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PHYSIOLOGICAL (GROWTH AND DEVELOPMENT THROUGH THE PARAMETERS OF OPTIMAL ENVIRONMENTAL FACTORS), MORPHOLOGICAL, BIOCHEMICAL PROPERTIES AND MEDICINAL SIGNIFICANCE OF *GLYCINE MAX* L SPECIES BELONGING TO *FABACEAE.*

Abstract

The article provides information on the physiological characteristics of Glycine max L, a leguminous plant belonging to the Fabaceae family, taking into account the influence of morphological and environmental factors. In general, the growth of the mass and size of the plant is related to the growth and development of the plant. The development of the plant is qualitative changes in the function and structure of the individual organs of the plant in ontogeny, from one stage of its organogenesis to another, from one phase of development. is to pass to another. Our main goal is to investigate the physiological regularities of plant development that depend on morphogenesis and possible ways of controlling plant development, resulting from the biochemical and biophysical processes taking place in the plant, by influencing its morphophysiological indicators with biopreparations of natural origin, by cultivating the soybean plant in different environmental conditions. At the same time, we have investigated the effect of soybean cultivation potential on its productivity and the role of biologically active substances in the physiognomic growth and development of the plant. It is also known that the Glycine max plant is used to a great extent for medicinal purposes, which was reflected in our research work. From the studies, it was concluded that there is a need to conduct more extensive research on the soybean plant. The scope of these studies covers the physiological, biochemical and molecular-genetic bases of plant productivity, as well as the study of productivity processes from the molecular level of the structural-functional organization of the life of the soybean plant to the whole plant and planting level. Takes first place. The aim of our research work is to investigate the structure of soybean plant cell, hormonal and light regulation of growth and development and other functional activities

Keywords: *morphophysiology, optimal environment, biomass, glycine max, biometrics*

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Fabaceae fəsiləsinə aid olan *Glycine max* l növünün fizioloji (optimal mühit amillərinin parametrləri sayəsində böyümə və inkişaf), morfoloji, biokimyəvi xüsusiyyətləri, becərilmə və istifadə əhəmiyyəti

Xülasə

Məqalədə Fabaceae fəsiləsinə aid dənli paxlalı bitki olan *Glycine max* L növünün morfoloji, mühit amillərinin də təsiri nəzərə alınaraq fizioloji xüsusiyyətləri haqqında məlumat verilmişdir. Ümumiyyətlə bitkinin kütləsinin (biokütlə) və ölçüsünün (biometrik) böyüməsi bitkinin boy atması və inkişafı ilə əlaqəlidir. Bitkinin inkişafı ontogenezdə bitkinin ayrı-ayrı orqanlarının funksiya və quruluşunda keyfiyyət dəyişiklikləri, onun orqanogenezin bir mərhələsindən digərinə, bir inkişaf fazasından. başqasına keçməsidir. Əsas məqsədimiz soya bitkisini müxtəlif ekoloji şəraitlərdə becərərək onun morfofizioloji göstəricilərinə təbii mənşəli biopreparatlarla təsir etməklə bitkidə gedən biokimyəvi və biofiziki proseslərdən irəli gələn, morfogenezdən və bitki inkişafına nəzarətin mümkün yollarından asılı olan bitkinin inkişafının fizioloji qanunauyğunluqlarını araşdıraq. Eyni zamanda soya bitkisinin becərilmə potensialının onun məhsuldarlığına təsiri və tərkibində olan bioloji aktiv maddələrin fizionom olaraq bitkinin böyümə və inkişafında rolunu da araşdırmışıq. Həmçinin *Glycine max* bitkisinin dərman məqsədi ilə çox əhəmiyyətli dərəcədə istifadəsi də məlumdur ki, bu da tədqiqat işimizdə öz əksini tapmışdır. Öyrənilənlərdən belə nəticə çıxarıldı ki, soya bitkisinə dair daha geniş təqqiqatlar aparmağa eytiyyac vardır. Bu tədqiqatların dairəsi bitkinin məhsuldarlığının fizoloji, biokimyəvi və molekulyar-genetik əsaslarını, eyni zamanda soya bitkisinin həyatının struktur-funksional təşkilinin molekulyar səviyyədən başlayaraq bütöv bitki və əkin səviyyəsinə qədər məhsuldarlıq proseslərinin öyrənilməsini əhatə edir. Məlumdur ki, Dənli-paxlalı bitkilər içərisində soya əkin sahəsinə görə dünyada birinci yeri tutur. Tədqiqat işimizdə məqsəd Soya bitkisinin hüceyrəsinin quruluşu, böyümə və inkişafın hormonal və işıq tənzimlənməsi və digər funksional fəaliyyətini araşdırmaqdan ibarətdir.

