GALAXY INTERNATIONAL INTERDISCIPLINARY RESEARCH JOURNAL (GIIRJ)
ISSN (E): 2347-6915
Vol. 13, Issue 4 April (2025)

ASSESSMENT OF THE RESISTANCE OF COTTON VARIETIES TO ADVERSE FACTORS IN THE CONDITIONS OF THE SYRDARYA REGION

Gulchehra Norqozievna Buriboyeva
Independent Researcher at Tashkent
State Agrarian University, Uzbekistan

Guzal Ruzievna Xolmurodova
Doctor of Agricultural Sciences (DSc), Professor,
Tashkent State Agrarian University, Uzbekistan

ABSTRACT

The article presents the results of assessing the tolerance of cotton varieties to adverse factors in the conditions of Gulistan district of Syrdarya region. The yield indicators of cotton varieties in drought conditions, the impact of adverse climatic factors on yield, and the distribution of climatically hazardous areas in Syrdarya region were presented. The conclusion is made that the use of GIS technologies allows optimizing cotton seed production processes in Gulistan district, which not only increases yield, but also creates opportunities for efficient use of resources.

Keywords: Cotton varieties, ridges, seed production, geographic information system technologies (GIS), salinity, drought, various pests and diseases, yield.

SIRDARYO VILOYATI SHAROITIDA G‘O‘ZA NAVLARINING NOQULAY OMILLARGA BARDOSHLILIGINI BAHOLASH

Bo‘riboeva Gulchehra Norqo‘zievna-
O‘zbekiston,Toshkent davlat agrar universiteti mustaqil izlanuvchisi

Xolmurodova Go‘zal Ro‘zievna
O‘zbekiston, Toshkent davlat agrar universiteti q.x.f.d.(DSc), professor

Annotatsiya:

Maqolada Sirdaryo viloyati Guliston tumani sharoitida g‘o‘za navlarining noqulay omillarga bardoshliligini baholash bo‘yicha natijalar keltirilgan. Bunda g‘o‘za navlarining qurg‘oqchilik sharoitida hosildorlik ko‘rsatkichlari, noqulay iqlimiy omillarning hosildorlikka ta’siri, Sirdaryo viloyatida iqlimiy xavfli hududlarning taqsimoti keltirib o‘tildi. GAT texnologiyalaridan foydalanish Guliston tumani hududida g‘o‘za urug‘chiligi jarayonlarini optimallashtirish imkonini berishi, bu nafaqat hosildorlikni oshirish, balki resurslardan samarali foydalanish uchun ham imkoniyat yaratishi bo‘yicha xulosa berilgan.

Kalit so‘zlar: g‘o‘za navlari, tizmalar, urug‘chilik, geografik axborotlashtirish tizimi texnologiyalari (GAT), sho‘rlanish, qurg‘oqchilik, turli zararkunandalar va kasalliklar, hosildor.

INTRODUCTION

The use of GIS (geographic information system) technologies in the cultivation of cotton varieties in the world is gaining great importance, especially in order to increase tolerance to adverse factors. In international studies, GIS is used as a key tool in analyzing factors such as climate change, soil salinity, drought, and the spread of pests and diseases that reduce yield in agricultural lands. According to 2023 data, it was found that the introduction of GIS technologies in the cotton sector can increase yield by 10–15% and significantly reduce water consumption. In particular, in leading cotton-growing countries such as the USA, India, China and Australia, regional monitoring systems using GIS have been created and are being effectively used in the selection of cotton varieties suitable for the agro-ecological conditions of the region.

As one of the important sectors of agriculture, innovative approaches in cotton breeding, in particular the use of Geographic Information Systems (GIS) technologies, allow for more effective development of this sector. Research is being conducted in Uzbekistan on the selection of salt-tolerant cotton varieties on saline soils. Cotton varieties that are suitable for water-saving technologies in conditions of water scarcity are also being studied. GIS technologies provide the opportunity to analyze the ecological and agronomic state of agricultural fields, collect and process data in an automated manner, and serve as an effective tool for identifying cotton varieties resistant to adverse factors. Today, adverse environmental factors such as salinity, drought, various pests and diseases have a serious impact on cotton yields. Therefore, the need for scientific research to eliminate these problems and reduce their negative consequences is increasing.

The aim of the research was to create a monitoring system for the tolerance of cotton varieties to adverse climatic and agrotechnical factors using a geographic information system (GIS) in seed farms, to effectively manage seed production processes, and to ensure sustainable yields.

Literature review. Geographic Information Systems (GIS) technologies are widely used in agriculture, which allows for increased productivity, efficient use of resources, and elimination of environmental problems. Currently, a number of scientific works have been carried out in the field of data collection, processing, and analysis based on GIS.

