



# Fusarium Head Blight of Oat

## Identifying Resistant Oat Breeding Lines at Agriculture and Agri-Food Canada's Cereal Research Centre

J. W. Mitchell Fetch<sup>1</sup>, A. Tekauz<sup>1</sup>, B.G. Rossnagel<sup>2</sup> and M. E. Savard<sup>3</sup>

<sup>1</sup>Agriculture and Agri-Food Canada, Cereal Research Centre, Winnipeg, Manitoba, Canada

<sup>2</sup>University of Saskatchewan, Crop Development Centre, Saskatoon, Saskatchewan, Canada

<sup>3</sup>Agriculture and Agri-Food Canada, Eastern Cereal and Oilseed Research Centre, Ottawa, Ontario, Canada



Jennifer Mitchell Fetch

Fusarium head blight (FHB), incited by *Fusarium graminearum* Schwabe and other *Fusarium* spp., is a prevalent disease of oat in Canada. In Manitoba, the presence of deoxynivalenol (DON) in locally produced oat was first detected in 1998 (McCallum et al., 1999). *Fusarium* species infestation of oat seed has been monitored through annual disease surveys since 2002 in Manitoba and 2004 in Saskatchewan. This, and grain contamination by DON has been reported for southern Ontario since 2005 (Canadian Plant Disease Survey 2002-2007).

Figure 1. Fusarium head blight on oat



Table 1. Percentage of oat kernels infected with *Fusarium* species in Manitoba (2002-2007)

Year	2002	2003	2004	2005	2006	2007	Mean
% Infected Kernels	12	2	10	6	14	13	9.5

In Manitoba, commercial oat fields were surveyed following heading by collecting panicles at random, because few visible symptoms of FHB are evident in standing oat crops. The oat seed present was subsequently sampled for the level of *Fusarium*. Based on the presence of *Fusarium* on seed, the incidence of FHB in Manitoba oat fields surveyed ranged from 36% (2004) to 100% (2002). In Ontario, the incidence was 100% for each of 2005, 2006, and 2007. The proportion of oat kernels infected with *Fusarium* for commercial oat fields in Manitoba is shown in Table 1.

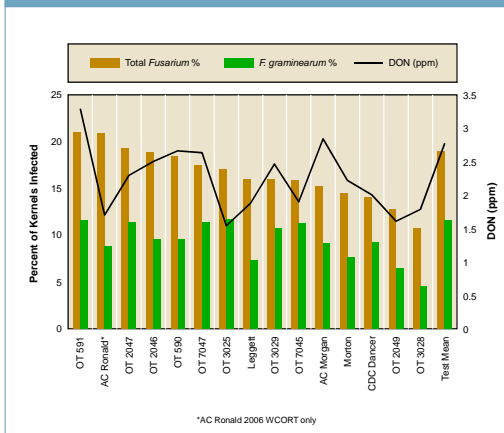
This average level is in contrast to the much higher level of 50% reported from an oat crop at maturity, a level higher than that found in comparative fields of wheat or barley (Tekauz & Mueller 2007). Mid-season sampling for FHB may therefore underestimate final infestation (and DON) levels.

The incidence of FHB in Saskatchewan oat fields was 20% in 2004, which increased to 40% in 2006 and 59% in 2007. The predominant species found in all of the provincial surveys (SK, MB, ON) were *F. poae*, *F. avenaceum*, *F. sporotrichioides* and *F. graminearum*.

To minimize damage and mycotoxin contamination, suitable sources of FHB resistance need to be identified and used in oat breeding programs to develop cultivars suitable for production in FHB-affected environments. In addition, the resistance status of advanced breeding lines (Western Cooperative Oat Registration Trial - WCORT) needs to be determined, as does that of cultivars already being grown commercially. This information would enable extension personnel to make sound recommendations so growers can select cultivars best suited to their production regions.

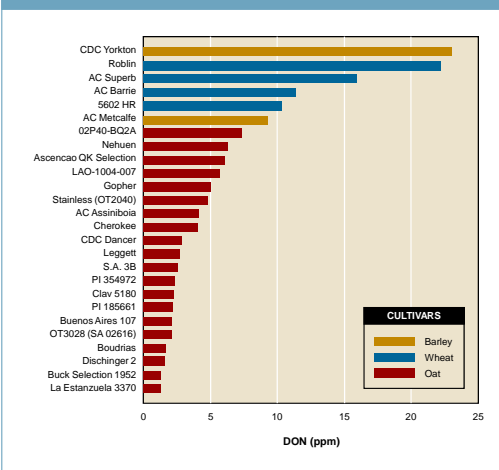
The resistance status of oat germplasm is being evaluated by screening advanced breeding lines as well as exotic oat accessions in a mist-irrigated artificially-inoculated FHB Disease Nursery. This screening nursery was first established in 2003 at Portage la Prairie, Manitoba.

Figure 2. Reaction of selected WCORT entries to *Fusarium* in 2006 (PLP & GLE) and 2007 (PLP) FHB Nurseries



\*AC Renard 2006 WCORT only

Figure 3. DON levels in oat accessions and check cultivars of oat, wheat and barley grown in the 2007 FHB Nursery at Portage la Prairie, MB



Figures 2 and 3 show the reaction of several lines evaluated in these nurseries in 2006 and/or 2007. Two advanced breeding lines and several exotic accessions with the lowest levels of *Fusarium* seed infestation and/or accumulated DON have been identified among the hundreds of lines tested during the past two years. Several of these (OT 3028, OT 2049, La Estanzuela 3370 etc.) may be considered as "moderately resistant" to FHB. These lines are being utilized as donors in the current crossing program at the Cereal Research Centre. Such crosses could result in the release of an FHB-resistant oat cultivar within 8-10 years.

### References

- McCallum, B.D., et al. 1999. Fusarium head blight in oat. 1<sup>st</sup> CWFHB Proceedings, Winnipeg, MB.  
 Tekauz, A. and Mueller, E. 2007. Are fusarium head blight survey data meaningful and reliable? 5<sup>th</sup> CWFHB Proceedings, Winnipeg, MB.

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