



“Development of forage oat cultivars with improved yield and nutritive value”

## IMPROVED FORAGE OATS

**PROJECT NO.:** 0009-027

**RESEARCH INSTITUTION:** University of Saskatchewan

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**Background:** Barley and oats are important annual forage crops used in western Canada for silage, green feed and swath grazing. Barley has been more widely used because it has higher forage quality than oats. However, oats generally has a considerable forage yield advantage over barley and other annual cereals in the moister environments of the black and grey wooded soil zones.

Oats have been generally selected for grain yield and quality rather than forage yield and quality. These researchers previously discovered oats with low lignin levels in the hull. Because lignin is difficult to digest, developing oats varieties with low lignin levels in the forage raise the digestibility and forage quality of oat greenfeed or silage.

**Objectives:** to improve the yield and nutritive value of forage oats by:

1. Incorporating the low lignin hull trait into standard forage oat cultivars; and
2. Improving the yield and quality of standard forage oat cultivars through crosses with high yielding and/or lower fiber oat lines.

**What they did:** Advanced generation lines of 18 crosses were used in this study. It is important to remember that any type of plant breeding takes a considerable amount of time, and therefore the results of this study also

represents many years of work, along with providing promising genetic lines for future development.

Lines were planted (along with parents and reference cultivars) in the dark brown soil zone (Saskatoon) and black soil zone (Melfort) for 4 years beginning in 2009. Various oat lines begin their trial tests in a preliminary oat yield trial. If they show promise in that preliminary trial, they move into a second round of trials. After two years of testing, superior lines from the secondary trials are considered for commercialization.

Dry matter yields were determined at the soft dough stage, and subsamples were taken to analyze percent dry matter, crude protein, acid detergent fibre, and neutral detergent fibre. CDC Baler (a common forage oat cultivar) and CDC Weaver (a grain oat cultivar) were used as controls. Promising lines were also incorporated as parents into the ongoing oat breeding program.

**What they learned:** In 2009 and 2010 (and years previous), two lines showed consistently higher yield and somewhat lower fibre than the control variety, CDC Baler. One line, now named CDC Haymaker, was licensed to SeCan Association and breeder seed has been provided. CDC Haymaker also averaged a higher protein content than CDC Baler. The other line’s performance was quite similar to CDC Haymaker, and a decision has been deferred on the release of this as a new cultivar. In 2011, seeding was delayed due to excessive moisture, and none of the

experimental lines outperformed CDC Baler in yield, and only a few were lower in fibre, with the exception of the second variety mentioned above. 2012 saw a high incidence of crown rust in the trial plots. Almost all of the lines were susceptible and this affected the yield significantly. However, three test lines did show resistance to crown rust and were superior in yield and quality to susceptible lines, and these lines are undergoing further testing.

During this study, the grain cultivar CDC Weaver displayed suitable forage characteristics, displaying higher yields and lower fibre content than CDC Baler in most of the experimental trials.

**What it means:** A new forage oat cultivar was released as a result of this project, combined with previous years' testing results. CDC Haymaker will have certified seed available in 2015. CDC Weaver, a grain cultivar currently available has superior forage characteristics, and is an alternative to CDC Baler until CDC Haymaker becomes available. CDC Weaver seed is available by contacting FP Genetics Inc. (<http://www.fpgenetics.ca>).

The forage oat breeding program at the University of Saskatchewan also hopes to further evaluate the promising lines in this project, such as the ones exhibiting resistance to crown rust. If these lines continue to show advantages in yield and forage quality in future trials, they will be released as new cultivars, with seed becoming available in 2019 or 2020.

The development of new oat cultivars with lower fibre content means that digestibility is improved. Coupled with the tendency of oats to out-yield barley, as well as comparable protein content, forage oats are a practical alternative to barley for swathgrazing, silage, and greenfeed.



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