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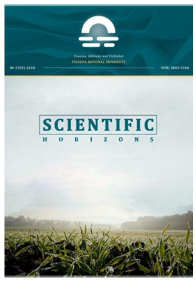

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Comparative analysis of the content of salicylic acid in biotechnological cotton genotypes under some kinds of abiotic stress

Nodira Rakhmatova*

Candidate of Biological Sciences. ORCID: https://orcid.org/0000-0002-5434-4971.
Center of Genomics and Bioinformatics of the Academy of Sciences of the Republic of Uzbekistan
111215, 2 Universitetskaya Str., Tashkent, Uzbekistan

Azadakhan Imamkhodjayeva

Candidate of Biological Sciences. ORCID: https://orcid.org/0000-0001-7201-4821.
Center of Genomics and Bioinformatics of the Academy of Sciences of the Republic of Uzbekistan
111215, 2 Universitetskaya Str., Tashkent, Uzbekistan

Vyacheslav Uzbekov

Candidate of Chemical Sciences. ORCID: https://orcid.org/0000-0002-3977-8093.
Institute of Bioorganic Chemistry of the Academy of Sciences of the Republic of Uzbekistan
100125, 83 M. Ulugbek Str., Tashkent, Uzbekistan

Khurshida Ubaydullaeva

Doctor of Biological Sciences. ORCID: https://orcid.org/0000-0001-7271-0720.
Center of Genomics and Bioinformatics of the Academy of Sciences of the Republic of Uzbekistan
111215, 2 Universitetskaya Str., Tashkent, Uzbekistan

Dilobar Zuparova

Candidate of Agricultural Sciences. ORCID: https://orcid.org/0000-0002-5094-8727.
Center of Genomics and Bioinformatics of the Academy of Sciences of the Republic of Uzbekistan
111215, 2 Universitetskaya Str., Tashkent, Uzbekistan

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Abstract. The relevance of this study is conditioned by the current findings on salicylic acid (SA) synthesis in plants, which suggest that the presence of some transient factors in cotton is a signal that the stress-protective functions of the plant are being activated. An increase in the content of key mediators of the defence signalling system in cotton cells triggers the activation of stress factors, triggering the defence mechanisms of the living organism. Thus, the resistance of plants to certain types of abiotic stress is achieved by activating the protective reactions of the signalling system. This process allows for the targeted use of biologically active substances such as salicylic acid. Therefore, the purpose of this study is to investigate the combined properties of the protective signalling system of some genetic types of cotton plants, when phenolic acids are synthesised in them. The leading approach to the study of this issue is a laboratory

*Corresponding author

experiment, which allowed comprehensively considering cotton lines containing RNA sensitive to certain types of abiotic stress. Additional biological and chemical techniques were used as auxiliary methods in the field to test the specific effects of saline soils on cotton RNA salicylic acid concentration. This study presents data on the resistance of the RNA interference (RNAi) genotype ESKIMO1 to salinity and limited irrigation. The content of salicylic acid in cotton tissues under the influence of various concentrations of NaCl was studied. The formation of reactive oxygen species in the process of activation of plant defence reactions to certain types of abiotic stress is substantiated. The study materials are of practical value to microbiologists, geneticists, and agronomists. The investigation of the biotechnological features of the plant genotype plays an important role in understanding plant adaptation to natural conditions caused by certain types of abiotic stress. The affordability of salicylic acid allows its widespread application as a commercial reagent in crop production practices

Keywords: salicylic acid; resistance; salinity; liquid chromatography; metabolomics

INTRODUCTION

Cotton is the leading crop in the Central Asian regions, ranking second in the export of technical products. Sharp temperature fluctuations, drought, soil salinity, and heavy metal pollution reduce cotton yields. To address this issue, biotech cotton varieties resistant to abiotic stressors are being developed. Although firmly anchored in the soil, plants are known to be able to respond to abiotic stresses by being able to activate several metabolic pathways, leading to the generation of a huge number of secondary products, in particular, those that perform a protective function. One of these metabolites is salicylic acid (SA). There is a large body of evidence in the available scientific data on the involvement of salicylic acid in the development of resistance to abiotic stressors. Analysis of literary sources by N. Abdi *et al.* (2022), J. Liu *et al.* (2022) and F. Zhang *et al.* (2022), who have investigated this problem, showed that salicylic acid has a wide range of physiological effects on plants, in particular, an anti-stress effect.

