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# ENVIRONMENTAL AND ECOLOGICAL PROPERTIES OF CORN

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When environmental factors are suitable for the corn plant, it grows well, develops and yields high yields. Therefore, it is necessary to correctly determine and fully satisfy the requirements of corn for the external environment. A healthy corn seed germinates when the soil temperature, air and humidity are sufficient. The seed begins to germinate after absorbing 44-45% of its mass of water. First, a physical process occurs (absorption), the seed swells, increases in size. Later, after absorbing 70-80% of the water it needs, biochemical processes begin in it, the needs and complex nutrients in the endosperm of the seed (protein, oils, starch, etc.) are broken down under the influence of special enzymes and transferred to a simple state.

Then, easily absorbed nutrients are transferred to the seed bud through the cotyledon (the only seed leaf of a grain plant) - the bud begins to sprout. Seed germination occurs at 6-8 ℃, and is somewhat accelerated at 10-12 ℃. At temperatures above 8 ℃, the seed germinates. The optimal temperature for normal germination and formation of grass is considered to be 18-20 ℃, and the maximum temperature is 30 ℃. Corn seeds begin to germinate optimally when the 10 cm layer of soil has enough moisture and air, and the temperature is 10-12 ℃.

Usually, first a single shoot sprouts from the seed, then a shoot begins to grow. The top of the shoot is covered with a special cap. The cap is the first bud leaf of the corn, the leaf of which has not developed, only the leaf sheath has been preserved. The top of the cap is closed and has a sharp shape. The cap grows until it reaches the soil surface, then stops growing under the influence of light. The shoot, which continues to grow, pierces the cap. When the grass is formed, young green leaves appear. In some cases, the color of the young leaf is white or yellow. This indicates that the planted seed is not healthy, is damaged by fungi or lacks microelements. Later, plants with pale leaves do not develop and die. This has led to the thinning of the plant. Good seeds are planted in areas where such plants are abundant.[1].

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The germination rate of corn seeds depends on the depth of planting, soil moisture, heat, and air availability. Sowing corn seeds shallowly (6-7 cm) in the spring and deeper (10-12 cm) in the summer gives good results. Air temperature also affects seed germination.

When the temperature at a depth of 10 cm of the soil is 14-15°C, the seed sown in non-saline soil will germinate after 4-5 days, and in saline soil after 6-8 days. This is because the seed is sown not in pure water, but in the soil solution, which contains various salts and other substances, which slightly hinder the germination of the seed. The germination of the seed is affected not by the chemical composition of the salts, but by the osmotic pressure they create.

That is why seeds planted in saline soil sprout 2 days later than seeds planted in non-saline soil. The germination of corn seeds is also affected to some extent by soil density and planting method. As soil density increases, the movement of water in it through capillary tubes accelerates.

**Heat demand.**Corn is a thermophilic plant. Its seeds germinate at 8-10 degrees. It produces grass at 10-12 degrees. If it is sown too early in very wet and cold soil, the seeds will rot and the bush will become sparse. 20-27 ℃ is considered the most favorable temperature for plant growth. If the temperature is higher than 30-35 degrees during the flowering phase, the pollen loses its pollination properties. As a result, the cob becomes sparse with grains. Cold temperatures of 2-3 degrees damage the grass, and in autumn, the leaves. Corn is more tolerant to spring frosts than to autumn frosts.

At a temperature of 3-4 ℃, mature corn plants are frost-bitten, but immature plants of sown corn are severely damaged, lie down, and the nutritional value of the green mass is also sharply reduced. For corn, a temperature above 10 ℃ is considered effective, if the air gets colder than this, the plant practically stops growing and developing. Thus, the biologically useful temperature for corn plants was calculated to be 18-20 ℃ for early-ripening varieties, and 23-26 ℃ for mid-ripening and late-ripening varieties.

