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CLUSTER DISTRIBUTION OF OATS GENOTYPES FOR ECOLOGICAL ADAPTIVITY QUANTITATIVE TRAITS OF PRODUCTIVITY

The research was conducted in the years 2016–2018 on the fields of the grain and forage crops breeding laboratory at the conditions of breeding and seed crop rotation of the Institute of Agriculture of Carpathian Region of NAAS. The subject of research was nine oats breeding lines with husked and naked grain and standard varieties Zakat and Artur.

The purpose of our work was the determination of the parameters of ecological adaptivity oats genotypes for quantitative traits "grain yield", "grain quantity in panicle" and "grain mass in panicle" and conducting of cluster distribution of genotypes for complex indices whose determined the adaptive and productive peculiarities.

There were determined for three quantitative traits the plasticity (b_i), stability (S_i^2) genotype effect, varietal stability to stress, genotype flexibility, homeostaticity (Hom) and breeding value (Sc). Statistical processing of experimental data was performed using the Microsoft Excel program with the definition of averages, minimum (min), maximal (max) and variation scope (R). Mathematical processing of data was carried out by the dispersive method. Cluster analysis for grouping oats genotypes for ecological adaptivity indices of quantitative traits was conducted with using Euclidean distances in program STATISTICA 10.

An analysis of oats genotypes is shown that in average for three years the breeding lines 369-6-3, 279-1-3 and 359-1-1 demonstrated the highest yield, accordingly 4,08, 4,02 i 4,00 t/ha. The most productive breeding lines were also better at growing in optimal conditions. The only breeding line 359-1-1 was distinguished relatively with greater productivity (3,67 t/ha) at unfavorable conditions (Xlim), but the better for yield were 400-2-10 (3,64 t/ha) and 112-196 (3,57 t/ha). The naked genotypes 407-1 (Krepysh / AC Belmont) and 405-1-5 (AC Belmont / Krepysh) with average grain yield relatively 2,72 and 3,13 t/ha were fallen from husked breeding lines and standard varieties.

The majority of investigated oats genotypes were sufficiently plastic for trait "grain yield" and the highest plasticity have 279-1-3 ($b_i =$

1,35), 369-6-3 (b_i = 1,30) and breeding line 407-1 (b_i = 1,23) with naked type of grain. The more stabilized manifestation of grain yield was in breeding lines 380-1-9, 407-1 (S^2_i = 0,01) and 279-1-3 (S^2_i = 0,02). The high productive oats genotypes (369-6-3, 279-1-3 and 359-1-1) also have the high indices of genotype effect (0,28–0,36) and genotype flexibility (3,99–4,13). The highest level of varietal stability to stress (-0,60 – -0,62) was in homeostatic genotypes: 400-2-10, 377-1-10 and 380-1-9.

The high plasticity for trait "grain quantity in panicle" was showed in breeding lines 400-2-10 (b_i = 1,52), 369-6-3 (b_i = 1,28) and 359-1-1 (b_i = 1,18), the most stable manifestation was in variety Artur (S^2_i = 3,6), 405-1-5 (S^2_i = 3,7) and 400-2-10 (S^2_i = 4,1). Homeostaticity of trait the higher for average was only in breeding line 377-1-10 (Hom = 482,0) and variety Artur (Hom = 306,0), these genotypes were the better for breeding value, relatively 48,7 and 39,3. The positive effects of genotypes were demonstrated breeding lines 377-1-10 (8,90 th.), 400-2-10 (1,10 th.), 112-196 (0,90 th.) and standard varieties Artur (3,70 th.) and Zakat (3,20 th.).

The standard variety Zakat (b_i = 2,39), breeding lines 369-6-3, 279-1-3 i 359-1-3 with a high coefficient of regression, relatively 1,60; 1,48 and 1,29 were distinguished by the considerable positive reaction the trait "grain mass in panicle" on the improvement of environmental conditions. The better stability of trait manifestation was in variety Zakat and breeding line 407-1 (S^2_i = 0,00).

An analysis of homeostaticity and breeding value indices for grain mass in panicle showed indisputable advantage of variety Artur (Hom = 16,70; Sc = 1,51) and lines 377-1-10 (Hom = 10,74; Sc = 1,45), 112-196 (Hom = 9,82; Sc = 1,30). The higher recounted genotypes have high effects of genotypes (relatively 0,15; 0,29 and 0,09 g), varietal stability to stress (-0,40; -0,69 and -0,62 g) and genotype flexibility (1,83; 2,12 and 1,74 g).

For the aid of cluster analysis can estimate the genetical similarity or genetical remoteness of genotypes for indices of ecological adaptivity quantitative traits. For trait "grain yield" the closest for indices of plasticity and stability were breeding lines 279-1-3, 359-1-1, 369-6-3 and varieties Zakat and Artur; for trait "grain quantity in panicle" – 279-1-3, 112-196, 405-1-5 and 369-6-3; for trait and "grain mass in panicle" –369-6-3, 279-1-3, 359-1-1, 405-1-5, 380-1-9 and 400-2-10. For all three quantitative traits, the genetical similarity of reaction on change of environment showed breeding lines 279-1-3 and 369-6-3.