
Year	2018	2019	2020	2021	2022																					
Value (MLN P)	6892	6776	6502	6146	4318																					
Self-sufficiency rate of locally produced agricultural products has decreased	Vegetable production covers less than 9% of the calculated needs of the permanent population. Fruit and berry production satisfies 16% of the demand for them. Livestock farming is underdeveloped	<p>Δ 2022 to 2018, %</p> <table border="1"> <tr><th>Category</th><th>Demand (%)</th><th>Gross Output (%)</th></tr> <tr><td>Vegetables</td><td>-1.7</td><td>1</td></tr> <tr><td>Fruits and berries</td><td>0.5</td><td>2.1</td></tr> </table>	Category	Demand (%)	Gross Output (%)	Vegetables	-1.7	1	Fruits and berries	0.5	2.1															
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Vegetables	-1.7	1																								
Fruits and berries	0.5	2.1																								
The gross harvest of tea has reduced, as well as areas and yields of tea plantations	The reduction in the areas and yields of tea plantations has led to a decrease in the gross harvest from 2018 to 2022. The tea industry has been subsidised since 2005	<table border="1"> <tr><th>Year</th><td>2018</td><td>2019</td><td>2020</td><td>2021</td><td>2022</td></tr> <tr><th>Hectareage</th><td>848.8</td><td>848.8</td><td>822.8</td><td>822.4</td><td>662.8</td></tr> <tr><th>Gross output, tons</th><td>53.8</td><td>3.6</td><td>97.2</td><td>41.7</td><td>29.3</td></tr> </table>	Year	2018	2019	2020	2021	2022	Hectareage	848.8	848.8	822.8	822.4	662.8	Gross output, tons	53.8	3.6	97.2	41.7	29.3						
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Reduction in the volume of food production	The production of food products includes the manufacturing of meat and meat products, beverages, and other food items	<p>gross output, mlrd P</p> <table border="1"> <tr><th>Year</th><td>2018</td><td>2019</td><td>2020</td><td>2021</td><td>2022</td></tr> <tr><th>meat products</th><td>4.8</td><td>4.9</td><td>4.5</td><td>3.7</td><td>2</td></tr> <tr><th>beverages</th><td>1.6</td><td>1.6</td><td>1.8</td><td>1.6</td><td>1.9</td></tr> <tr><th>other food items</th><td>0.03</td><td>0.05</td><td>0.08</td><td>0.09</td><td>0.11</td></tr> </table>	Year	2018	2019	2020	2021	2022	meat products	4.8	4.9	4.5	3.7	2	beverages	1.6	1.6	1.8	1.6	1.9	other food items	0.03	0.05	0.08	0.09	0.11
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The main conclusion, which can be formulated about current state of Sochi agricultural sphere, is about evident decrease in agricultural production. Consequently, the resort city's dependence on external food supplies intensifies against the backdrop of rapid population growth and tourism inflow.

This Sochi agricultural sector research, has allowed to identify general parameters that characterize its level of development. The agricultural complex is primarily composed of 500 large and medium-sized enterprises that shipped goods worth 9,3 billion rubles in 2022.

In total, there are 14 large agricultural organizations, about 200 farming enterprises, over 23000 private homestead properties. All of them are operating within the resort's territory. There are 4,4 thousand hectares of agricultural land have been allocated within the administrative boundaries of the resort. There are 1,2 thousand hectares are suitable for tea cultivation. The total tea leaf harvest in 2022 amounted to 229,3 tons. Sochi tea factories contribute Sochi's status as the largest producer of domestic tea.

The examination of annual analytical reports on the results of the socio-economic development of the municipal entity, the urban district of the resort city of Sochi in the Krasnodar Krai, allowed assessing the volumes of fruit and vegetable production by agricultural organizations (Figure 1) and private homestead properties (Figure 2).

