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Fractal Dynamics in Growth of Seedlints of *Zea mays*

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Introduction

In recent years, numerous information has accumulated that alternative neutralistic biological and ecological processes can be realized in ecologically equivalent environmental conditions. One of the most generalized concepts of the stochastic appearance of self-similar structures is fractal analysis [1,2]. There are data that the physiological and biochemical indicators of plants in natural habitats can be fractal in nature [3-8]. However, it remains an open question whether the picture of the indices demonstrated by plants in stable laboratory conditions will have a fractal nature.

Objects and Methods

The objects were 2 week *Zea mays* sprouts, which were grown on the Hoagland-Arnon nutrient medium. The first 6 days of the plant were grown on a full mixture and from 7 to 12 days the plants were transferred to a deficit of elements of mineral nutrition. In the course of the experiment, individual indicators of growth in length, mass, and intensity of transpiration were recorded. Fractal analysis was performed according to the method proposed by Gelashvili et al. [2].

Results

It was found that the growth of biomass in all seedlings had a similar dynamics. This was reflected in the fact that between all individual indices of RGR (mg/mg) there were fixed significant correlation links. The correlation coefficient varied from 0.64 to 0.79. In this case, the remaining individual indices (increase in length and intensity of transpiration) had a relatively independent dynamics. In this case, the correlation relations between the parameters then appeared and disappeared. All this indicates that in the transition to a deficit, the achievement of the same magnitude of biomass increment by individual plants is possible by including various physiological mechanisms-growth or transpiration.

It was established that both before and after the transition to a deficit and the pattern of observed growth weight and transpiration indicators is an object of a fractal nature.

Discussion

Thus, there are prerequisites to consider the growth and transpiration processes of plants, not from the standpoint of rigid determinism, but from the standpoint of neutralist concepts. Previously, different authors in various modifications of unified neutral theory showed a weak (statistically insignificant) dependence of various biological processes on environmental conditions [9-11]. This justifies our attempt to apply neutralist approaches to the analysis of massifs not only of data on secondary plant metabolism [12,13] but also of events of the basic plant metabolism.

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