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Short Communication

Biologically Active Compounds of Plants in Uzbekistan Flora and their Potential Applications in Agriculture

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Many plant compounds contribute to ecological interactions among microorganisms, plants, and animals, playing a crucial role in plant defense mechanisms developed through evolution. Biochemical studies show that plants synthesize protective substances in response to adverse environmental conditions. The isolation of such substances from natural raw materials and their treatment of plants can be used to increase the stability and productivity of agricultural crops. Expanding the range of biological products with growth-stimulating, insecticidal, acaricidal and other activities based on natural compounds remains an urgent task. Their advantage lies in the absence of harmful effects on the soil and the environment. In the production of such drugs, environmentally friendly and energy-saving technologies are used.

A contemporary approach in plant protection in modern practice is the use of preparations based on biologically active plant compounds, which have the ability to weaken the damaging effect of stress factors and have a stimulating effect on the immune system of plants.

The Institute of Chemistry of Plant Substances, Acad. S. Yu. Yunusov, Academy of Sciences of the Republic of Uzbekistan, is among the world's leading centers for plant material research. Here, work is actively underway to create and introduce preparations for agriculture that help increase the productive potential of plants.

The Institute has created plant growth stimulants using secondary plant compounds. The Uchkun preparation was derived from polyisoprenoids extracted from cotton leaves (Gossypium hirsutum L., Malvaceae) [1]. The advantage of its use is a low consumption rate, low toxicity, high efficiency, availability of local raw materials and the absence of phytotoxicity. Biostimulator Uchkun is a sum of biologically active substances (?-tocopherol, polyisoprenoid alcohols, phytosterols and higher aliphatic alcohols, etc.) at a consumption rate of 5-10 g / t of seeds increases the yield of many crops (cotton, wheat, cucumbers, tomatoes, etc.) and protects them from adverse conditions (water scarcity, saline soils). The results of long-term tests have shown that Uchkun has a positive effect on the growth and development of industrial, grain, vegetable and gourd crops. It is not inferior in biological activity to Vitavax, Sodium Humate, etc. The use of the drug in small doses makes it promising for use in agriculture [1,2].

It is known that more than 800 million hectares of the earth's soils are saline, of which 32 million hectares are subjected to secondary salinization. Sodium chloride is the most common cause of salinity and has the most significant negative impact on plants. Growth regulators play an important role in the regulation of cellular homeostasis under extreme conditions. Pre-sowing seed treatment with plant growth regulators enhances the adaptive capacity of cultivated plants to environmental stressors such as salinity, water deficit, and high temperatures. This approach is among the most effective and environmentally sustainable methods in modern crop cultivation technologies . We are conducting research on the study of the biological activity of the lipid components of halophytic plants growing on saline soils of the republic and the territory of Karakalpakstan. It was revealed that the substances have a stress-protective activity to salinity conditions during pre-sowing seed treatment.

Chenopodium album L. (family Amaranthaceae) has a high salt tolerance over a wide range of salt concentrations, easily adapts to adverse conditions and can produce more than 500,000 seeds per bush, while the seeds can remain in the soil for up to 40 years without loss of germination. For the first

time, the growth-stimulating and stress-protective activities of neutral lipids, glycolipids, phospholipids, and fatty acids in the seeds of Ch. album. It was found that unsaponifiable substances and fatty acids of neutral plant lipids stimulate the growth and development of wheat and cotton seedlings under saline conditions, and thus reduce the negative impact of salt stress [3].

Amaranthus retroflexus L. (upturned amaranth, Amaranthaceae family) that, under conditions of salt stress, the lipid components of the seeds of the A. retroflexus plant have a stress-protective effect. Presowing soaking of seeds of wheat and cucumbers in 0.001% and 0.0001% concentrations of these substances contributed to a decrease in the inhibitory effect of sodium chloride stress, which manifested itself in the activation of growth and the accumulation of fresh and dry weight of seedlings [4].

One of the promising areas of ecological farming is the use of substances to protect plants against phytophages. Plant secondary metabolites are diverse in nature and may exhibit different biological activities against insects. Herbal extracts can remain effective for a long time, because they contain a complex of compounds that prevent the rapid development of resistance by the phytophages. Earlier, as a result of laboratory screening and field tests, we identified some plant species, the extracts of which had high insecticidal and acaricidal properties. A protective and stimulating complex composition based on plant monoterpenoids of the plant Achillea millefolium (Asteraceae) and polyprenols of Gossypium hirsutum L. (Uchkun preparation) has been developed. The composition has a toxic effect on the red spider mite and helps to restore the chlorophyll content in damaged plant leaves [5]. The composition can replace the treatment with a chemical protective agent - Vertimek. The development of this tool is of great practical interest for the protection of greenhouse plants, since, with a sufficiently high toxicity to insects, it provides environmentally friendly products.

This study demonstrates the potential application of biologically active compounds from various plant species as environmentally friendly biological products in agriculture.

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