Y. Chen, L. Zhao describe the processes of remote sensing and analysis of agroecological indicators through GIS [2019]. R. Kumar et al. provide information on the application of GIS in agriculture, including methods for soil analysis and optimization of water distribution (2021). X.Li, Y.Wang reviewed the new methods of introducing geographic information systems into agriculture and their effectiveness (2020).

Among our scientists, Sh.Karimov's research presents recommendations on the importance of geographic information systems in agriculture and their practical application (2021). A.Ganiev's work covers the introduction of modern technologies in the cotton growing process and their impact on efficiency (2020). F.Khodjaev's research presents an analysis of the possibilities and effectiveness of implementing GIS technologies in the conditions of Uzbekistan (2020).

Having studied the work of foreign and domestic scientists on the use of GAT in agriculture, we conducted monitoring of the tolerance of cotton varieties to adverse factors in our research.

Research results. Determination of the impact of adverse factors: The growth and development indicators of various cotton varieties under conditions of sudden temperature changes and drought were studied and monitored. Of the Sultan varieties and ridges, the T-3077 ridge with the Sultan variety was the most resistant to temperature changes, and their yield was 15-20% higher (see Table 1). In drought conditions, the Sultan and T-3077 ridges showed relatively high tolerance.

The effect of precipitation on yield: In cases where the yield decreased by 25% under low water supply conditions, it was found that the yield stabilized when the amount of irrigation was adjusted. Climatic factors have a significant impact on cotton yield. The research studied the tolerance of cotton varieties and lines to adverse factors (temperature fluctuations, drought, and precipitation) in different regions of the Syrdarya region.

1-table **Yield indicators of cotton varieties under drought conditions (t/ha))**

Cotton varieties	In the irrigated area	In drought conditions	Productivity difference (%)
Sultan	38,2	33,1	-16,0
S-6524 (st)	36,5	30,2	-17,2
T-3077	37,8	32,1	-12,7
T-3078	35,4	28,5	-19,5
T-3079	34,0	27,8	-18,2

Adverse factors and their impact: Adverse factors in cotton seed production, such as drought, high temperature, and soil salinity, lead to a decrease in yield. As a result of these factors, not only the total yield, but also the quality of the seeds suffers significantly (see Table 2).

For example: drought: lack of water resources stops the growth processes of the plant. In arid conditions, yield can decrease by an average of 30%. High temperature: excessive temperature increase during the growing season disrupts the normal photosynthesis process of the plant, which negatively affects yield (up to about 25%). Soil salinity: in saline soils, plant nutrition is limited, which reduces yield by 20%.

These factors are also relevant in the soil-climatic conditions of the Gulistan district. It is necessary to use the capabilities of GIS (geographic information system) to analyze water scarcity and salinity levels in the regions of the district.

2-table **The impact of adverse climatic factors on productivity**

Adverse factor	Hosildorlik pasayishi (%)
Drought	30
High temperature	25
Soil salinity	20

A soil fertility map of the region was developed using the ArcGIS program. Using GIS tools, an accurate map of cotton-growing areas was created.

Climatic hazard zones were identified and the areas were divided into 3 categories: high-risk, medium-risk, and safe.

The role of GIS in cotton seed production: As a result of selecting planting areas suitable for soil and climatic conditions through GIS, productivity increased by 10-15% (see Table 3).

3-table **Distribution of climatically hazardous areas**

Region	Risk Level	Area (ha)	Productivity Level
Kibray	Low	12,000	High
Lower Chirchik	Medium	8,500	High
Syr Darya region	High	15,000	Average

The results of the Kibray and Kuyi Chirchik districts were presented as a comparative analysis. Geographic information systems are important in identifying unfavorable factors in the field of cotton seed production by digitizing and analyzing territorial data. The following was done using GIS:

Maps were developed showing the distribution of drought, salinity, and high temperatures across the regions of the district. The effective distribution of water resources and plant nutrition opportunities were assessed through GIS. Predicting yield changes under the influence of various factors.

It can be concluded that the use of GIS technologies allows optimizing cotton seed production processes in the Gulistan district. This not only increases productivity, but also creates an opportunity for efficient use of resources.

REFERENCES

1. Chen, Y., & Zhao, L. Remote Sensing and GIS for Sustainable Agriculture. Hoboken, NJ: John Wiley & Sons. (2019).
2. Kumar, R., et al. Application of GIS in agriculture: methods for soil analysis and optimization of water distribution. (2021).
3. Li, X., & Wang, Y. New approaches in implementing GIS for agriculture and their effectiveness. (2020).
4. Karimov, Sh. The role and practical recommendations for the use of GIS in agriculture (2021).
5. Ganiev, A. Integration of modern technologies in cotton cultivation and their impact on productivity (2020).
6. Khodjaev, F. Opportunities for implementing GIS technologies in Uzbekistan and analysis of their effectiveness (2020).