

## AVEQ – A Project on Avena Genetic Resources for Nutritional Quality

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A project meeting of the fifteen partners was held in November 2010 in Bucharest, Romania, together with the 6th regular meeting of the ECPGR Avena Working Group. The project, which will complete during 2011, aims to bring the expertise of highly specialised

analytical laboratories into the genetic resources community to evaluate traits of high relevance for human welfare.

Oats are unique among the cereals in nutritional quality. Being used as raw material in the health food market, risks by mycotoxins contamination is a major concern. Frost tolerance could open possibilities for winter growing in southern Europe with expected higher yield potential and economic competitiveness for the oat crop. A working collection with 567 accessions of hexaploid cultivated oats, including 126 current commercial cultivars from 13 European countries, 46 accessions of *A. strigosa*, 5 accessions of *A. abyssinica* and 34 wild species accessions have been grown in seven field experiments ranging from Estonia to Italy, from France to Bulgaria and sampled for analysis of protein, fat, minerals, total dietary fibre, total and soluble  $\beta$ -glucan, vitamin E (tocols) and avenanthramides. In separate field experiments, plots have been artificially inoculated with a mixture of Fusarium strains

and sampled for mycotoxins analysis. Frost tolerance was studied in the field in Bulgaria, Italy and Romania and with a laboratory test in Italy. Large variability was observed in yield and technical quality (seed weight, test weight, husk content) and better technical quality was produced in northern European conditions.

Analytical work is ongoing, but preliminary results were already presented. High contents of dietary fibre (>10%) were found in some old cultivars or landraces, in a modern Lithuanian cultivar (*Jaugila*) and in wild species. About 50% of the hemicelluloses fraction is  $\beta$ -glucan, a major health promoting agent. Extraordinary high levels of  $\beta$ -glucan were found in accessions of *A. wiestii* (6.8%) and *A. damascena* (6.8%). In harvests from Bulgaria, higher contents of antioxidants were found compared to the contrasting site in Estonia. High tocol contents were found in *A. barbata* and *A. strigosa*. Avenanthramides are a class of antioxidants unique to oats and remarkable health effects

are also anticipated from their similarity to an anti-allergic and anti-proliferative drug. Contents observed in some *A. strigosa* accessions under Bulgarian growing conditions were higher than ever seen before.

Fusarium disease symptoms were rarely observed in oats even after inoculation. Reliable results are achieved only with mycotoxins analysis. Compared to a reference wheat cultivar, much lower DON contamination, but higher T-2 contamination was observed in oats. Old and modern cultivars could be identified with low contamination in all inoculated experiments.

Nine accessions, including modern cultivars, were found to survive very hard winter conditions in Romania 2009/10. Consistent variability for frost tolerance was found in field and laboratory tests. All project results will be included in the European Avena Database. Web applications to manage geographically distributed C & E experiments online will be a further outcome of the project.



AVEQ project partners Photo: C. Germeier, Julius Kuehn Institut, Germany