Early diagnostics of productivity and longevity of alfalfa selective samples

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Abstract. The paper provides signs of productivity and longevity at the stage of seedlings, which accelerates selection in the breeding process for important indicators. Correlations between the shape of the root system and longevity, leaf area and productivity have been determined.

Key words: root system, morphology, productivity, varietal differences.

In the selection process, the criteria by which the best genotypes are selected for productivity are important. At the same time, the aboveground feed mass is taken into account by mowing and years of life, with the subsequent allocation of more productive cultivars.

However, some breeders believe that it is necessary to make a correlation dependence between productivity and morphological characteristics. In alfalfa, a fairly close relationship was revealed between the level of aboveground mass and such indicators as the number of stems in the bush and the mass of one shoot, the rate of growth of the assimilation surface and the lengthening of the shoot, the power of the root system development and some features of its morphology, the speed of regrowth after mowing is also important [1,2,3].

The best and most accurate indicators that closely correlate with high productivity in adult alfalfa plants are the size (mass and volume) of the root system, as well as the total leaf surface of one plant. In more productive genotypes, these indicators are significantly higher than in less productive ones [4,5].

Long-lived plants are also a complex and diverse phenomenon. It is determined, first of all, by the ratio in the population of plants that differ in different degrees of longevity, including the genetic abilities of individuals, resistance to pests and diseases, and to adverse environmental factors [6].

For the selection of forms with high adaptive properties and at the same time having signs of longevity, productivity, it is necessary to select the source material for a number of years. In this regard, the selection of plants in the seedling stage is of great importance.

Objects and methods of research. In order to obtain such a source material, vegetation experiments were carried out on light installations. Depending on the variants of the experiment, the plants were grown in vessels at the beginning of the growing season with a day length of 20 hours from 1-2 months of age to 14-16 hours. Germination of alfalfa seeds was carried out at a temperature of 24-260C and soil moisture in vegetation vessels of 60-70% of the total moisture capacity. During the experiments, observations, records and measurements were carried out according to the generally accepted method. We studied 5 varieties of variable alfalfa (Medicago sativa L.), which has previously
known indicators of longevity and productivity (Table 1). Wild-growing samples were taken at different altitudes in mountain conditions (1400, 1600, 2000 m above sea level).

Table 1. Characteristics of the studied samples in terms of productivity and longevity

| Varieties, wild forms            | Productivity | Degree of longevity |
|----------------------------------|--------------|---------------------|
| Nadezhda-zoned variety           | high         | small               |
| Wild Dargav 1600 m n. o. m.      | high         | medium              |
| Wild-growing Fiagdon 1400 m. n. o. m. | Very low    | high               |
| Wild-growing Cei 2000 m. n. o. m. | Below average | high               |
| Vega 87                          | medium       | average             |

The results of the studies showed that different samples differed in the morphology of the root system in terms of longevity, as a rule, in three-year-old forms, more "branching" of the roots and less "anchor", and the young ones on the contrary (Table 2). Experiments on the productivity of alfalfa have shown that populations of variable alfalfa already at the early stages of ontogenesis, there are very significant differences in morphological and physiological characteristics.

Table 2. Number of different types of roots in alfalfa samples with different longevity (%)

| Longevity score | Anchors | Branched | Core |
|-----------------|---------|----------|------|
| minors          | 43      | 21       | 19   |
| long-lived      | 18      | 32       | 23   |

The closest relationship was observed between the productivity of the green mass and the area of one trifoliate leaf (correlation coefficient R=0.87-0.90). Therefore, it can be argued that more productive individuals have larger leaves. Thus, in varieties with high productivity, the leaf area was 5-6 cm², in medium-productive varieties it did not exceed 4-4.5 cm², and in low-productive varieties this indicator did not exceed 3.5-3.8 cm². In long-lived forms, the correlation coefficient between the shape and the number of roots was also quite high and was in the range of r=0.78-84.

Evaluation of plants at an early stage of organogenesis provides a reliable selection of productive and long-lived plants for further selection and formation of varieties with high characteristics necessary for legumes, in particular, alfalfa.

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