



## The Legacy of Ken Frey – and an Appeal for Help.



Kenneth J. Frey was born in 1923 and [passed away in 2013](#). He was a [distinguished oat breeder and geneticist at Iowa State University](#) from 1948-1993.

Ken realized the importance of *Avena sterilis* as a source of genetic variation to broaden the *A. sativa* gene pool. He also realized that, in order to capture the wild alleles, they had to become accessible in a domesticated background. For this, he used recurrent selection in gene pools containing new alleles for specific traits.

Some of the traits for which Ken mined alleles from *Avena sterilis* included:

- 1950's -60's: crown rust
- 1970's-1980's: high protein, high yield, vegetative growth rate
- 1980's-1990's: high oil, high beta-glucan, phenotypic stability.

He also developed a fast track recurrent selection system, with a one year Co-C2 cycle in the field and two greenhouse generations.

Ken's philosophy was to “make the alleles available” and some of his many contributions included:

- pioneering the use of Multilines (M68, M69) against crown rust
- studying near-isogenic lines and coining the term “linkage drag” ([Brinkman & Frey 1977](#))
- developing the hill plot
- developing the theory of breeding for marginal conditions and organic agriculture
- screening *Avena sterilis*: anticipating DIVSEEK decades before it was developed
- educating >100 graduate students, including many women.

Some of Ken's other discoveries included:

- [Thro & Frey \(1985\)](#): groat oil % in *A. sativa* and *A. sterilis* have similar ranges – 4 to 9% - and the alleles are complementary and additive
- [Frey and Holland \(1999\)](#): from Co to C9, oil content could be increased from 9.8% to 15.9%.

Ken developed recurrent selection populations for protein, yield, high growth rate, high beta-glucan, and high oil. Until 1982, he deposited these populations in the US and Canadian gene banks. The lines currently available as genebank accessions include:

- National Small Grains Collection (USA): 79 lines (57 crown rust, 11 growth rate, 6 high protein, 1 beta-glucan, 3 others)
- Plant Genetic Resources of Canada: 38 (traits not given, but 9 high protein, some high growth rate, crown rust)



- Norway: 44 lines (25 high protein, 8 high oil, 2 high growth rate, 8 others).

Unfortunately, later stocks were not deposited and the seed store at ISU was destroyed in 2013 before anyone checked. However, Ken had distributed his stocks widely, so these populations may still be out there. He had a certain distaste for the tendency to produce “slick papers” without lasting value; his legacy, however, really has lasting value. It would be very sad and a great loss if his populations - based on decades of dedication - were not made known and available.

**Who else may have some on the shelves? These need to be recovered and deposited in NSGC and PGRC.**

If you have any of these lines, or know of someone who does, please get in touch with me at [asmund.bjornstad@nmbu.no](mailto:asmund.bjornstad@nmbu.no).

Thank you very much for your help!

-Åsmund Bjørnstad, NMBU, Norway  
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