Açar sözlər: *morfofiziologiya, optimal mühit, biokütlə, glycine max, biometrik*

Introduction

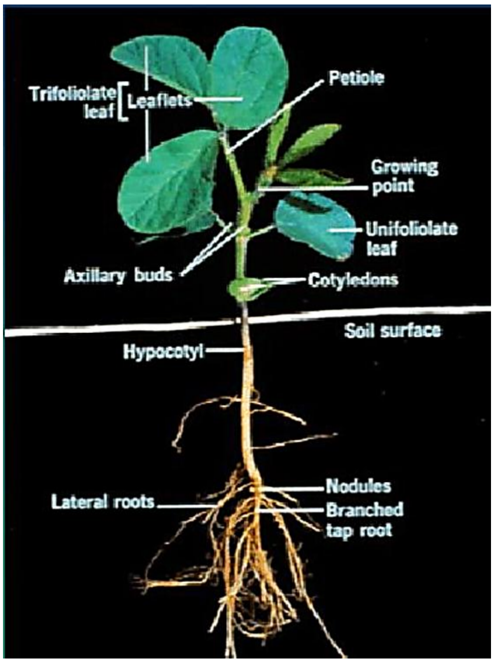
The growth of the mass and size of the plant is related to the growth of the plant. The development of the plant is qualitative changes in the function and structure of the individual organs of the plant in ontogeny, from one stage of its organogenesis to another, from one phase of development. is to pass to another. The growth and development of the plant does not always happen simultaneously. For example, a short-day plant cannot accumulate active temperature totals in a long-term low-voltage temperature regime to move to the next phase of development in northern latitudes, in which case the plant's height increases rapidly, but its development lags behind. The active temperature necessary for the northern ecotype varieties of soybean to pass ontogenesis is only 1800 degrees, but only 600 degrees for the vegetative period, in the south they quickly collect the necessary temperature total, passing into the generative period and resulting in seed ripening (Osipov, 2004-2017: 204). They do not have enough time for the process of height growth, the plant remains short (20-30 cm), beans and seeds are in small quantities, but Its height reaches 60-80 cm and the number of pods in the plant increases to 30 in the areas of 55 degrees north latitude. To one degree or another, all external environmental factors have a complex effect on the growth and development of the plant, the product and its quality. At this time, no factor can replace the other, all of them have the same importance for the life of plants due to their physiological effects. For example, lack of lighting cannot be replaced by high temperature, excess of potassium and phosphorus cannot compensate for the deficiency. It is the physiological law of these factors that is irreplaceable and equally important. As a result of this law, the height, development, yield and quality of the plant are minimum limited by factors. Sometimes the result is explained as an independent law. Many other important consequences of the factors which are irreplaceable and of equal importance follow from the law. If the parameters of each environmental factor are optimal, all physiological processes is active in the plant, the genotype can realize its potential productivity (Mikulovich, Lisovskaya, 2009: 8). The abundance of each factor is as harmful as its scarcity. For example, when water is abundant, soil aeration decreases, and oxygen becomes a limiting factor. As a result of this law, the factors irreplaceable and having the same importance is sometimes formulated as an independent law - optimal law. Although they are quite important, sometimes they play the main role, of these factors the parameters of some of them cannot be adjusted yet. For example, the duration of frost-free periods is limited to the interval of vegetation periods.

During the return of spring frosts, the sowing period of short-day photoperiodic plants is postponed, their vegetation period is shortened, and their potential productivity decreases. Development phase the speed of transition depends on the voltage of light emission, the higher it is, the faster the development phases replace each other. This is especially necessary for heat-loving plants. Active temperatures, which are extremely important, are predicted to be the only unregulated factor. The volume and quality of the harvest depends only on the total amount of sediments and their distribution over the growing season. The intensity of precipitation is also important. Rainwater creates large surface water troughs resulting in water erosion and poor soil wetting. The parameters of all these factors are determined according to the geographical region. The morphological and physiological characteristics of the Glycine max plant, which is the object of our research, are influenced by the two environmental factors we mentioned.

Morphophysiology and cultivation *Glycine max* L.