M. Omidi *et al.* (2022) in their research refute the fact that the accumulation of salicylic acid is an indicator of the plant's response to stress. The researchers suggest that the first indicator to be considered when examining the signalling responses of plants to abiotic stress is an increase in the generation of the active form of oxygen. Throughout the study, authors have accumulated data indicating that the amount of salicylic acid increases more slowly and is involved in the multiplication of oxygen-inducing signals. Salicylic acid acts as a plant regulator involved in many processes, including seed germination, root formation, stomatal closure, flowering induction, thermogenesis, and response to abiotic and biotic stresses. Numerous studies prove the protective effect of salicylic acid against various types of abiotic stress (ultraviolet, ozone, heat stress). For example, it acts as a cell stimulator to resist stressful environmental conditions such as salinity, drought, and temperature stress.

The damages presented by the effects of abiotic stresses require the exploration of approaches that reduce their negative impacts on plants. Investigating the role of salicylic acid as a plant signalling molecule, A. Dubey *et al.* (2021) and Kamburova *et al.* (2022) proved that both external and internal sources of salicylic acid influence the expression of core genes encoding polypeptides and increasing the thermogenesis process in plant tissues. Also the study examined the effect of salicylic acid on the expression of the plant mitochondrial genome by encoding their electron-transport chain complex. As a phytohormone that provides plant resistance to damage by various pathogens, salicylic acid induces the production process of PR proteins. For example, a study by N. Esmaeili *et al.* (2021) proved that the manifestation of PR-1 class proteins indicates the resistance of the plant against contact with the pathogen; PR-2 class proteins cleave the plant cell wall glucans into shorter fragments. Insufficient amount of proteins of the PR-3 class led to chitin deficiency and, as a result, pathogens affected plants. When salicylic acid interacts with catalase, the efficiency of the latter decreases and the oxygen concentration increases.

The salicylic acid content in biotech cotton under abiotic stress is studied less than the response of this plant to pathogen infestation. P. Singh *et al.* (2022) noted an increase in endogenous salicylic acid with the accumulation of excess heat in mustard plants, grapes, and soybean plants during drought, and rice on saline soils. Based on the analysed studies, *the purpose of the present study* is to investigate the salicylic acid content in cotton tissues with RNA interference (RNAi) of the ESKIMO1 gene under the influence of different concentrations of NaCl.

MATERIALS AND METHODS

The object of the study was cotton biotechnological lines containing the calling RNA construct to the ESKIMO1 gene: RNA and genotype Eskimo1, and hybrids of the Eskimo1 genotype with varieties Porloq-1 and Ravnaq-1. The original genotype Cocker-312 (C-312) was used as control samples. The experiments were carried out on plants grown under phytotron conditions to investigate the response of the Eskimo1 RNA and cotton genotype to the impact of saline solutions. The concentration of SA was observed when plants were irrigated during the growing season with a NaCl salt solution in a concentration of 50 to 200 mM. For this, pre-soaked seeds of selected samples are sown in ordinary soil, pre-washed and kept in a thermostat at a high temperature in a cabinet, poured into pots with a volume of 250 g with drainage, so that the seedlings do not rot and the soil composition is waterlogged. Cultivation was carried out under artificial lighting, by analogy with the change of seasons in the summer period of the year for 21 days. At first, watering was done with 50 ml of distilled water daily until the cotyledon leaves appeared. Then the control variant was irrigated with distilled water, the experimental variant with the corresponding NaCl solutions.

After the appearance and deployment of cotyledon leaves and exposure to saline solutions, SA was extracted from the tissues of cotton leaves at the vegetation stage, which reached 3-4 leaves. Before extraction, the leaves were dried and already 1 ml of extractant was added to 200 mg of ground powder of dried cotton leaves, with the composition methanol: water: acetic acid (80:19:1 v/v). Then the mixture was stirred on a rocking chair for 3 hours, after which centrifugation was carried out in the mode of 10,000 samples for 5 minutes. From the centrifuged samples, the liquid fraction was separated into another, clean test tube, and a portion of fresh extractant was once again added to the sediment. This extraction was carried out for a longer period of time (for 12 hours), and after centrifugation, the supernatants were pooled and dried on a vacuum rotary unit. Further, 0.5 ml of 15% aqueous acetonitrile containing 0.05% acetic acid was added to the dry residue, shaking was carried out on a vibratory mixer and centrifuged again. The supernatant obtained and selected at this stage was analysed on a high-pressure liquid chromatograph LC20.

