Agronomic performance of two generations (F_{12} and F_{13}) of thirteen winter wheat composite cross wheat populations with differing cultivation histories in 2014/15.

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As environmental and agronomic conditions are heterogeneous between and within locations, diversity within varieties or crop populations should increase adaptability to the changing and variable range of growing environments. The additional pressure of plant genetic diversity loss, has driven novel breeding approaches such as Composite Cross Populations (CCPs) and other genotype mixtures, thereby increasing both intra- and inter-varietal diversity and ensuring a "wider adaptation" capacity for crop varieties (Döring *et al*., 2011). A winter wheat (*Triticum aestivum* L.) CCP was created by intercrossing 20 varieties in 2001, through collaboration with the Elm Farm Research Centre and the John Innes Institute. In 2005, a seed batch of the F_4 was equally divided and distributed to Hungary and Germany. In 2007, it was decided to submit one of the CCPs to changes in environments every year. A pattern was developed between eight partners whereby these "cycling" populations would be grown in a plot of >100m^2 and sent to the next cycling partner the following year. The aim of the project was to compare a total of 13 populations that all originated from the same seed batch in 2005, but that have been exposed to vastly different climatic conditions over time, in one site (Germany). In 2014/15, the second experimental year, saved seed from 2013 (F_{12}) and harvested seed from 2014 (F_{13}) were sown, in order to compare two generations in one growing season. The experimental year 2014/15 was characterized by long dry periods, particularly between February and June 2015, and under these dry conditions most populations outyielded the selected reference varieties. There was no effect of differential seed size of the two generations for most agronomic characteristics for each population. Although the harvested TGW of both the F_{12} and the F_{13} of each population was not significantly different from one another, there were still significant differences of harvested TGW between the populations in the F_{12}. These significant differences of harvested TGW were no longer present in the F_{13} between each population after one year under the same management system. These results indicate that the heritability of seed size is low as has been shown before (Silvertown, 1989) and that seed size variation tends to be a result of phenotypic plasticity, which is thought to be adaptive, especially as the result of environmental variation (Marshall *et al*., 1985; Vaughton and Ramsey, 1998; Lehtilä and Ehrlén, 2005).