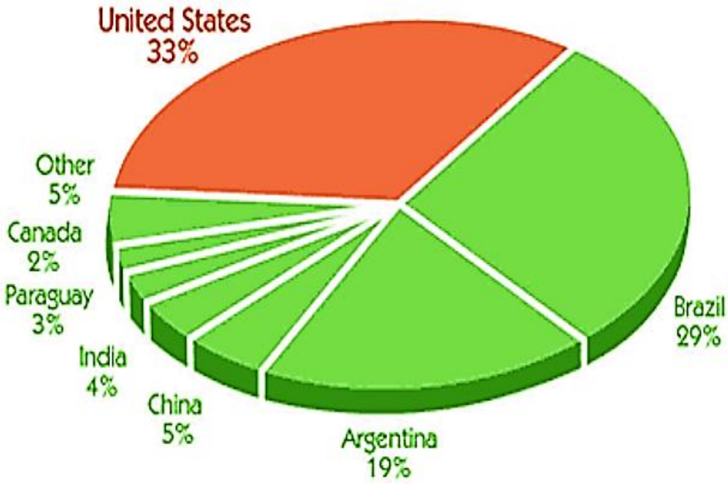
Soy is a plant that loves heat and humidity. It requires a higher temperature of 18–25 °C during flowering and ripening. Seeds germinate at a temperature of 6–8 °C. Soybean sprouts survive spring frosts around –2–5 °C. This plant requires the most water during the flowering and fruiting phase. The transpiration coefficient is about 600. The flowering phase can last 15-40 days, and up to 80 days in late-ripening varieties. Soybean is a short-day plant. Other than saline and chalky soils, other soils are suitable for soybeans (Məmmədov, 2015). Soybean grows better in soils with neutral (pH=6.5–7.0.) reaction Cultivated soybean stems are thin to thick, hairy or glabrous. The height of the stems is from very low (from 15 cm) to very high - up to 2 meters or more (Qurbanov, 2009: 263). In all species of the genus Soya, including the cultivated soybean, the leaves are trifoliate, occasionally 5, 7 and 9-leafed, with pubescent leaves and pinnate venation. The first supracotyledonous node of the stem has two simple leaves (primordial leaves) (Yenken, Soya, Yenken, 1989: 287). These primary leaves, in accordance with the Müller-Haeckel biogenetic law, are considered as phylogenetically older forms of leaves. A common feature for all soybean species is the presence of underdeveloped subulate stipules at the base of the rachis and stipules at the base of a single leaflet. The corolla of the flower is purple in various shades and white (Novruzov, 2010: 124).

Soybean fruits are beans that open in two flaps along the ventral and dorsal sutures and usually contain 2-3 seeds. The beans are mostly large - 4-6 cm long, as a rule, resistant to cracking. The pericarp (bean flap) of soybean consists of 3 layers - exocarp, mesocarp and endocarp. The main part of the endocarp is the sclerenchyma, which forms the so-called parchment layer. It is believed that it is the sclerenchyma, drying up and shrinking, that contributes to the cracking of the beans.



Picture 1. *Glycine max* L

The main form of soybean seeds is oval, with different convexity. The size of the seeds varies from very small - the weight of 1000 seeds is 60-100 g, to very large (more than 310 g) with a predominance of medium-sized seeds - 150-199 g. The seed coat is dense, often shiny, which often turns out to be practically impermeable to water, forming so-called. "hard" or "hard stone" seeds. Under the seed coat there are large axial organs of the embryo occupying the central and largest part of the seed - the root and the kidney, often colloquially referred to as the embryo (Shpaar, 2000: 264). The color of the seeds is predominantly yellow, occasionally there are forms with black, green and brown seeds. Soybean occupies the first place in the world among cereals and legumes. In the world agricultural system, its cultivated area is 67 million hectares. Soy is grown in about 50 countries (Cəfərov, 2000: 112). This plant is cultivated in many parts of the world. The average yield worldwide is 14-15 centners. In advanced farms, under irrigation conditions, grain yield was 25-30 centners, and green mass yield was 250-300 centners. Mainly well-watered chestnut, light-chestnut gray-brown soils, etc. suitable for soybeans.



Picture 2. Distribution of soybean production in the world

Soybeans can be grown after cereals, corn and cotton in crop rotation. Soybeans should not be planted after soybeans, sunflowers, annual legumes and perennial leguminous forage grasses. If the predecessors are cereal crops, the stubble should be removed from the field as soon as the crop is harvested and the stubble should be covered.

Biochemical composition and use.

