

A Time Course of Scab in Developing Field-Grown Wheat Spikes



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Whole-crop cereals as animal feed

Ensiling (fermentation)

- Milk to soft-dough
- Medium dough (higher dry matter)





Grass silage, **wholecrop wheat** and triticale and peas are ensiled in the same clamp.

Dairy farmer Andrew Addison, Spittals Farm, Low Moor, Penrith, UK -- Jennifer MacKenzie

Wheat Silage for Beef Cattle

Homer B. Sewell

Department of Animal Sciences
(1993)



**Wheat Silage is Option
for Farmers Needing
Feed (June 1997)**

University of Florida IFAS Extension

Triticale as a Forage Crop for the Southeastern United States

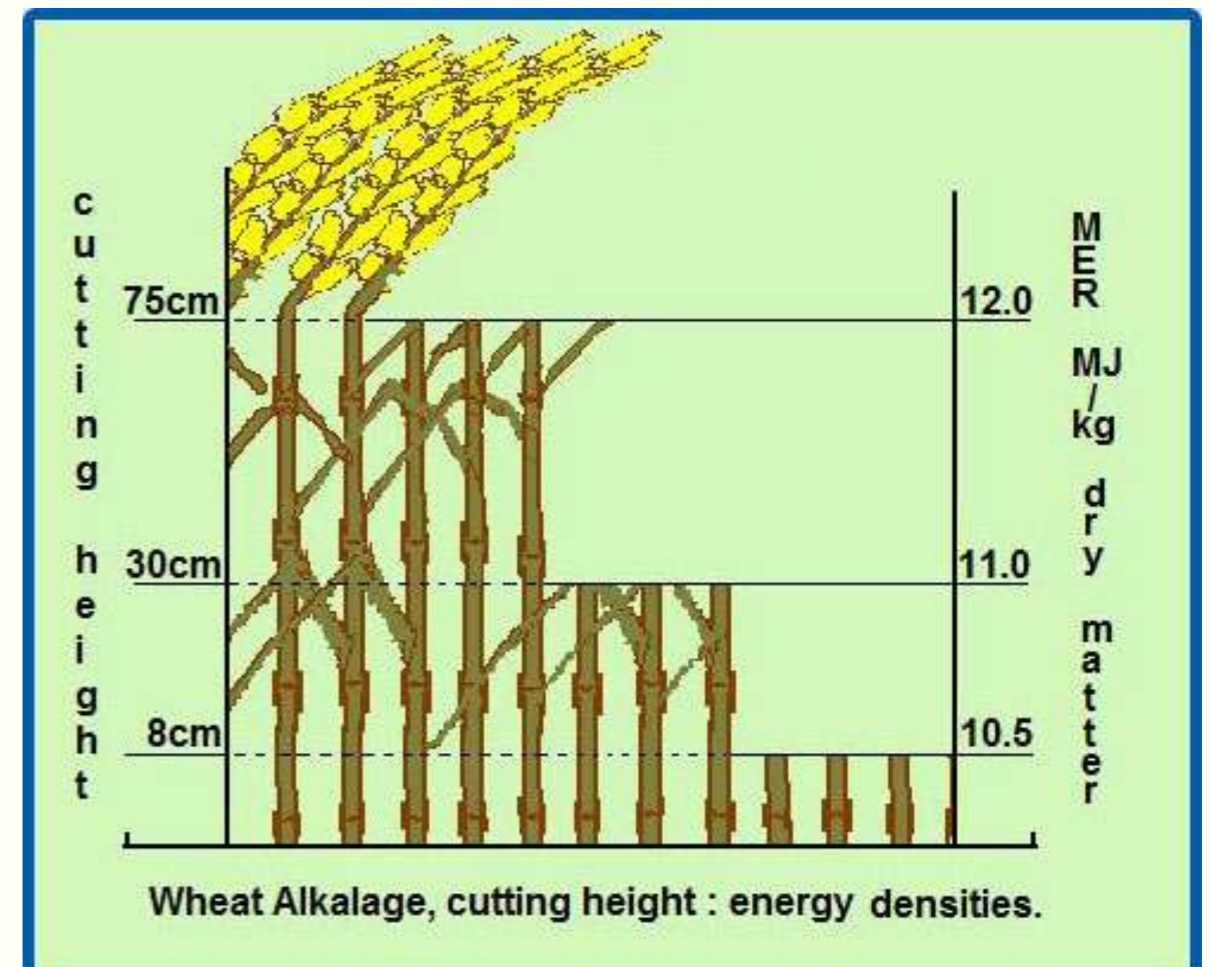
Bob Myer, Ann Blount, Cheryl Mackowiak, and Ron Barnett (2009)