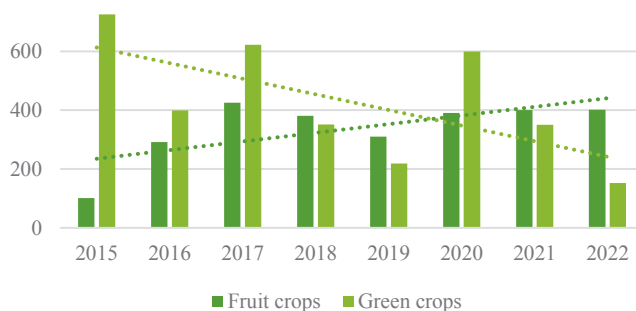


Fig. 1. Production of fruit and green crops by agricultural enterprises of resort city Sochi, tons

A trend analysis for the period from 2015 to 2022 demonstrates an increase in the production volumes of fruit crops by agricultural enterprises in the resort city of Sochi by 3,9 times. At the same period, it was a decrease in the production volumes of green crops by 4,8 times. The vegetable production decline is attributed by the leaders of agricultural enterprises to the negative impact of climatic factors on the yield of grown in open ground crops. The turnover growth is attributed to the extensive expansion of fields and orchards, as well as the application of advanced planting schemes.

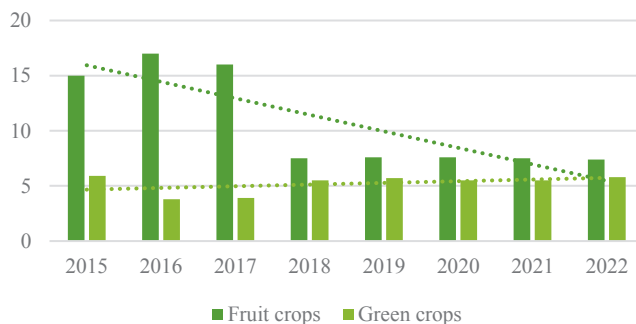


Fig. 2. Production of fruit and green crops by private homestead properties of resort city Sochi, tons

The trend analysis of production and sales volumes of crops by personal subsidiary farms indicates a twofold decrease in the sales of fruit crops and a slight increase in the sales of vegetable crops. Comparing the 2022 data of produced goods volumes shows that large enterprises produced 54,3 times more fruit crops and 26,2 times more vegetable crops, despite the numerical superiority of the latter. This phenomenon is explained by a significant difference in the occupied and cultivated areas of agricultural land.

Thus, the need of developing local agricultural sphere is obvious. Agrobiotechnoparks allocation in the territory of Russian southern tourist centers can become a driver for the agricultural sector development and can assist to broaden the list of services offered to tourists. Predicted positive effects of integrated in the popular-scientific tourism system agrobiotechnoparks were collected and presented in the table 2.

Table 2. Positive effects of agrobiotechnoparks development for city resort Sochi

Agrobiotechnopark «Subtropiki Rossii» (Russian Subtropics)	
Positive effects for local agriculture sphere	Positive effects for popular-scientific tourism
Possibility of purchasing planting material adapted to local conditions in the agrobiotechnopark nursery-garden	Visiting citrus and subtropical thematic gardens and gather the harvest (fresh fruits), make photos
Scientific and methodological support of growers, including effective planting schemes, fertilization schemes, plant treatment protocols	Introduction to new and modern agricultural technologies
Open lectures for agricultural industry specialists to enhance their educational level	Attending open lectures that explore the health benefits of subtropical crops
Promotion of modern agrotechnologies, including smart seedbeds and city farms	Increasing the interest of young people in the academia and implementing career guidance function
Workplaces for scientists with the opportunity to conduct scientific experiments	The opportunity to discover more of the entire cycle of growing vegetables and greens
Development of cooperation and interaction between science and the real sector of the economy	The opportunity to taste fresh and processed products

Development of agrobiotechnoparks in the territory of major tourist centers in the south of Russia presents additional opportunities, including:

1. Expanded the sale market of fresh and processed products through direct sales to hospitality industry enterprises and tourists in the region;
2. The opportunity to achieve high economic efficiency;
3. Development of additional commercial activity forms related to organizing excursion programs for tourists with the opportunity to visit production areas and scientific laboratories;
4. The opportunity to present southern cultures on the agrobiotechnopark's territory such as citrus, grapes, feijoa, persimmons, figs, kiwi, tea, flowers through the establishment of thematic gardens with the possibility of harvesting;
5. Organization of tasting rooms on the agrobiotechnopark's territory and stands for sale of fresh and manufactured products;
6. Potential for reducing operating costs due to warm climatic conditions in southern resorts, make-up water and the high profitability of equipping enterprises with solar panel systems;

7. Creation of new centers of tourist interest in the region, particularly attracting tourists interested in modern technologies for the production of fruits, berries, vegetables and greens.

The plan of agrobiotechnopark organizational scheme, which can be effectively integrated in the popular-scientific tourism system, is presented on Figure 3.

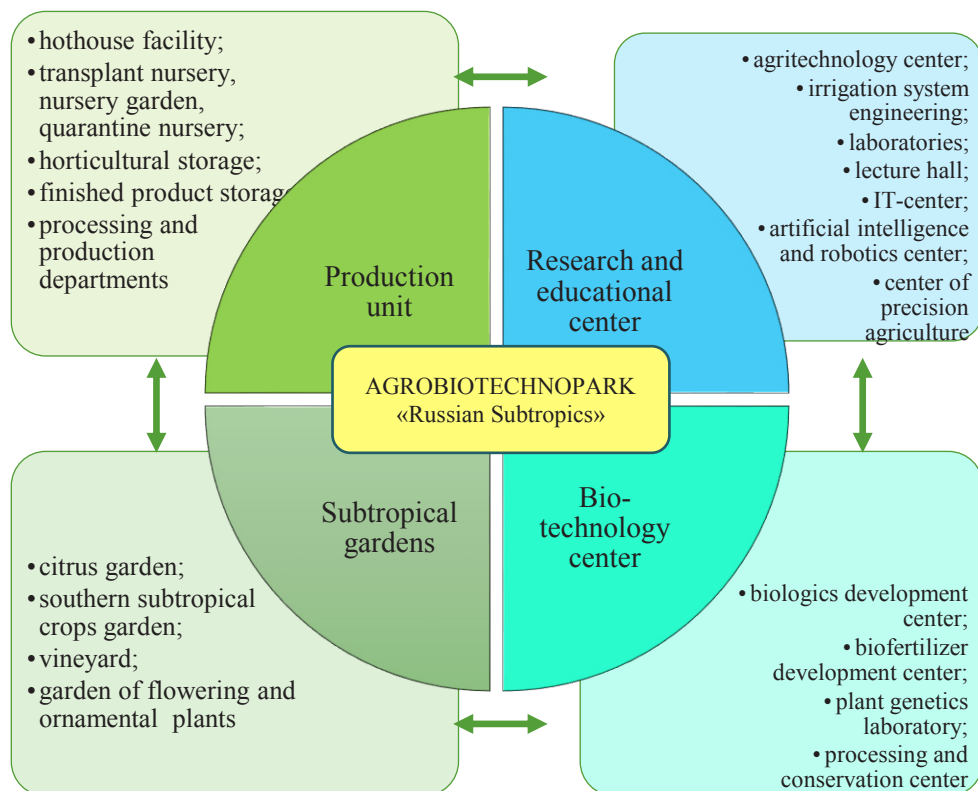


Fig. 3. Agrobiotechnopark organizational scheme vision

The main principle of agrobiotechnopark operation is an idea of collaboration between science and agricultural enterprises for effective transfer of technologies, scientific recommendations, practical cooperation and infrastructure support. Just an important that agrobiotechnoparks can be included into the system of tourist services to spark visitors interest to agritourism.