To simulate salt stress, plants were divided into 2 groups: control and experimental. For 21 days, the control plants were treated with ordinary water, and the experimental plants were treated with a salt solution (NaCl) at concentrations of 50, 100, 150, and 200 mM. Drought was modelled by limiting the flow of water due to irrigation in the amount of 40, 60, 80 ml on the soil with plants. Extraction of free salicylic acid was performed according to the method of J.K. Zhu (2002). The supernatant was analysed by HPLC using a Shimadzu Prominence LC20 chromatograph, which included an LC20AD 4-gradient pump with a 5-channel DGU-20A5R degasser, an SPD-M20A diode array detector, a CTO-20A column thermostat, and a manual injector Rheodyne 7725i with 20 µl sample loop. Chromatography conditions: column – Zorbax Eclipse XDB C18 (3.0x100 mm), particle size 3.5 µm, pre-column Zorbax Eclipse XDB C18 2.1x12.5 mm, elution mode – isocratic, mobile phase 25% acetonitrile in 0.05% phosphoric acid pH 2.5, flow rate 0.5 ml/min, detection photometric at 235 nm. Thermostat temperature – 40°C. Inlet pressure – 9.5 MPa (95 bar). Sample volume – 20 µl.

The content of salicylic acid was determined according to a pre-built calibration line, for which 5 solutions of the salicylic acid standard were analysed, in the concentration range of 0.3125-5 µg/ml. The correlation coefficient between peak areas and salicylic acid concentrations was not less than 0.9999. The amount of salicylic acid was given to 1 g of the initial weight of dry leaves. Data processing, plotting of a calibration curve, and output of results were performed using Shimadzu Lab Solutions software suite.

RESULTS

SA is involved in the regulation of such important plant physiological processes as photosynthesis, nitrogen metabolism, proline metabolism, glycine betaine production, and the antioxidant defence system under stress conditions, and thus, ensures plant resistance to abiotic stresses (Munns & James, 2003). In addition to being involved in the induction of defence-related genes and stress tolerance in plants exposed to biotic stresses, SA has been shown to improve plant tolerance to major abiotic stresses. According to the results of the experiment, it turned out that in the control sample C-312 and in the Eskimo1 line, when watered with distilled water, the SA content did not exceed 5 µg/g of dry leaf tissue. At the same time, the content in seedlings of the Eskimo1 line was slightly less than in the control genotype (C-312). However, even when these two genotypes were irrigated with a salt solution at a concentration of 50 mM, the SA content increased to 6 µg/g of dry leaf tissue, and a slight excess was observed in Eskimo1 plants (Fig. 1).

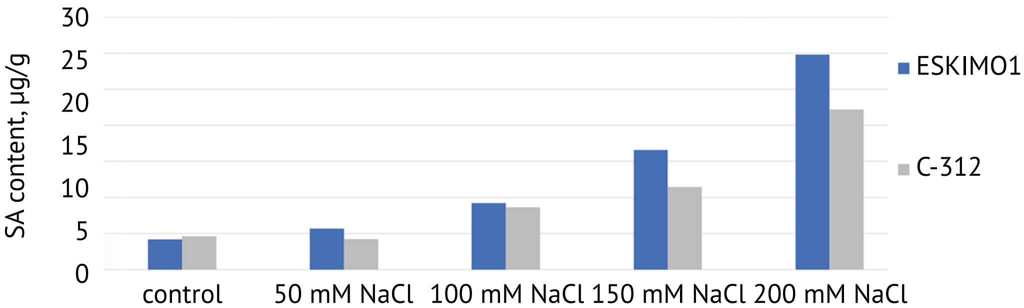

***Figure 1**. Dynamics of SA accumulation in ESKIMO1 and C-312*

***Source:** compiled by the authors*

Thus, as shown in the diagram, with an increase in the concentration of the stress component, the content of the phytohormone increases. And the maximum concentration of NaCl solution in this experiment, as a stress factor, led to the synthesis and accumulation of SA up to 29.8 μg/g of dry leaf tissue in plants of the Eskimo1 line against 22.19 μg/g, detected in the control parental cotton genotype – C-312. When seedlings were irrigated with NaCl solutions at a concentration of 100 and 150 mM, an increased content of SA was also observed in leaf tissues near the biotechnological line. Therefore, the study results showed that the content of SA, taken as an indicator of resistance to stress, when plants are treated with NaCl solutions, significantly increases in biotechnological genotypes.

