Assessment Of Lentil Seed Quality; Inherent Longevity And Its Progression Through Development

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There are many circumstances in which it is both beneficial, and important, to be able to predict the effect the environment has on the longevity of seeds – whether they are being stored short-term, e.g. between growing seasons, or long-term, for hundreds of years in genebanks. The Australian Grains Genebank (AGG) is the national programme for preserving grain crop genetic resources for Australia and, like all active genebanks, it has a mandate to conserve and maintain viable seed for use in plant research and/or breeding programmes. However, for this to be a reality, we must be able to manage our seeds effectively (i.e. ensuring timely regeneration), therefore, understanding inter- and intra-species differences in seed longevity is critical as it underpins decisions on accession viability retest intervals, regeneration and/or recollection.

Equations for predicting seed longevity for a particular species under a constant set of temperature and humidity conditions were developed from the 1960's onwards and underpin all seed conservation practices. For orthodox seeds which can tolerate being dried down and stored at subzero temperatures, longevity increases in a predictable manor with a decrease in temperature and moisture content. However, the level of sensitivity to these environmental conditions differs between species resulting in inter-specific differences in longevity. These sensitivity parameters, more commonly known as seed viability constants, need to be estimated for each species. To date, these have only been determined for approximately 70 mostly crop species which is a very small proportion of the world's plant species. The AGG's pulse collection contains over 28,300 accessions, with field pea (c. 6,332), chickpea (c. 9,114) and lentil (c. 5,328) the three largest crop groups. The seed viability constants for both chickpea and field pea were discovered in 1988, whereas, the inherent longevity of lentil is still unknown. This poster will outline the experiment(s) which aim, firstly, to determine estimates for these species-specific parameters for lentil, and secondly, to broaden our understanding of lentil seed quality (physiological) development in relation to time. This will form the basis of several follow-up experiments where we plan to delve deeper into the genotype-by-environment interaction which, affects three important facets: the value of maximum seed quality; the time when it is first attained during seed development and maturation; and for how long it is maintained thereafter *in planta*. The outcome of this research will help shape our regeneration procedure to ensure seeds are at their maximum quality when placed into storage hence, optimising longevity, and limiting loss of genetic integrity. This will ensure that the AGG provides high quality seed to Australia's research and breeding programmes for the development of more resilient grain crop varieties into the future.