4 Discussion

Agrobiotechnoparks is an experimental area for new agrotechnology management system based on artificial intelligence and robotics. Research teams can be involved into the process of developing virtual machine remote control system due to algorithms of evaluating levels of illumination, temperature, humidity, soil moisture. These systems can allow to optimize costs and increase crop yield. New agrobiotechnoparks' developments and achievements can attract tourist interest as well.

There are variety of authors, devoted their researches to the agriculture, agritourism, technologies in agricultural industry. The basic aspects of agritourism development were discussed in the works of Filippo Sgroi, Enrica Donia, Angelo Marcello Mineo [1], Omid

Khairabadi, Hassan Sajadzadeh, Saheb Mohamadianmansoor [2]. Factors on service experience in agritourism were discussed in paper of Jordi Gascón [3], Sijie Cheh, Marios Sotiriadis, Shiwei Shen [4], Mei Ling Dai, Daisy X.F. Fan, Rong Wang [5]. Important aspects of sustainable agriculture and artificial intelligence were discussed at papers of Mariou Vasileiou, Leonidas Kyrgiakos, Christina Kleisiary [6], Juha Backman, Markku Koistinen, Ari Ronkainen [7], Guduru Dhanush, Narendra Khatri, Sandeep Kumar [8]. Collaboration of agriculture and science was shown in papers devoted to growing scientific-based practices by Demeku Mesfin, Engdawork Assefa, Belay Simane [9], Raychel E.Santo, Sara N. Lupolt, Brent F. Kim [10]. Different socio-economical aspects of agrotourism were discussed by I. Susila, D. Dean [11], Zhenshan Yang, Jianming Cai [12], Claudia Jazmin Galeano-Barrera, Edgar Mauricio Mendoza-García [13]. The theme of agrobiotechnoparks as an experimental basics for scientific research results adaptation and area for promoting scientific achievements to tourists presented as piecewise knowledge.

Agrobiotechnoparks, representing scientific and technological projects for the implementation of modern technologies in the agro-industrial complex, are designed to increase the level of agricultural production. It can act as a basis for effective interaction between scientific organizations and agricultural enterprises to allow rapid testing of results from innovative scientific and technical activities and their subsequent integration into production processes. Highly instrumented laboratories, established within the structure of agrobiotechnoparks, will conduct innovative research in biotechnology, breeding, ways of plant protection. Grant support of over 1,5 billion rubles from the federal budget was planned for agrobiotechnopark infrastructure development in 2023.

Degree of modern technologies development allows the implementation of agrobiotechnopark projects in urban environments in the form of city farms. The Russian company Greenbar produces vertical farms for growing fresh greens, berries and vegetables using quantum bioponics technology on autonomous planting beds with built-in software called «Virtual Agronomist», managed by artificial intelligence. The technology is implemented using a franchise scheme. In 2020 with the assistance of the Russian Expert Center this company was presented at Dubai international exhibition, leading to collaborations with countries such as India, UAE and Qatar. By implementing Greenbar technologies in 2021, the UAE established the first raspberry farm covering an area of 1,500 m² under the management of a neural network, enabling the cultivation of 9 tons of produce per year. In 2022 a similar project was implemented in the Moscow region, Russia with a projected capacity of 3 tons of raspberries and blackberries per month. The company plans to open at least 600 similar farms worldwide by 2028. According to expert estimates, the city farm market is expected to grow from 7,4 billion in 2023 to 9,88 billion in 2025, with a market growth rate of 2,5 billion dollars from 2023 to 2025. Another company that developed innovative technology for autonomous planting beds with hydroponic installations and sprouters – «SmartHydroDrills», actively collaborated with European countries until 2021, supplying equipment for growing cherry tomatoes, greens and peas. In the conditions of sanctions, companies need to focus more on the domestic market.

Thus, the development of agrobiotechnoparks becomes a modern trend in the agricultural sector, expanding opportunities for producers, including those implemented in urban environments. Due to modern agrotechnologies it is possible to establish a fully functional agrobiotechnopark on a 100-hectare site, which can become a traveler attraction center.