M. Ashraf (2005) considered various strategies to maximise cotton growth and productivity under salt stress conditions. In the course of analysing the process of adaptation to environmental stress at the stage of germination and early stages of vegetation through a change in the composition of secondary metabolites in plants, they also note that when growing cotton, with the addition of NaCl solutions at concentrations of 50, 100, 150, and 200 mM, a noticeable an increase in the concentration of tannic acid (15.1-24.3%), flavonoids (22.5-37.6%), and gossypol (26.8-51.4%). The salinisation behaviour of hybrid genotypes, in which the Eskimo1 line participated in the crossbreeding combination, aroused interest. That is, Ravnaq-1×ESKIMO1 and Porloq-1×ESKIMO1 hybrids were included in the analysis. Notably, the Ravnaq-1 cotton variety was created by the technology of marker-associated breeding and the Porloq-1 variety was created by RNA interference of the phytochrome gene (Abdurakhmonov, 2016; Darmanov *et al.*, 2015). The pattern of SA content in Ravnaq-1×ESKIMO1 Porloq-1×ESKIMO1 hybrids against the background of parental samples is shown in Figure 2.

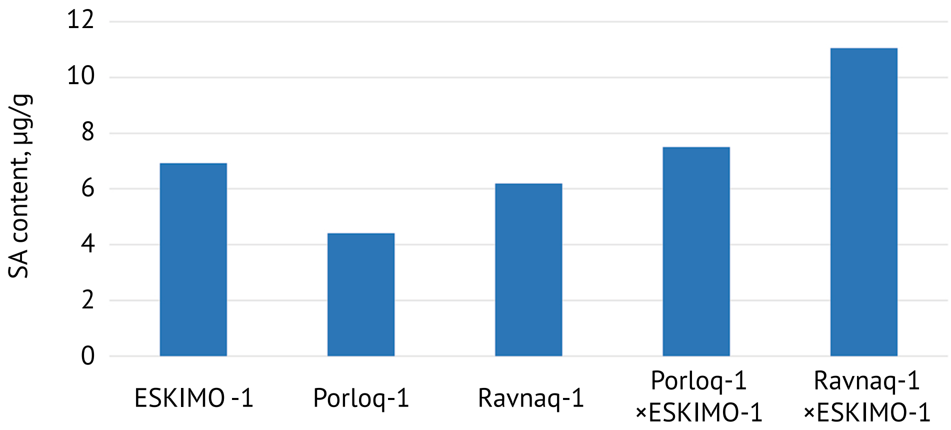

Figure 2*. Indicators of SA values in Porloq-1 and Ravnaq-1 hybrids with RNA and genotype Eskimo1 when watering plants with 150 mM (in greenhouse conditions)*

Source: *compiled by the authors*

The level of SA in plants of the hybrid combination Ravnaq-1×ESKIMO1 was 1.6 times higher than in the Eskimo1 genotype (6.92 μg/g, dry weight) and 1.8 times higher than in the original parental varieties Ravnaq-1. In the hybrid Porloq-1×ESKIMO1, the SA content is approximately 10% higher than in the Eskimo1 genotype and 1.7 times higher than in the original parental variety Porloq-1. Such studies have not been carried out before, as well as the fact that obtaining biotechnological RNA and genotypes for the phytochrome gene and the ESKIMO1 gene (an ortholog of the Arabidopsis gene) for cotton has not been observed in the world literature until today. In this regard, an indirect comparison with the literature data can be made.

As a glycophyte, cotton is considered to exhibit higher resistance to abiotic stresses than other major agricultural crops. As a rule, salinity can also be caused by increased evaporation during hot periods of the year. And there is a need to observe the impact of moisture limitation on biotechnological cotton genotypes. Extreme environmental conditions such as drought are known to significantly affect the growth, productivity, and quality of cotton fibre. Drought stress causes a wide range of morpho-physiological and biochemical changes that adversely affect the development and productivity of cotton. Under such conditions of limited water access (drought stress), the growth and development of cotton is significantly reduced, for example, which affects the height of the plant, dry leaf weight, dry weight of the stem, leaf area index, and accordingly the number of fruit elements, fibre quality, development of crown and root system (Loka *et al.*, 2011). Admittedly, like other plants, cotton has acquired a wide range of morpho-physiological, biochemical, and molecular mechanisms in response to multiple stresses that allow them to avoid and/or tolerate these stressors and survive in harsh environments.

