THE DEVELOPMENT OF THE GROWTH OF NON-PRODUCTIVE VARIETIES AND THE INFLUENCE OF ENVIRONMENTAL FACTORS ON GRAIN YIELDS

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ANNOTATION

Light quality refers to the color (wavelength) of light. Sunlight supplies the complete range of wavelengths and can be broken up by a prism into bands of red, orange, yellow, green, blue, indigo and violet.

Blue and red light, which plants absorb, have the greatest effect on plant growth. Blue light is responsible primarily for vegetative (leaf) growth. Red light, when combined with blue light, encourages flowering. Plants look green to us because they reflect, rather than absorb, green light.

Knowing which light source to use is important for manipulating plant growth. For example, fluorescent (cool white) light is high in the blue wavelength. It encourages leafy growth and is excellent for starting seedlings. Incandescent light is high in the red or orange range, but generally produces too much heat to be a valuable light source for plants. Fluorescent grow-lights attempt to imitate sunlight with a mixture of red and blue wavelengths, but they are costly and generally no better than regular fluorescent lights.

Duration

Duration, or **photoperiod**, refers to the amount of time a plant is exposed to light. Photoperiod controls flowering in many plants (Figure 1). Scientists used to think that the length of light period triggered flowering and other responses within plants. Thus, they describe plants as short-day or long-day, depending on what conditions they flower under. We now know that it is not the length of the light period, but rather the length of uninterrupted darkness, that is critical to floral development.

Plants are classified into three categories: short-day (long-night), long-day (short-night), or day-neutral, depending on their response to the duration of light or darkness. **Short-day** plants form flowers only when day length is less than about

12 hours. Many spring- and fall-flowering plants, such as chrysanthemum, poinsettia and Christmas cactus, are in this category.

In contrast, **long-day plants** form flowers only when day length exceeds 12 hours. Most summer-flowering plants (e.g., rudbeckia, California poppy and aster), as well as many vegetables (beet, radish, lettuce, spinach and potato), are in this category.

Day-neutral plants form flowers regardless of day length. Examples are tomato, corn, cucumber and some strawberry cultivars. Some plants do not fit into any category, but may respond to combinations of day lengths. Petunias, for example, flower regardless of day length, but flower earlier and more profusely with long days.

The regulation of plant growth and development with the help of physiologically active substances allows one to influence the individual stages of ontogenesis in order to mobilize the genetic potential of the plant organism and, ultimately, to increase the productive capacity and quality of crops.

In recent years, much attention has been paid to the development and application of growth regulators of a new generation with a wide range of physiological activity that are safe for humans and the environment. At the same time, growth regulators are considered an environmentally friendly and cost-effective way to increase the productive capacity of grain crops, allowing them to more fully realize the potential capabilities of plants.

Thus, the study of the influence of growth regulators of the new generation on the yield and quality of grain of spring wheat taking account of the specific soil and climatic conditions is important.

In connection with the previously mentioned, the purpose of our research was to study the effect of growth regulators on the productive capacity of spring wheat of the variety “Zemlyachka” under the conditions of the forest-steppe of the Volga region.

Their ability to form high-quality products is very important in grain production, in addition to ensuring the realization of the biological potential of a plant's productive capacity.

Grain quality is a total set of the biological, physicochemical, and technological properties of grain, which determine its suitability and ability to satisfy certain needs in accordance with its purpose.

The quality of wheat grain is a factor of intensifying agricultural production, therefore, the improvement of biochemical indicators of production is of key importance in farming and crop growing. One of the most important indicators of grain quality, which largely determines its technological properties is the protein content. Protein is a complex set of high-molecular organic compounds, in the element composition of which there are about 53% carbon, 17% nitrogen, 7% hydrogen. Most of the proteins in the grain are in the endosperm, and in solid form, as a reserve substance, which makes them more resistant to chemical and physical effects. In the studies conducted with the action of growth regulators, the protein content of spring wheat grain increased by 0.13–2.13% over the years of research, depending on the variant, the largest increase was observed in the variants of Crezacin and Energia.

The main indicator that determines the baking properties of grain is the gluten content, which can range from 7.0 to 50%. It forms the so-called backbone or skeleton of bread, causing the gas-holding capacity of dough. With enough good gluten, the dough becomes porous and easy to bake. The quality of gluten and its output depends not only on the varietal characteristics of the grain, but also on the area of cultivation, climatic conditions, and entomological factor. It was found that this indicator in the grain of spring wheat of the Zemlyachka variety increased in comparison with the control group in the variants Crezacin and Energia by 3.27–3.47% respectively.

The role of carbohydrates is very important in grain, the main one is starch. When baking bread, starch forms a colloidal system (jelly), which, together with

the gluten complex, contributes to the formation of elastic crumb, that is, it creates the structure of bread.

In the conducted studies, with the action of growth regulators, the starch content increased compared to the control group by 2.01–5.08%, depending on the variant. The best results were observed with the use of growth regulators Crezacin and Energia.

Heavy metals occupy one of the priority areas in terms of their prevalence, biohazard and ability to enter trophic chains in agroecosystems among contaminants. An increasing biological, mechanical and chemical load on the components of agroecosystems lead to the fact that the mechanisms of natural self-regulation turn out to be insufficient. As a result, there is a progressive decrease in soil fertility, significant crop losses, deterioration in produce quality. The negative effects of heavy metals on plants are due to their phytotoxic effect and accumulation in crop produce, which poses a threat to human health.

As a result of numerous studies, three protective mechanisms have been identified in plants in the way of the penetration of heavy metals into plants: in the soil-root, root-stalk, and stem-grain areas. The data obtained can be used in the system of measures to obtain high quality products. Getting into the “soil-plant-animal-human” system, heavy metals are included in the biological circulation and food chains, retaining toxic and mutational properties for a long time. This requires the development of adequate technological methods to minimize the negative effects of toxicant aftereffects.

An excess of heavy metals in the soil causes negative changes in the physiologically important functions of plants. High concentrations of heavy metals lead to an imbalance of food components in plants and adversely affect the synthesis and functions of many biologically active compounds: enzymes, vitamins, hormones, etc.

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