5 Conclusions

In 2023 the management of the branch maker agricultural enterprise of the Sochi resort, which is known as the municipal unitary agricultural enterprise «Rossiya», decided to build up an agrobiotechnopark «Russian subtropics» and develop it as the leading ensuring

sustainable strategic development direction. The planned project's capacity is about 3 thousand tons of vegetables and 8 thousand tons of fruits. Compared to the volume of produced by large agricultural enterprises in 2022, it will amount to a 2% increase in production of both fruit and vegetable crops. The important project aim is to create at least 800 new jobs in the city. This aspect also holds significant socio-economic importance for the resort city. The conceptual agrobiotechnopark design involves utilizing 10 land plots with a total area of 100 hectares for accommodating greenhouses, subtropical orchards, nurseries (including a quarantine nursery to identify infected planting material imported into the city from other regions), processing workshops, conservation and drying facilities, as well as scientific-production laboratories, lecturer halls and others. An analysis of the enterprise's capabilities for developing an agrobiotechnopark and comparing them with the established national standards (GOST R 56425-2021) allowed to formulate a positive conclusion.

The inspection of the enterprise «Rossiya» allowed to establish compliance with the technical regulations of the following design indicators: occupied area, density and number of floors of the building, existing of necessary housing and communal services facilities availability. The project can be submitted as an application for obtaining a federal grant and presented at investment sites. With proper technical and economic justification, the project can attract business significant investors. Thus, the implementation of this concept can be achieved through the mechanism of public-private partnership.

To raise the prospect of state and private funding it possible by the way of collaborating with local Administration, department of environmental protection, park management and industry. Local administrative experts can give a consultation to agricultural enterprise managers how to present their project in the best way. The idea of the interdisciplinary cooperation will support large investors to identify this start-up as a project with high potential.

Competitive position of presented subtropical agrobiotechnopark operating both in agriculture and tourism spheres can be enforced by the following factors:

- favourable location of the agricultural enterprise. It locates close to the federal territory «Sirius» (partially on its territory), which is the modern coastal tourist cluster developed during the preparation and hosting of the XXII Winter Olympic Games 2014 in Sochi;
- growing interest among Russian tourists in agrotourism due to the opportunity for urban residents and their children to get closer with high-tech solutions in agricultural sphere, self-harvesting and tasting fresh subtropical produce.

During the summer season the federal territory «Sirius» accommodates about 60000 visitors daily, including up to 8000 preschool and school-age children. Up to 40000 tourists visit Sirius for excursions daily. Based on the total capacity of this territory being 100000 per day, it is possible to facilitate the visitation of the agrobiotechnopark by 1% of the visitors, amounting to 1000 people per day. Considering the implementation of the «smart tourism» program, it can be said that the planned agrobiotechnopark project can enhance the effectiveness of its implementation by providing an opportunity for youth with scientific and educational purposes to participate in laboratory work and explore advanced agricultural technologies. The marketing support of the project by the Sochi Administration, Administration of the federal territory Sirius and major tour operators will contribute to generating a sufficient volume of tourist traffic to the agrobiotechnopark. In the long term, this will allow for the recovery of costs for the development of additional tourist infrastructure: parking for personal and excursion vehicles, safe routes for tourists to explore greenhouse farming, pedestrian trails through subtropical orchards, recreation areas, places for collecting and weighing harvests, cafes and buffets on lands with access to the Psou river, points for selling souvenir products, seedlings, sanitary facilities and waste collection points.

Considering the average cost of visiting similar located in the resort city of Sochi facilities at 500 P it can be assumed, that the revenue from providing services to tourists with an average attendance of 1000 people per day, will amount to 500000 P without taking into account additional income from providing extra services.

With the planned development of at least three sites for serving tourists (greenhouse complex, subtropical orchards of citrus crops and others), the load of 1000 visits can be considered as minimal. Thus, the creation of the agrobiotechnopark «Russian Subtropics» will solve several important tasks for the agricultural sector and effectively contribute to scientific-educational tourism, expanding the range of activities included in the regional tourist product.

Acknowledgments

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