S.E. Shermatov *et al.* (2017) investigated how extreme environmental conditions, such as drought, significantly affect cotton fibre growth, productivity, and quality. Of these, drought tolerance mechanisms were classified by Y. Fang and L. Xiong (2015) into four strategies: drought avoidance, drought rescue, drought tolerance, and drought recovery. Drought avoidance and drought tolerance are the two main plant strategies against drought stress. Drought avoidance is the maintenance of key physiological processes, such as stomatal regulation, root development, etc., in moderate drought conditions. Drought tolerance is the ability of plants to withstand severe dehydration through certain physiological actions, such as osmotic adaptation with osmoprotectors (Luo, 2010). Drought rescue may depend on the ability of plants to regulate their growth period or life cycle, for example, cotton varieties with a short life cycle to avoid the stress of seasonal drought (Manavalan *et al.*, 2009). Restoration of plants after drought leads to the resumption of growth and, as a consequence of physiology, to yields after exposure to severe drought. The ability of cotton to resist dehydration by regulating SA synthesis and accumulation was examined.

When setting up the experiment, as mentioned above, the plants were grown in small pots for 21 days under lighting conditions simulating the diurnal regime, and watering was limited both in volume and time. The variant of the limited irrigation volume includes conditions when watering was carried out in a volume smaller than in the control (100 ml). And the second option – watering was not done daily, but at intervals of one, two, and three days (Fig. 3).

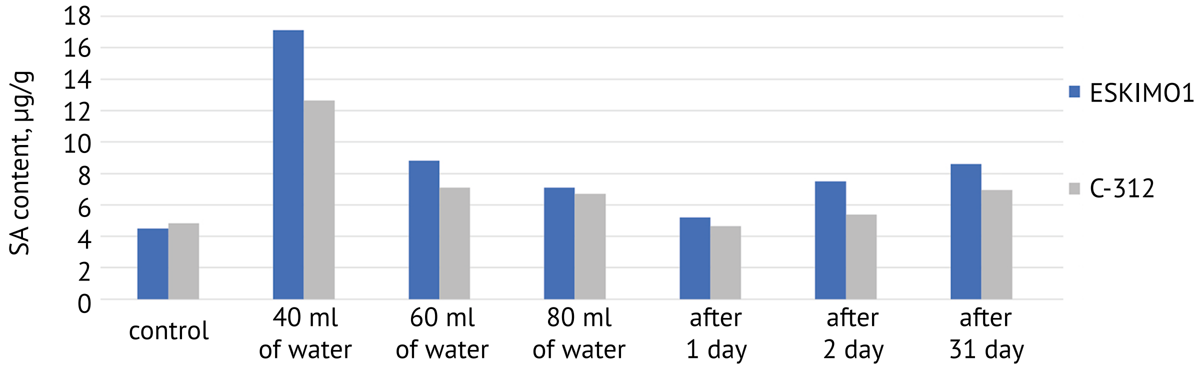

***Figure 3**. Dynamics of SA content in dry tissue of seedlings of line ESKIMO1 and control line C-312 under limited watering (in volume and time)*

***Source:** compiled by the authors*

In the course of studying the response of the RNA and cotton genotype Eskimo1 to limited irrigation, it was found that the content of SA differed and correlated with their resistance to water deficit. At the same time, the least amount of SA was observed in the control variant and the irrigation variant every other day. Whereas the highest content of SA was found in the variants when the plants were watered in insufficient volume – 40 ml of water (17.1 μg/g dry weight) versus 60 and 80 ml (8.8 μg/g and 7.1 μg/g.). Increased content of SA was also observed with a long interval between watering, both after 2 days (7.5 μg/g dry weight) and after 3 days (8.9 μg/g). For the parental genotype (C-312), there is a reduced accumulation of SA under stress conditions. The responses of hybrid genotypes to the conditions of limited water access were similar to the responses to an increase in the level of salinity concentration in the above experiment. The pattern of SA content in Ravnaq-1×ESKIMO1 Porloq-1×ESKIMO1 hybrids against the background of parental accessions is shown in Figure 4.

