The Genetics of aged seeds

The Royal Swedish Academy of Agriculture and Forestry seed collection comes from a series of collections made in the late 19th and early 20th century. It includes more than 3000 collects from a large variety of species and geographic origins, primarily seeds. This collection is now the target of a study using molecular genetics tools. The research is conducted by The Swedish museum of cultural history in collaboration with Linköping University and Uppsala University. Below are some suggestions of possible degree projects ("exjobb"). However, the seed collection is so extensive, many other interesting aspects can be studied as well. Only the imagination (and sadly money) sets the limit...

Integrity of seed bank propagation
Some land races are being maintained in gene banks as a source of genetic variability. How good is the quality of gene bank propagation? Are landraces in gene banks being kept free of contamination? Is variability being lost over time through genetic drift (or selection)? By comparing specimens from present day gene bank samples with those collected 100 years ago questions like these can be addressed. As a possible extension of the project (or in collaboration with others), effects of species and breeding type (inbreeder/outcrosser) can be investigated.

Genetic characterisation of modern plant breeding traits in land race crops
Many of the traits important for the development of modern day crop varieties are known and encoded by "key alleles" at simple Mendelian genes. For example, in cereals, major genes regulating plant height, photoperiod response and free-threshing have been identified. In many cases these alleles have been introduced into the Swedish crops from varieties from other countries or even continents. To what extent were these key alleles present in the Swedish land races before modern plant breeding practices? To what extent could our native plant material have been a source of plant improvement?

Genetic variability in Swedish land race crops
The genetic variability is generally considered to be higher in land race crops than in modern varieties, and modern plant improvement is thought to have led to a reduction in plant genetic variability. By using seeds from land races collected before modern breeding practices began this can be studied. It is also possible to study the genetic variability over a geographical region on a scale of interest.

The genetics of extinction
With the development of modern farming practices many previously common weeds are now gone extinct or very rare. How is the genetic variability of a species affected by a large reduction in population size? Are some species more tolerant to a reduction in population size? Can plants maintain a higher level of variability than what is predicted theoretically? Compare old collects of "Sweden's most common weeds" with present day collects of the same species to address questions like this. This project will include field-work to collect

present day plants.

Degree projects can be carried out either in Uppsala or Linköping. Prior knowledge in molecular genetics is required. If you are interested in any of the above projects or have ideas for a project of your own, or are just curious to find out more about the seed bank, don't hesitate to contact Matti Leino (Matti.Leino@nordiskamuseet.se, 0150-48 75 40) or Jenny Hagenblad (Jenny.Hagenblad@ebc.uu.se, 018-471 28 63).