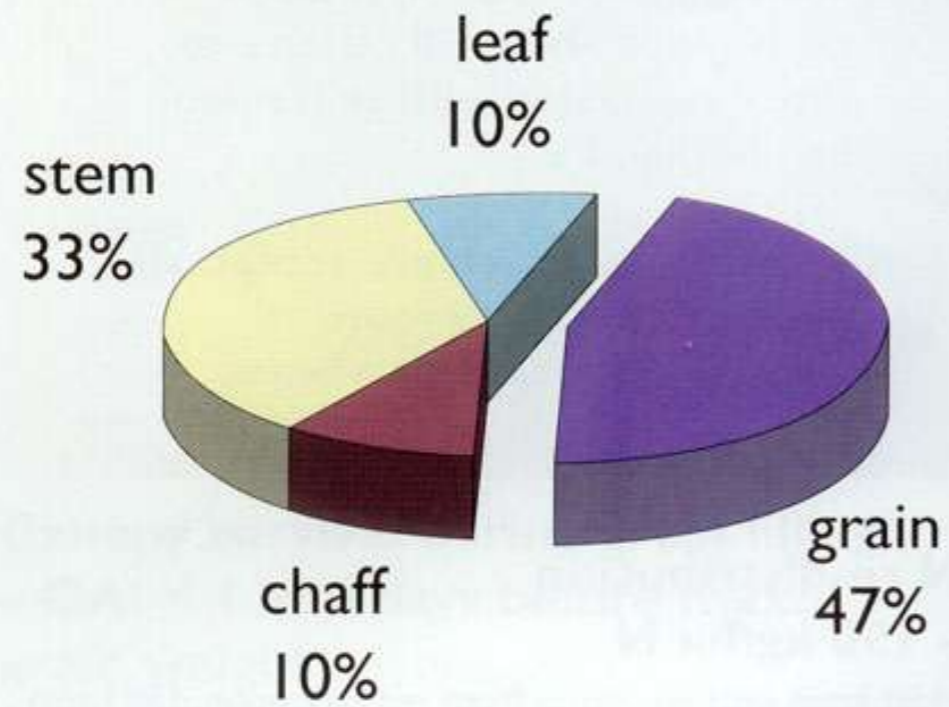


Winslow, Ltd., New Zealand

Alkalage – treatment with urea or urea-based additive

- High dry-matter (550 to 800 g/kg)
- At or near physiol. maturity





**Typical
components
of a mature
winter wheat
plant**



www.fiveflp.com

Walsh et al, 2008,
Anim. Feed Sci Tech
144:257-278



We eat straw!

