

## **Taking lentils out of their comfort zone: application of genomics to lentil breeding**

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Canada is the largest producer and exporter of lentil in the world, but the crop did not originate in a temperate climate with a long photoperiod. Lentil is grown in many other parts of the world where the photoperiod and temperature prior to flowering differ dramatically. Cultivars from one region struggle to perform well in other regions due to problems related to phenology, making breeders reluctant to use un-adapted material in their crosses with a subsequent loss of genetic variability. Lentil also has several wild relatives that offer useful genetic variability but using wild germplasm comes with a whole other level of ‘unadaptedness’. To better understand how lentil is adapted to different macro-environments, and to identify markers for genes that control adaptation responses, we grew a diversity panel of 324 accessions for two seasons in nine locations around the world. We collected data on phenology and related traits as well as environmental data at all locations. Several interspecific populations have also been phenotyped for traits related to domestication, agronomy and seed quality to assess the consequences of using them in a breeding program. All lines have been genotyped to better understand the underlying genetic variability and identify regions of the genome that breeders should be aware of when using exotic germplasm.