The main biochemical component of soybean seeds is protein. Among all cultivated crops in the world, soybean is one of the highest protein. According to various sources, the protein content in the seeds of this crop averages 38-42%, and can reach up to 50%. Soy proteins are heterogeneous in structure and function. Soy is rich in essential amino acids, especially lysine (2-2.7%), which is poor in grain proteins Most of the soy protein (about 70%) is made up of storage proteins 7S-globulins (β-conglycinins) and 11S-globulins (glycinins). Which are quite normally absorbed by mammals. Due to the fact that a significant part of soy proteins are water-soluble proteins, obtaining vegetable protein from soy is most effective (Kərimov, 2010: 378). Soy flour is the most widely used source of protein in the creation of balanced feeds, however, during the production process, it needs heat treatment to inactivate anti-nutritional components (Zelentsov, Kochegura, 2006). Among the residue there are substances that are considered to be anti-nutritional components of food, such as inhibitors of proteolytic enzymes, lectins, urease, lipoxygenase, and others.Anti-Nutritional Ingredients. Protease inhibitors make up 5-10% of the total amount of protein in soybean seeds. Their activity ranges from 7 to 38 mg/g. A distinctive feature of these substances is that, interacting with enzymes designed to cleave proteins, they form stable complexes devoid of both inhibitory and enzymatic activity.

The result of such a blockade is a decrease in the absorption of dietary protein substances. Once in the stomach, some of the inhibitors (30-40%) lose their activity, while the most stable ones reach the duodenum in an active form and inhibit the enzymes produced by the pancreas. As a result, the pancreas is forced to produce them more intensively, which can ultimately cause its hypertrophy. Lectins (from Latin legere - to collect) are proteins and glycoproteins that have the ability to bind carbohydrate residues on the surface of cells in a highly specific manner, in particular, causing their agglutination. Lectins are often involved in cellular recognition, for example, some pathogenic microorganisms use lectins to attach to the cells of the affected organism. Lectins were originally isolated from plant seeds, but they are found in most living organisms. Lectins can cause erythrocyte agglutination, and also have selective mitogenic activity against various blood cell subpopulations.Lectins (phytohemagglutenins) are glycoproteins. They disrupt the absorption function of the intestinal mucosa, increase its permeability to bacterial toxins and decay products, agglutinate erythrocytes of all blood groups, and cause growth retardation. In the composition of the protein, they are from 2 to 10%, and the activity ranges from 18 to 74 HAU / mg of flour. Lectins are well extracted with water and alcohol. Some researchers note that milder conditions are sufficient for inactivation of lectins than for trypsin inhibitors, namely, treatment with propionic acid or thermal exposure at 80–100 °C for 15–25 minutes.rease is an enzyme that carries out the hydrolytic cleavage of urea with the formation of ammonia and carbon dioxide. The level of its activity is important only for dairy farming when using soy in feed containing urea, since the interaction of urease with feed urea produces ammonia, which poisons the animal's body. In the original soybean seeds, the proportion of urease can reach 6% of the amount of all proteins.

Lipoxygenases are iron-containing enzymes that catalyze the dioxygenation reaction (the addition of two oxygen atoms) to polyunsaturated fatty acids. Different types of lipoxygenases are found in plants, animals and fungi. They are involved in various cellular functions. Lipoxygenase is an enzyme that oxidizes lipids containing cis-cis-diene units. The resulting hydroperoxide radicals oxidize carotenoids and other oxygen-mobile components, thereby reducing the nutritional value of soybeans. In addition, under the action of lipoxygenase, during long-term storage of seeds, aldehydes and ketones (hexanal, ethyl vinyl ketone) are formed in them, which give soybean a specific unpleasant odor and taste. Soy is not only a source of protein, but also oil, the content of which in the seeds ranges from 16 to 27%. Crude oil contains triglycerides and lipoid.