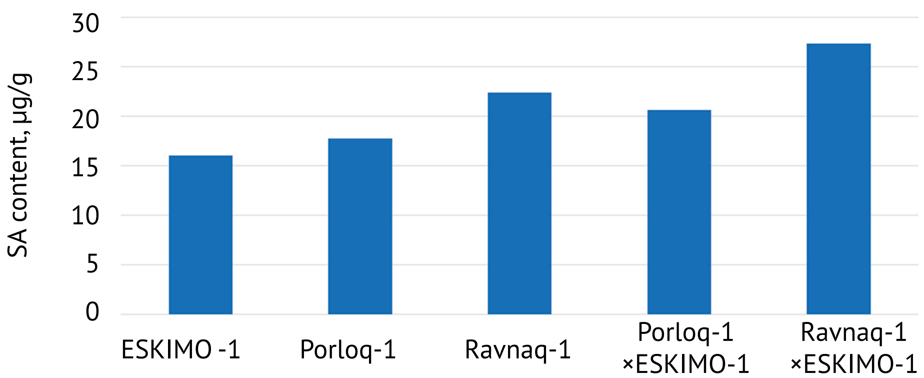

***Figure 4**. Indicators of SA values in Porloq-1 and Ravnaq-1 hybrids with RNA and genotype Eskimo1 when watering plants with 150 mM (in greenhouse conditions)*

***Source:** compiled by the authors*

According to the results of analytical investigation, the content of SA of the Eskimo1 genotype in field growing conditions with limited irrigation (in the control, watering was done 3 times during the growing season before flowering) was 16.05 μg/g dry weight. In comparison with it, the varieties Porloq-1 and Ravnaq-1 showed a slightly increased accumulation of SA (17.76 and 22.42 μg/g, respectively). An interesting fact was the increase in the amount of SA in the Porloq-1×ESKIMO1 and Ravnaq-1×ESKIMO1 hybrids up to 27.35 μg/g for the last crossing combination. The level of SA in the plants of the hybrid combination was 1.6 times higher than in the plants (6.92 μg/g, dry weight) and 1.8 times higher than in the original parent variety. In the hybrid, the SA content is approximately 10% higher than in the Eskimo1 genotype and 1.7 times higher than in the original parent variety. Thus, the obtained results indicate that the studied genotypes, carrying in the genome the RNA and construct to the ESKIMO1 gene, have an increased content of SA under conditions of salt and osmotic stress, which suggests their higher resistance to these types of stress.

DISCUSSION

According to the findings obtained in this study, salicylic acid levels in the tissues of biotech genotypes of cultivated plants indicate the presence of some kind of abiotic stress. Under various external unfavourable conditions, the genes that carry out the transcriptional signal of the plant's inability to convert energy into biomass are activated, and proteins are then synthesised to protect the plant against stressful conditions. Under stress factors, the cultivated plant is unable to realise its full productivity potential, causing the quantity of harvested crops to drop.

S. Syeed *et al.* (2021) examined the effect of salicylic acid on the production of protective enzymes of the antioxidant system of grain under the influence of sulphuric acid. Wheat sprouts were soaked for 6 hours in a salicylic acid solution with a concentration of 0.1 mM. Next, the experimental material was introduced into soils previously treated with sulphurous acid and grown with a gradual increase in its concentration. The study revealed that growth intensity, the activity of oxidative degradation of lipids, and the content of amino acids that promote photosynthesis depend CdSO_4 on the level concentration. Salicylic acid stimulates the antioxidant system while keeping it at a high level and at all concentrations $CdSO_4$ contributes to increased oxidative stress.

The ability of plants to retain their antioxidant status was also mentioned by the researcher. The balance between pro-oxidant and antioxidant reactions occurring in the cells of the control and experimental cotton groups were determined. The study of the functioning of the antioxidant system was also carried out by M. Rakszegi *et al.* (2019) in the context where a plant adapts to altered environmental conditions caused by stressors. The researchers compared the antioxidant systems of two cotton varieties: those resistant to saline solution and those not resistant to saline solution. Similar to the present study, the stability of components of antioxidant defence system in the study by J. Guo *et al.* (2015) investigated the adaptation of both cotton species to chloride salinity. Salt-resistant and non-salt-resistant seeds were exposed to 1% and 4% NaCl solution, respectively. After 24 hours, the malondialdehyde index increased slightly in the stable variety, while the unstable variety showed a significant increase. The authors suggest that in seedling leaves of salt-tolerant cotton cultivars, the accumulation of oxidative degradation of lipids and malondialdehyde was controlled at the same level under the action of NaCl. This was facilitated by the increased action of antioxidant enzymes. A high level of lipid peroxidation in Gulistan (salt-resistant) varieties after 24 hours indicates a more effective protective reaction that limits the spread of the superoxide radical. In the non-salt-resistant cotton variety, the increase in lipid peroxidation was insignificant. A high constitutive level of ascorbate peroxidase was detected in the Gulistan cotton variety. When exposed to saline solution, the ascorbate peroxidase index was significantly activated in both experimental specimens, reaching a maximum value.

