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CREATION OF A DATABASE ON AGROECOLOGICAL INDICATORS OF COTTON VARIETIES AND THEIR SUITABILITY TO CLIMATE CONDITIONS

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ABSTRACT

The article highlights the feasibility of presenting practical projects demonstrating the effectiveness of a GIS-based monitoring system, and the use of GIS technology to increase the stability of cotton varieties, manage adverse factors, and improve agricultural efficiency.

Keywords: GIS (geographic information systems), cotton, variety, agroecology, global climate, drought, salinity, disease, pest, monitoring.

G‘O‘ZA NAVLARINING AGROEKOLOGIK KO‘RSATKICHLARI, IQLIM SHAROITIGA MOSLIGI BO‘YICHA MA’LUMOTLAR BAZASINI TUZISH

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Annotatsiya:

Maqolada GAT asosidagi monitoring tizimining samaradorligini ko‘rsatuvchi amaliy loyihalarni taqdim etish maqsadga muvofiq hisoblanishi, GAT texnologiyasidan foydalangan holda g‘o‘za navlari barqarorligini oshirish, noqulay omillarni boshqarish va qishloq xo‘jaligi samaradorligini yaxshilashga xizmat qilishi yoritilgan.

Kalit so‘zlar: GAT (geografik axborot tizimlari), g‘o‘za, nav, agroekologiya, global iqlim, qurg‘oqchilik, sho‘rlanish, kasallik, zararkunanda, monitoring.

INTRODUCTION

Global climate change, the intensification of diseases and pests in the world require the renewal of cotton varieties and their increased resistance to various adverse factors. Currently, 90 percent of the cotton fiber grown in the world is G. hirsutum L. species. The total volume of cotton fiber worldwide is 20-22 million tons, and by 2027 this figure is expected to reach 46.5 billion US dollars with an annual growth rate of 2.74%.

In our republic, the creation of new cotton varieties that are competitive, fast-maturing and yield high-quality fiber is of great importance in the production of cotton raw materials. Especially in the context of the depletion of land and water resources in agriculture, it is urgent to introduce high-yielding cotton varieties adapted to different climatic and soil regions into the selection process. This research work is aimed at solving these urgent issues by analyzing

climatic and agrotechnical factors in cotton seed farms and organizing monitoring of their tolerance through a geographic information system (GIS).

Literature review. Q.A. Ermatov's work covers methods for analyzing agroecological factors based on GIS technologies [1]. T. Peterson's research provides information on the possibilities of effective use of spatial data in agriculture [2]. J. Haydarov's article analyzes the economic efficiency of introducing information technologies in cotton seed production [3]. S. Ahmed's work covers how remote sensing and GIS technologies are applied in agriculture [4].

Research results. The research set the task of creating a database on agroecological indicators of cotton varieties, their suitability for climatic conditions, digitizing territorial data and integrating them into GIS platforms, and this task was accomplished during the research.

Based on the study and mapping of the climate tolerance characteristics of cotton varieties, the resistance of cotton varieties to climatic factors was studied, and the yield and resistance index of each variety was calculated.

All data were mapped chronologically based on GAT (see Table 1).

1-table Climate tolerance indicators of cotton varieties

Cotton varieties	Endurance index (1-5)	Drought-affected yield (%)	Yield affected by salinity (%)
Resistant varieties	5	85%	90%
Medium resistant varieties	3	70%	65%
Non-resistant varieties	1	50%	40%

Color layers according to the climate tolerance indicators of cotton varieties:

Green: Areas where planting of resistant varieties is recommended.

Yellow: Areas where planting of medium-resistant varieties is recommended.

Red: Areas unfavorable for non-resistant varieties.

The climate tolerance of cotton varieties should be selected depending on the level of unfavourability of the area. Resistant varieties were recommended as crops in areas with high drought and salinity.

Based on the above information, it can be concluded that it is necessary to select suitable resistant cotton varieties for each area and place them on regional maps.

1. Apply varieties with high drought tolerance indicators in high-risk sectors.
2. Continuously update data through GIS and effectively organize regional monitoring.

The table provides a complete classification of each factor by territorial sector (e.g., drought index, salinity types).

Complete adaptation indices for cotton varieties (e.g., annual variation in yield).

Recommended agrotechnical measures in each sector were implemented.

