

## Structure of the oat gene pool at Plant Gene Resources of Canada

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### Canada started as a leader in oat genetic resources research

Oat as a crop for short growing seasons and cooler temperate climates is important for Canada. While global oat production has declined considerably since the 1960s, it has remained relatively stable in Canada. Oat research and breeding in Canada has included a fruitful and close cooperation among Canadian plant breeders, pathologists, cytologists, taxonomists and genebank curators from Plant Gene Resources of Canada and international genebanks starting back in the 1960s. Canadian scientists organized and participated in many collecting missions for oat germplasm in the Mediterranean Region, the Near East and Central Asia between 1964 and 1982, resulting in more than 7000 unique oat accessions at PGRC of nearly all known *Avena* species. New species were described and the systematics of the genus *Avena* were reviewed based on this material (Baum 1977). Intensive characterisation for disease resistances of rust diseases and steady transfer of monogenic resistances from the wild progenitor *Avena sterilis* L. to the common hexaploid oat *A. sativa* are a unique success story in collaboration among dedicated scientists to make use of crop wild relatives in plant breeding. The relevance of crop wild relatives was emphasised more than 100 years ago (Baur 1917) and today this strategy gains momentum again (Loskutov and Rines 2011).

### The world base collection of oat at PGRC

In 1977, PGRC was assigned the task to preserve the base collection of oat germplasm by the International Board for Plant Genetic Resources (IBPGR, today Bioversity International)

(Thormann and Engels 2001). Many world genebanks deposited back-up duplicates of oat samples at PGRC and today the PGRC collection has more than 27,000 accessions of 29 *Avena* species, the largest oat collection in the world (FAO 2010). During recent years, PGRC has focused on regeneration and characterisation of the *Avena* material to ensure that seeds and information about the material are available. The PGRC website ([www.agr.gc.ca/pgrc-rpc](http://www.agr.gc.ca/pgrc-rpc)) is used to disseminate information to order seed material from PGRC. The passport data has been improved and geo-referenced for producing distribution maps. Recent research at PGRC has focused on molecular, morphological and seed quality diversity to better understand the structure of the genepool (Diederichsen 2008, 2009; Fu et al. 2003, 2005). Recent acquisitions of oat occurred during collection missions to Ukraine and Italy. A set of 350 world oat cultivars was added due to collaboration with N. Tinker of Ottawa. Between 1998 and 2013, PGRC distributed a total of 16,061 *Avena* accessions of all species to 29 countries in the world. This underlines the impact the PGRC oat collection has on world- wide oat research and breeding.

### **Outlooks for the PGRC oat collection**

It is presently required to make strategic decisions regarding the PGRC oat collection. None of the International Research Centres (CGIAR Centres) has a mandate for oat, underlining the global relevance of the PGRC oat collection. International coordination could be improved to enhance conservation and utilization of *Avena* diversity in the spirit of the International Treaty on Plant Genetic Resources for Food and Agriculture. Additional collecting of wild and landrace *Avena* material from central Asia may be warranted. PGRC continues to enter Canadian cultivars in the collection; a principal decision is whether PGRC should strive to update the world base collection of *Avena* by adding more recent material from international sources.

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