M. Pessarakli (2002) analysed the correlation of two cotton varieties in terms of insensitivity to salt solutions and the ability to produce antioxidant enzymes. The study shows that differences in the response to salt stress are associated with the activity of enzymes of the antioxidant system. The resistance of the test material to saline solutions is highly correlated with the efficiency of antioxidant enzymes to reduce the production of reactive oxygen species, which enhances the ability of living organisms to maintain physiological constancy.

S. Saud and L. Wang (2022) investigated the effect of heavy metals as one of the types of abiotic stress inducing salicylic acid content. Wheat seedlings were treated with a solution high in copper and zinc. Under this type of abiotic stress, the development of the plant body is reduced by almost half. When seeds were treated exogenously with salicylic acid at high concentrations of heavy metals, the increase in root weight was 20.6% and in shoot weight 22.4. Thus, as can be seen from the results of this study, the introduction of a high concentration of copper and zinc into a nutrient solution can lead to disruption of metabolic processes in plants at the cellular level.

Salicylic acid plays an important role in activating the defence system under abiotic stress in the structure of the photosynthetic apparatus. Thus, in an experiment on cucumber seedlings by T. Yadav *et al.* (2020), it was shown that pre-treatment with salicylic acid caused a decrease in oxidative damage when exposed to low temperatures by enhancing the expression of the alternative oxidase gene. An increase in the activity of antioxidant enzymes under the action of salicylic acid has thus been detected. The author of the study suggests that an important precursor that occurs when endogenous salicylic acid is produced are reactive oxygen species. Thus, studies by M. Omidi *et al*. (2022) showed the levelling of the protective effects of exogenous salicylic acid as one of the antioxidants produced under the influence of certain types of abiotic stress. N. Esmaeili *et al*. (2021) confirms this hypothesis, as the study of the effects of salicylic acid on the main energy-transforming processes of plants are the main producers of reactive oxygen species in the plant cell and are of great interest to the scientific community.

These findings address the biotechnological challenge of developing a cotton variety that will increase crop productivity through its antioxidant status. In recent years, genetic engineering research has developed techniques, methods, techniques and technologies for the inter-system transport of genes. Recently, scientists have been able to clone the genes of living organisms and use special techniques to conduct experiments to produce enzymes that induce the protective properties of plants. For example, in the present study, the author targeted a DNA regulatory region recognised by RNA polymerase as the start of gene transcription to select a suitable gene. Of great interest are repressed RNA polymerases, which, under the influence of inducing factors such as light, thermogenesis, and the influence of a parasitic microorganism, activate the transcription of the introduced gene. To monitor the process of gene transport, marker genes are introduced, which track the process of embedding a foreign gene into the recipient's genome. Such genes are selectively picked out on media of high concentration, as the marker genes are resistant to various antibiotics and herbicides. Also of great importance in the study of cross-system gene interaction are reporter genes – attachment proteins that have unique features or unique enzymatic activities. Such genes do not degrade the selective advantages of the cell and result in transgenic phenotypic transformations. Therefore, the main task that agricultural industry specialists, microbiologists, and breeders are trying to solve is to increase the survival rate of cultivated plants under abiotic stress and the creation of overproducing biologically active substances.

CONCLUSIONS

Based on the above, the cultivation of new salt-tolerant and tolerant to limited irrigation valuable cotton crops is relevant and efficient using biotechnology and genetic engineering methods, as revealed by the method of salicylic acid content diagnostics. A comparative analysis of biotechnological cotton lines containing the ESKIMO1 gene and a control sample of the C-312 genotype showed that at high concentrations of saline solution, the level of salicylic acid rapidly increased to 29.8% in the ESKIMO1 variety, while the level of salicylic acid in the C-312 variety was 22.19%. However, with a water deficit (40 ml) the amount of salicylic acid in ESKIMO1 was 17.1%, which is 4.5% higher than in C-312 (12.64%). The salicylic acid level began to decrease with the gradual addition of water. Thus, the study proved that the activation of the properties of the protective signalling system of some genetic types of cotton is activated during the synthesis of salicylic acid in plants under the influence of some abiotic factors.