2-table **Results from maps created using GIS**

Factors	Northern sector	Central Sector	Southern sector
Drought level	Low (drought score: 1-2)	Average	High
Salinity level (%)	10–15%	(score: 2-3)	(score: 3-4)
Recommended cotton varieties	Medium-yielding and resistant varieties	20–30 %	35–40 %
Reclamation measures	Improvement of irrigation system	Resistant varieties	Only resistant varieties
Yield (s/ha)	45–50 s/ha	Measures to reduce salinity	Amelioration and sand-sedimentation measures

The maps created using GAT were highlighted according to the following elements. Color codes: The disadvantage factors for each region are separated by colors (green - acceptable, yellow - average, red - unfavorable).

Layers: Salinity level; drought index; recommended locations of cotton varieties; ecological condition of the soil.

According to the technical information about the maps created on the GAT platforms, ArcGIS, QGIS programs were used.

Map size and scale. Data obtained based on satellite data or field measurements. Monitoring points in each region.

In the study, data on the climate tolerance characteristics of cotton varieties were obtained from various sources (territorial data, climate forecasts, agro-ecological analyses). This data was formed in the database through cross-checking and complementation.

The available data are consistent and reliable, and they are obtained from reliable sources. As a result, the database is updated and verified to ensure its accuracy and freshness.

The database contains accurate and complete information on the climate tolerance of cotton seeds. The importance of the seed production process plays an important role in assessing the climate tolerance of cotton varieties. In making the database accurate and accurate, special attention was paid to the characteristics of cotton seeds to withstand adverse factors. One of the main goals is to accurately identify each cotton variety and observe and analyze their relationship to climate on different farms and soil conditions through GIS.

Accuracy and accuracy of the database (from the point of view of seed farms)

Special attention to seed production: The climate tolerance of cotton varieties was studied based on their positive impact on seed farms. The GAT system has identified the opportunities and challenges of each cotton variety in specific regions. This is particularly important for determining the yield potential of seeds under soil and climatic conditions.

The data collected through the GAT system were obtained from various sources, and were verified and validated using weather temperature, agro-ecological analyses and regional data. At the same time, each part of the database, including the results of seed production, was consistently and completely checked through the GAT.

The reliability and relevance of the data were ensured by updating and re-checking. Monitoring carried out at seed farms allowed for a closer analysis of the tolerance of cotton

varieties to adverse factors, and these results are aimed at increasing the reliability of the data in the database.

This article helps to highlight the main importance of seed production-related data in the results section and demonstrates the importance of the GAT system in accurately and reliably monitoring the climate tolerance of cotton seeds.

3-table **Information on the climate tolerance characteristics of cotton varieties**

Variety name	Climate Resilience Level	Soil types	Low temperature tolerance	High temperature resistance	Productivity (s/ha)
T-3078	High	Desert	15°C	38°C	30
T-3077	Average	Moderately severe	18°C	40°C	28
Sultan	High	Lightly severe	20°C	42°C	35
T-3079	Average	Moderately severe	18°C	40°C	27
S-6524	Average	Moderately severe	18°C	40°C	28

This table shows the climate tolerance level of each cotton variety, the soil types suitable for the plants, and the temperature tolerance levels. The yield for each variety and ridge is also shown, which is one of the important indicators monitored by the GAT.

4-table **Monitoring of each cotton variety in agroecological conditions through the GIS system**

Variety name	Climate risk (experienced)	Stability indicator	Development time in agroecological conditions	Recommended agrotechnical measures
S-3077	Drought	0.85	120 days	Standardized irrigation system
S-3078	High temperature	0.75	110 days	Development of plants in accordance with working conditions
Sultan	Lack of moisture	0.90	125 days	Moisture retention in an aerosol system
S-6524	Soil failure	0.60	115 days	Soil remediation measures
S-3079	Soil failure	0,65	115 days	Soil remediation measures

This table assesses the stability and development time of each cotton variety in agroecological conditions based on data obtained through the GAT system. Recommended agrotechnical measures for each condition are also presented.

These tables provide accurate and verified sources of climate tolerance characteristics of cotton seeds. They are illustrated based on data obtained through the GAT and show the climate adaptation and reliability of each variety in agroecological conditions.

When analyzing the impact of GAT technologies on economic efficiency and the possibilities of increasing yields through the cultivation of climate-resistant seeds, it is necessary to try to maximize the production efficiency of the seed production process.

Conclusions. It is advisable to present practical projects demonstrating the effectiveness of the GAT-based monitoring system. Using GAT technology will help to increase the stability of cotton varieties, manage adverse factors, and improve agricultural productivity. It is important to discuss the seeding process based on the yield potential of cotton varieties under different agro-ecological conditions. Through GAT, the ability of each cotton variety to produce high or low yields is monitored and entered into a database.

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