



# The screening of wild *Avena* species of VIR collection in aluminium tolerance

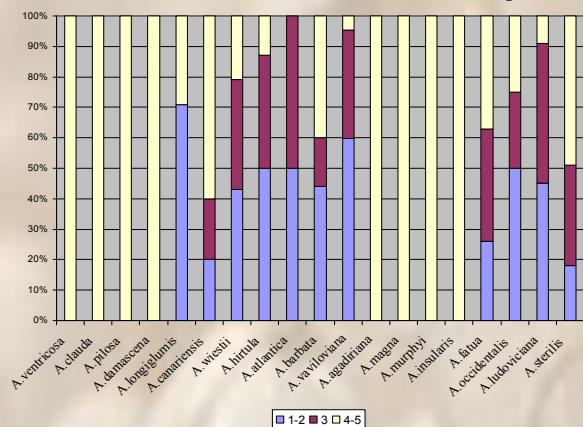
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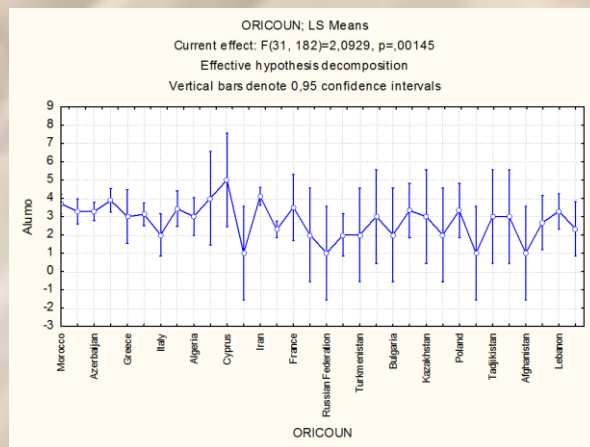
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The response of species and genotypes of agricultural plants to soil pH differs and influences the general adaptability of plants. Unfavorable edaphic conditions related to an increased soil acidity and accumulation of toxic aluminium ions are among the limiting environmental factors for productivity of cultivated plants. One hundred and eighty accessions of nine diploid (43 accessions), six tetraploid (57 accessions) and four hexaploid (80 accessions) wild oat species of different geographical origin were selected for comprehensive field trials which were conducted at the Pushkin Branch of VIR in 2010–2014 together with seed multiplication.

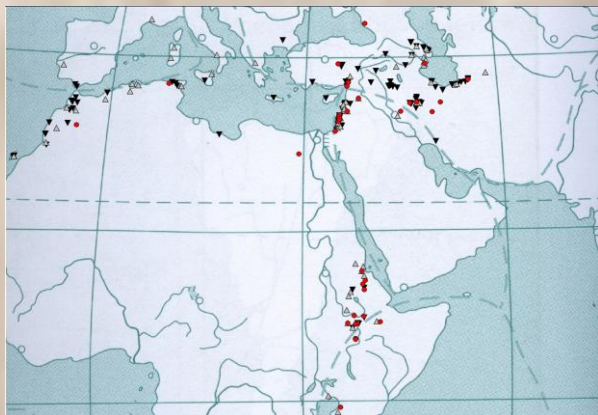


The aluminum tolerance laboratory screening of accessions was performed in the climatic chamber with the controlled daylength and temperature. The aluminum tolerance in cereals was evaluated using the technique developed by A. Aniol (1991b) and modified at VIR (Kosareva and Semenova, 2005). The technique is based on the staining of the aluminum damaged root regions with Eriochrome cyanine R and evaluation of the capability of the plants to restore mitotic activity in roots affected by the mobile aluminum.

The evaluation of genetic diversity of Al tolerance at the species level has shown that the diploid (*A. ventricosa*, *A. clauda*, *A. pilosa*) and tetraploid (*A. magna*, *A. murphyi*, *A. insularis*) species with the C genome were less tolerant than the accessions with a different genomic composition. Wild *Avena* species accessions with a high degree of Al tolerance (on standard level) belonged to the diploids *A. canariensis* from the Canaries (Spain), *A. longiglumis* from Morocco and *A. wiestii* from Egypt, tetraploids *A. barbata* from Azerbaijan, Israel, Tunisia, Turkey and Iran, *A. vaviloviana* from Ethiopia, and hexaploids *A. ludoviciana* from Afghanistan and Ethiopia, *A. sterilis* from Israel, Iraq, Iran, Morocco, Syria, Turkey and Ethiopia.



Influence of geographical origin of *Avena* wild species accessions to aluminium resistance



The geographical distribution of evaluated *Avena* wild species accessions

The comparison of the data on Al tolerance with those on soil conditions has shown that most highly tolerance accessions tend to be collected on mountain cinnamon, chestnut, or mountain forest brown soils. According to the results of the principal component analysis, preliminary screening for Al tolerance can be carried out among hexaploid species with higher degree of plant resistance to pathogens. A search for such wild *Avena* species forms can be carried out in Portugal, Spain and the Canaries, Italy, Azerbaijan, Turkmenistan, Syria, Iraq, Israel, Algeria, Morocco, Tunisia and Ethiopia taking soil differences into account.