A comparison of the responses of biotech cotton genotypes to the above abiotic factors involves the investigation and interpretation of their mechanisms at the plant cell level. Thus, the study suggests that salicylic acid acts as a plant response to stresses of various nature, and its activation in the genome with the participation of inducing signals such as reactive oxygen species. The nature and method of response at plant developmental stages along with organs and tissues is also a matter of great interest, but such phenomena are largely overlooked and require further investigation. Although abiotic stresses have been addressed extensively in the international scientific community, the prospect for further research will be to develop a complete picture of plant responses to certain types of abiotic stress. Analyses of the behaviour of biotech genotypes are expected to reflect some of the behaviour of plants.

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None.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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Нодіра Рахматова
Кандидат біологічних наук. ORCID: https://orcid.org/0000-0002-5434-4971.
Центр геноміки та біоінформатики Академії наук Республіки Узбекистан
111215, вул. Університетська, 2, м. Ташкент, Узбекистан

Азадахан Імамходжаєва
Кандидат біологічних наук. ORCID: https://orcid.org/0000-0001-7201-4821.
Центр геноміки та біоінформатики Академії наук Республіки Узбекистан
111215, вул. Університетська, 2, м. Ташкент, Узбекистан

В'ячеслав Узбеков
Кандидат хімічних наук. ORCID: https://orcid.org/0000-0002-3977-8093.
Інститут біоорганічної хімії Академії наук Республіки Узбекистан
100125, вул. М. Улугбека, 83, м. Ташкент, Узбекистан

Хуршида Убайдуллаєва
Доктор біологічних наук. ORCID: https://orcid.org/0000-0001-7271-0720.
Центр геноміки та біоінформатики Академії наук Республіки Узбекистан
111215, вул. Університетська, 2, м. Ташкент, Узбекистан

Ділобар Зупарова
Кандидат сільськогосподарських наук. ORCID: https://orcid.org/0000-0002-5094-8727.
Центр геноміки та біоінформатики Академії наук Республіки Узбекистан
111215, вул. Університетська, 2, м. Ташкент, Узбекистан

Анотація. Актуальність питання, представленого в даній роботі, визначається сучасними даними про синтез саліцилової кислоти (СК) в рослинах, які свідчать про те, що наявність деяких транзиторних факторів у бавовнику є сигналом про активацію стрес-протекторних функцій рослини. Збільшення вмісту ключових медіаторів захисної сигнальної системи в клітинах бавовнику спричиняє активацію стресових факторів, запускаючи захисні механізми живого організму. Таким чином, стійкість рослин до певних видів абіотичного стресу досягається за рахунок активації захисних реакцій сигнальної системи. Цей процес дозволяє цілеспрямовано використовувати біологічно активні речовини, такі як саліцилова кислота. Тому метою даної роботи є дослідження комбінованих властивостей захисної сигнальної системи деяких генетичних типів рослин бавовнику за умов синтезу в них фенольних кислот. Провідним підходом до вивчення цього питання є лабораторний експеримент, який дозволив комплексно розглянути лінії бавовнику, що містять РНК, чутливі до певних видів абіотичного стресу. Додаткові біологічні та хімічні методи були використані як допоміжні в польових умовах для перевірки специфічного впливу засолених ґрунтів на концентрацію саліцилової кислоти в РНК бавовнику. У цьому дослідженні представлені дані про стійкість генотипу ESKIMO1 з РНК-інтерференцією (RNAi) до засолення та обмеженого зрошення. Досліджено вміст саліцилової кислоти в тканинах бавовнику за дії різних концентрацій NaCl. Обґрунтовано утворення активних форм кисню в процесі активації захисних реакцій рослин на окремі види абіотичного стресу. Матеріали дослідження мають практичне значення для мікробіологів, генетиків та агрономів. Дослідження біотехнологічних особливостей генотипу рослин відіграє важливу роль у розумінні адаптації рослин до природних умов, спричинених певними типами абіотичного стресу. Доступність саліцилової кислоти дозволяє широко застосовувати її як комерційний реагент у практиці рослинництва

Ключові слова: саліцилова кислота; стійкість; засолення; рідинна хроматографія; метаболізм