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DEPENDENCE OF GROWTH PROCESSES OF (*ECHINACEA PURPUREA* (L.) MOENCH) OF THE FIRST YEAR OF VEGETATION ON AGROMETEOROLOGICAL FACTORS

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In recent decades, members of the genus *Echinacea* Moench. gained well-deserved popularity among those who grow medicinal plants. Natural reserves of raw materials in their homeland, North America, are quite limited, which prompted its introduction into culture in the world and Ukraine [1]. An analysis of world experience shows that among the nine species *Echinacea purpurea* (L.) Moench. is a leader in the scale of study and use [5,7].

In recent years, Ukraine has been actively studying the medicinal, fodder and honey properties of echinacea, systematic work on breeding, phytochemistry, in order to develop regional technologies for its cultivation to create a raw material base [3,4,6]. That is why the aim of our work was an in-depth study of ecological and biological features of *Echinacea purpurea* in the first year of the growing season. Morphometric studies were conducted in the conditions of industrial plantations of Poltava region, agrometeorological indicators according to meteorological stations with the help of a special program.

The ontogenesis of echinacea has certain patterns [2]. According to long-term data, the mass of aboveground part of one plant in the period from germination to June developed very slowly - the increase was only 0.8 g. From June to July the growth rate increased and the above figure was 10.9 g. Then it took place more intensively - in August the mass was 42.4 g, and in September - 74.5 g. A similar pattern was inherent in the development of the root system. During the period from germination to June, the mass was 0.1 g. In the following months, the rate of growth and development gradually increased: in July - 1.3, August - 8.9, September - 19.1 g. Thus, echinacea begins to grow rapidly , starting from August, and these processes are actively occurring until the end of the growing season.

It was also found that environmental factors affect the growth processes of echinacea. It was found that the mass of the aboveground part (MAP) significantly correlates with the amount of precipitation from the beginning of the calendar year

(r=0.459) and from the date of sowing (r=0.589). The root system was more sensitive to changes in soil moisture. Its mass (MRS) was closely related to precipitation (r=0.499 and r=0.640, respectively). The effect of air temperature on the MAP was more significant. The correlation coefficient with temperatures above 0 °C was r=0.664, above 5 °C r =0.675 and above 10 °C r =0.684, which indicates the importance of this factor for the development of echinacea. Characteristically, the relationship between the MRS and temperatures was not much greater, but more stable (r = 0.691-0.698).

Regression analysis of experimental data was performed taking into account the reliability of correlations. Regarding the dependences of the growth of the aboveground part on the amount of precipitation since sowing, they have the form: $Y=0.3705e^{0015X}$, $R^2=0.5592$; $Y=0.0013X^{1.7458}$, $R^2=0.5385$. The equations that characterize the dependence of MRS growth on the sum of temperatures above 10 °C have the following form: $Y=0.2787\ e^{0.0044X}$, $R^2=0.7871$; $Y=3E\text{-}07X^{2.6923}$, $R^2=0.8599$. It can be concluded that the development of the aboveground part is more related to the temperature of the air during the growing season than to the amount of precipitation.

Similar patterns are characteristic of the growth of the root system. Dependence on precipitation is illustrated by models: $Y=0.0317\ e^{0.0189X}$, $R^2=0.5377$; $Y=4E\text{-}05X^{2.0672}$, $R^2=0.5377$. More reliable were the equations that characterize the increase in the MRS depending on the sum of temperatures above 10^0C: $Y=0.0207e^{0.0053X}$, $R^2=0.7661$; $Y=4E\text{-}09X^{3.0539}$, $R^2=0.7623$.

The identified patterns allow to optimize the technological process of growing echinacea in order to obtain medicinal raw materials.

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