Carbohydrates in soy are 22-35%, they include sucrose, dextrins, hemicelluloses, a small amount of monosaccharides and fiber. Soy is low in (1-1.5%) starch. Micro and macro elements (Petibskaya, 2012: 17). Minerals make up 4-6%. The composition of the ash elements of soybean seeds includes the following macroelements (in mg per 100 g of seeds): potassium - 1607, phosphorus - 603, calcium - 348, magnesium - 226, sulfur - 214, silicon - 177, chlorine - 64, sodium - 44, as well as trace elements (in micrograms per 100 g): iron - 9670, manganese - 2800, boron - 750, aluminum - 700, copper - 500, nickel - 304, molybdenum - 99, cobalt - 31.2, iodine - 8.2. The plant contains many vitamins. Benefiting from the rich composition of soybeans, soy milk is produced after soaking, grinding and filtering the beans. According to some nutritionists, soy milk is rich in nutrients A, D, E, B vitamins, riboflavin and iron. Plain soy milk is very rich in protein. Compared to regular cow's milk, it has more fiber and is fatter than cow's milk. These fats are not harmful to the body, on the contrary, they lower cholesterol levels. A distinctive feature of soy is the highest content of phospholipids in comparison with other crops. In soybean oil, their content ranges from 1.5–2.5%. Phospholipids promote membrane regeneration, increase the detoxifying ability of the liver, have antioxidant activity, reduce the need for insulin in diabetics, prevent degenerative changes in nerve cells, muscles, and strengthen capillaries. There have been some concerns that soy may have a "feminizing" effect, or lower testosterone levels in men, affecting erections and sperm quality. Soy is called by whom the main testosterone-lowering product in men unauthoritative source (Sərdarova, 2022: 704). This is because the active ingredients in soy, isoflavones, are derived from phytoestrogens, plant-derived compounds that may behave similarly to estrogens. Estrogens are hormones that are actively involved in the female reproductive system. Men's bodies also produce estrogens, but in much smaller quantities. However, some [who?] men fear that consuming phytoestrogens can lower testosterone levels, which will reduce sex drive source unspecified 548 days.

Scientists have been studying the effect of soy on testosterone levels for many years. In 2010, the journal Fertility and Sterility published an analysis of more than 30 related studies involving more than 900 men on the US National Library of Medicine website. The researchers concluded that “neither soy products nor isoflavone supplements alter bioavailable testosterone levels in men. Soy is the most common among legumes and oilseeds. It is widely used as a food, fodder and industrial crop. Butter, milk substitutes and lactic acid products, flour are made from it. Soybean oil makes up about 30% of the vegetable oils produced in the world. Soy flour is used as a protein supplement. Since soy milk does not contain lactose, it is the best alternative that can be preferred especially by people with lactose intolerance. Soy milk is a suitable option for people with cow's milk allergy, which has been increasing in recent years. It is also used by vegetarians instead of cow's milk. The daily food amount of soy milk should not exceed 100 ml. Some studies have shown that those who prefer soy products lose weight better. This is attributed to the positive effects of soy isoflavans on insulin regulation and fat metabolism. For this reason, soy milk can be added to the list of options for those who want to lose weight.

Conclusion

Soybean is a sensitive plant to fertilization. Experiments have determined that soybean absorbs 142 kg of N, 32 kg of P2O5, 35 kg of K2O to produce a product of 20 centners. Under the main plow, N 60–90 kg, P2O5 60–90 kg, K2O 30–54 kg should be given. 30% of nitrogen fertilizer should be given before sowing, and the rest as feeding twice, including 40% 2-3 weeks after the harvest, and 30% during the period of bean formation and graining. Cubes RUM-5,1; It can be applied with RMQ-4 manure spreaders. Grade 1 seed should be taken for sowing. Before sowing, seeds should be treated with rhizorthorphin (nitragin) at the rate of 200 grams per hectare. That amount of rhizotorphin should be dissolved in 1.2 liters of water and sprayed on the tissue. For the purpose of combating bacteriosis, root rot, aminomycosis, and fusarium diseases, 1-2 kg of 70% tachigran should be applied to 1 ton of tissue at least 3-4 weeks before sowing.

As a result, we can note that the soy plant ranks first in the world in terms of its medicinal value. Soy milk has many benefits. Due to the content of Omega-6, Omega-3 fatty acids and iron, soy milk makes the walls of blood vessels more elastic and durable. In addition, these substances prevent the deterioration of blood vessels by the action of free radicals and the addition of cholesterol in the inner walls; It stabilizes the blood lipid profile. Doctors consider this property one of the best for soy products. Poly and monosaturated fats inhibit the transport of cholesterol into the blood, thus reducing the concentration of high-density lipoprotein ("good" cholesterol) Prevents cancer. Soy milk has good anti-cancer properties. Some studies show that its use reduces the risk of developing prostate cancer in men and breast cancer in women;Prevents the development of osteoporosis; Thanks to its high antioxidant properties, soy milk prevents the destructive effect of free radicals on tissues and cells, slows down their aging;It is easy to digest because it does not contain gluten and lactose; It is a source of protein;It affects the reduction of symptoms that occur after menopause in women.

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