**Light requirement.** Corn is a light-loving short-day plant. If the day length is more than 12-14 hours, its growing season will be extended. Corn requires

ISSN (E): 2836-3612

good light, especially when it is young. If it is planted too thickly, weeds will take over, and the yield will decrease dramatically.

The photoperiod of corn, depending on the variety and hybrid, lasts 30-40 days. In the north, the photoperiod is longer. In the south, the opposite is true. In our conditions, the photoperiod of corn sown in spring passes more slowly than that of corn sown in summer. When the light duration is 9-10 hours, corn blooms quickly. When it exceeds 12-14 hours, its growth period is significantly longer. It requires strong light, especially in the early stages. For corn to bloom and set grain, the light intensity should be at least 1400-1800 lux. [2].

When corn is planted thickly, the middle, especially the lower leaves of the plant, do not receive enough light. The net productivity of photosynthesis decreases by 15-30%. When corn does not receive enough light, the formation of fruit bodies is delayed, the flowering of paternal and maternal inflorescences is prolonged, and the number of grainless plants in the field increases. When conditions are favorable for the growth and development of corn, a leaf area of 40-50 thousand m2 is sufficient to obtain high yields. When the leaf area increases due to an increase in plant thickness, the light regime deteriorates and the yield decreases.

The productivity of corn depends on the rapid formation of leaves, their overall surface and photosynthetic activity. Because 95.5% of the dry mass of organic substances formed in the plant is formed primarily in the leaves. Temperature affects the course of the photosynthesis process to a certain extent. When there is sufficient moisture, the photosynthesis process proceeds rapidly at 23-27 ℃. Then, with increasing temperature, this process slows down. When the temperature reaches 45 ℃, photosynthesis stops. When the light is strong and high, the photosynthesis process in the corn plant occurs even at 4.5-9 ℃ [4].

The rapid rate of photosynthesis in corn coincides with its rapid growth period. As can be seen from the above data, the photosynthetic activity of corn depends on several factors, including climate, soil conditions, temperature, moisture, nutrients, seedling thickness, and root activity. Therefore, by creating adequate conditions for the growth and development of corn, its photosynthetic activity can be significantly improved, thereby increasing its productivity.

**Soil requirements.** Good yields of corn are obtained on soft, porous, humus-rich soils that are free from weeds, and have a pH of -5.5-7, which is well supplied with nutrients and moisture. These include black soil, dark chestnut soil, dark loam and sandy soil, as well as loamy soils. It is also possible to obtain a good yield of corn on sod-podzolic and dried peat-bog soils in the non-black soil zone by applying high agricultural technology. Lands with waterlogging, very saline, and strongly acidic Rh-5 soils are not suitable for planting corn.

Corn seeds require a lot of oxygen during germination. To obtain a high yield from this plant, the soil should contain at least 18-20% oxygen during its growth period. When the oxygen content in the soil drops to 10%, the roots of corn grow slowly, and when it drops to 5%, they do not grow at all. In this case, the plant's absorption of water and nutrients, and the metabolic processes in the roots and stems are disrupted. In the later phases, the need for aeration is due to the need to provide the roots with oxygen from the air. The ability of the roots to absorb oxygen depends on their respiratory energy. Aerobic respiration is the energy source for the root's absorption process [3]. For corn, the soil density (bulk mass) should be around 1.1-1.3 g/cm$^3$. When the soil has a bulk density of 1.5 g/cm$^3$ and a moisture content of 30%, air exchange decreases sharply. Carbon dioxide gas accumulates in the soil. This poisons the corn roots. Corn can grow in all soils that can be cultivated. Saline and marshy soils are not suitable for corn cultivation. In such areas, it is necessary to improve the land reclamation condition before planting corn, that is, to wash away the salt and drain excess water. Corn does not grow well on cold soils with a light mechanical composition (loam) and heavy mechanical composition, which poorly permeable to water. The mechanical composition of such soils should be improved by applying organic fertilizers.

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