ANALYSIS OF ECOPHYSIOLOGICAL CHARACTERISTICS OF SOYBEAN VARIETIES

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The main challenge facing agriculture today and in the future is to increase food production for an ever-growing population in many regions of the world in a deteriorating environment. Minimizing exposure to various abiotic stressors is a common challenge [1].

Abiotic stressors have a strong negative effect on agricultural plants, reducing plant growth and productivity. Water scarcity, soil salinity, and high temperatures are among the main causes of declining crop yields and food supplies around the world. Therefore, the study of the effects of abiotic stressors on plants and the mechanisms of stress resistance is one of the main areas of plant physiology. Mechanisms of resistance to abiotic stress also include practical aspects such as reducing the harmful effects of stress in different ways or using native varieties adapted to combined stress as a source of genetic material [2-4].

Drought and salinity are major abiotic factors affecting crop productivity worldwide. Global warming is associated with more frequent, longer, and severe droughts in many regions of the world, as well as increased salinity in irrigated lands. About 20% of the world's irrigated land, which produces one-third of the world's food, is subject to secondary soil salinization. In addition, salt stress also induces ion stress and $Na+$ toxicity [5].

Today, each of the crops that occupy large areas in world agriculture is determined by the crop area based on their multi-sector nature. According to the cultivated area, soy crops take second place after wheat, rice, and corn. The efficiency of plant protein production based on soybean cultivation depends not only on the technical equipment of the farmer but also on the skilful use of the ecophysiological properties of the crop, as well as the maximum satisfaction of its needs for environmental factors [6-8].

The ability to grow soybeans in a certain zone is determined by the length of the day, and the amount of heat and humidity. Soybean is a short-day plant that is very sensitive to light. All shades and day lengths are not the same: the earlier the variety, the less affected by changes in the light regime.

According to the data, the main factor in the variability of the growth rate of soybean plants is air temperature, and the result of its influence is manifested in different ways depending on the biological and adaptive characteristics of plants, its variability, deviation from the optimum, required variety and factors [9-12].

It requires heat, especially during flowering and grain filling. At this time, the most comfortable temperature is 22-25 °C. In the absence of precipitation during the flowering period, excessively high temperatures will cause the flowers to drop.

Soybean is sensitive to heat: the higher the heat stress, the shorter its growing season. For the normal growth and development of early ripening varieties, a temperature of 1700-1800 to 1900-2000 °C is required, and for medium and late ripening varieties, a sum of activity temperature of 2000-2100 to 2700-2900 °C is required.

According to some researchers, soybeans are drought-resistant plants due to the presence of a root system that penetrates very deep underground.

Satisfactory soybean yields can be obtained under very limited moisture conditions, and high yields are obtained when sufficient moisture is provided, especially during soybean flowering and grain filling. At the same time, soy, due to its biological properties, belongs to crops that temporarily tolerate excess soil moisture well.

The observations of many authors show that soybean consumes the most moisture during flowering and grain filling. This is explained by the fact that the most rapid formation of vegetative mass took place during this period.

Numerous experiments have shown that one soybean plant evaporates 100-150 g of water from emergence to flowering and -300-350 g from the beginning of flowering to grain filling.

The drought resistance of soybean is not the same in different phases of their development. It tolerates a lack of moisture well during germination and at the beginning of growth, but the most important period in relation to moisture is the period of seed formation.

Relatively low air humidity does not have a significant negative effect on soybean production. However, it has a significant negative effect if it comes with low soil moisture during seed germination and pod formation.

The optimum conditions for the development of shade are 75-80% air humidity. At high temperatures and low relative humidity (less than 60%), flowers and leaves fall, so special conditions are created during planting. On the one hand, the leaves shade the soil, as a result of which evaporation decreases, on the other hand, the relative humidity of the air in the crop increases by about 15% due to transpiration [13-15].

Soybean easily tolerates short-term spring cold (1-2.5 °C), but growth slows down a bit. Autumn frosts do not pose a great threat to early soybean varieties. They reduce yield and only speed up ripening. Frostbite does not damage the pods. Light plays an important role in the development of soybean, a short-day plant. Flowering starts earlier on short days and later on long days, but some soybean varieties do not flower on long days [16-30].

The shade does not need a high level of light. It requires uniform lighting for the whole plant. Saturation of light is especially necessary for the absorption apparatus and the lower layer of plants where most of the pods are collected. The shade's demand for light increases with a decrease in temperature, and vice versa, decreases with an increase in temperature.

According to many authors, the soybean does not require soil fertility. It can grow on a variety of soils, that is, it can be grown in all agricultural regions of the country where sufficient heat and optimal moisture are provided. Soybean cultivation may have low productivity in soils with low organic matter, and acidic and alkaline soils.

The potential of agricultural plants is revealed only when grown with good variety and quality seeds and in ecological conditions suitable for biological characteristics.

According to the quality of planting, soybean seeds are divided into 3 classes by germination: class 1 - 90%, class 2 - 85% and class 3 - 80%. Weather conditions have a significant effect on the germination period and development of the seed, and subsequently on the quality of planting. High temperature has a negative effect on metabolic processes in ripening seeds. Wet weather and favourable air temperature cause the grains to be well supplied with nutrients, they are much larger, have a smooth top layer, have very good planting characteristics and have a high yield. Rainy and cold weather delays the ripening process, which affects the quality of sowing seeds.

A distinctive feature of soybeans is the different quality of the seeds. Large differences in the weight and size of the seeds have a negative effect on oil production technology. One of the reasons soybean seed quality varies is that the organs responsible for seed growth and development are exposed to different weather conditions. As a result, the physiological processes that ensure their growth and development are not the same.

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