Amanda Van De Kerckhove, Saskatchewan



www.pig-farming.blogspot.com



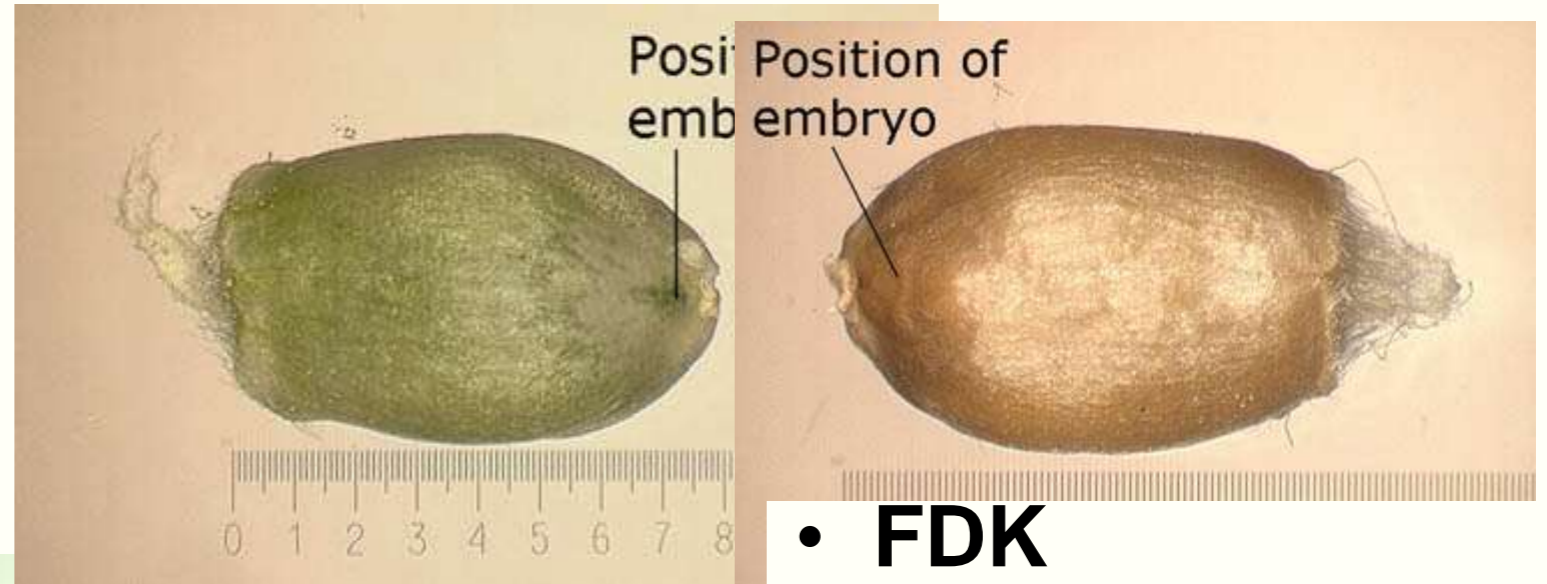
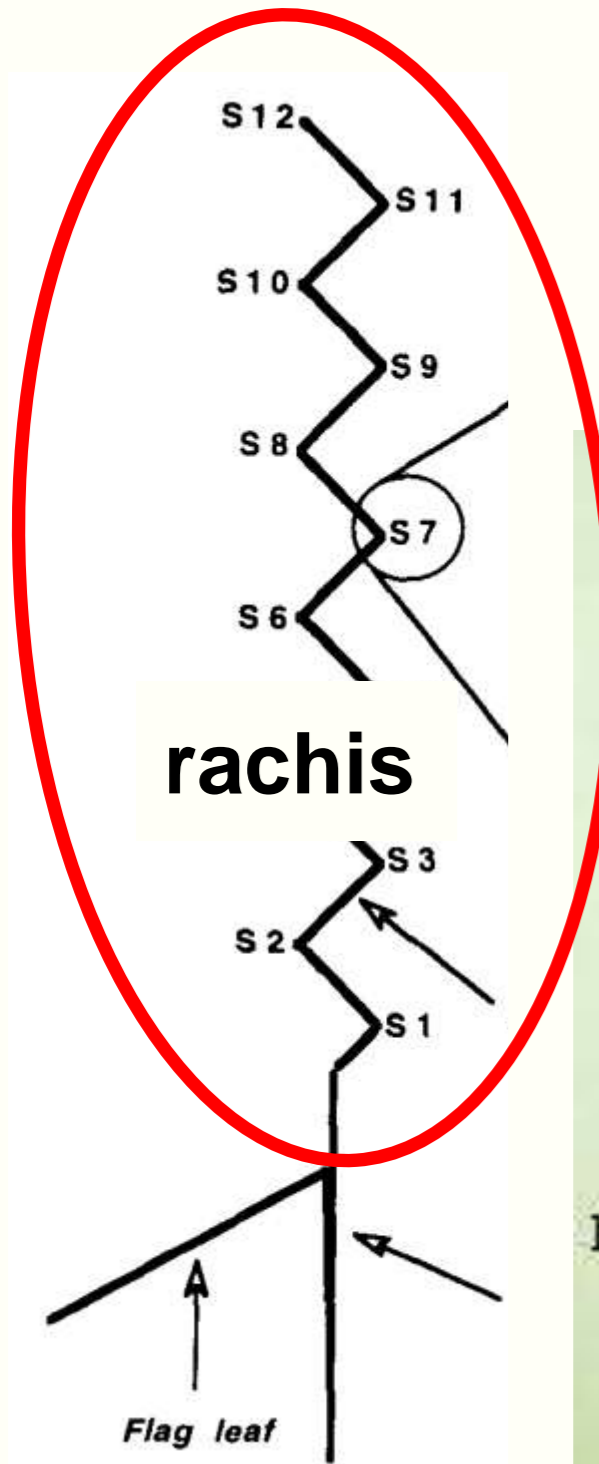
Two-year field experiment in Kinston, NC

- 2006: 8 cvs
- 2007: 4 of them
- Spray-inoculated at mid-anthesis
- Misting: 0, 10, 20 or 30 days
- Sampled 30 spikes per plot: 14, 24, 34, 44, 54, 64 daa
- Visible symptoms at ~20 daa -> index

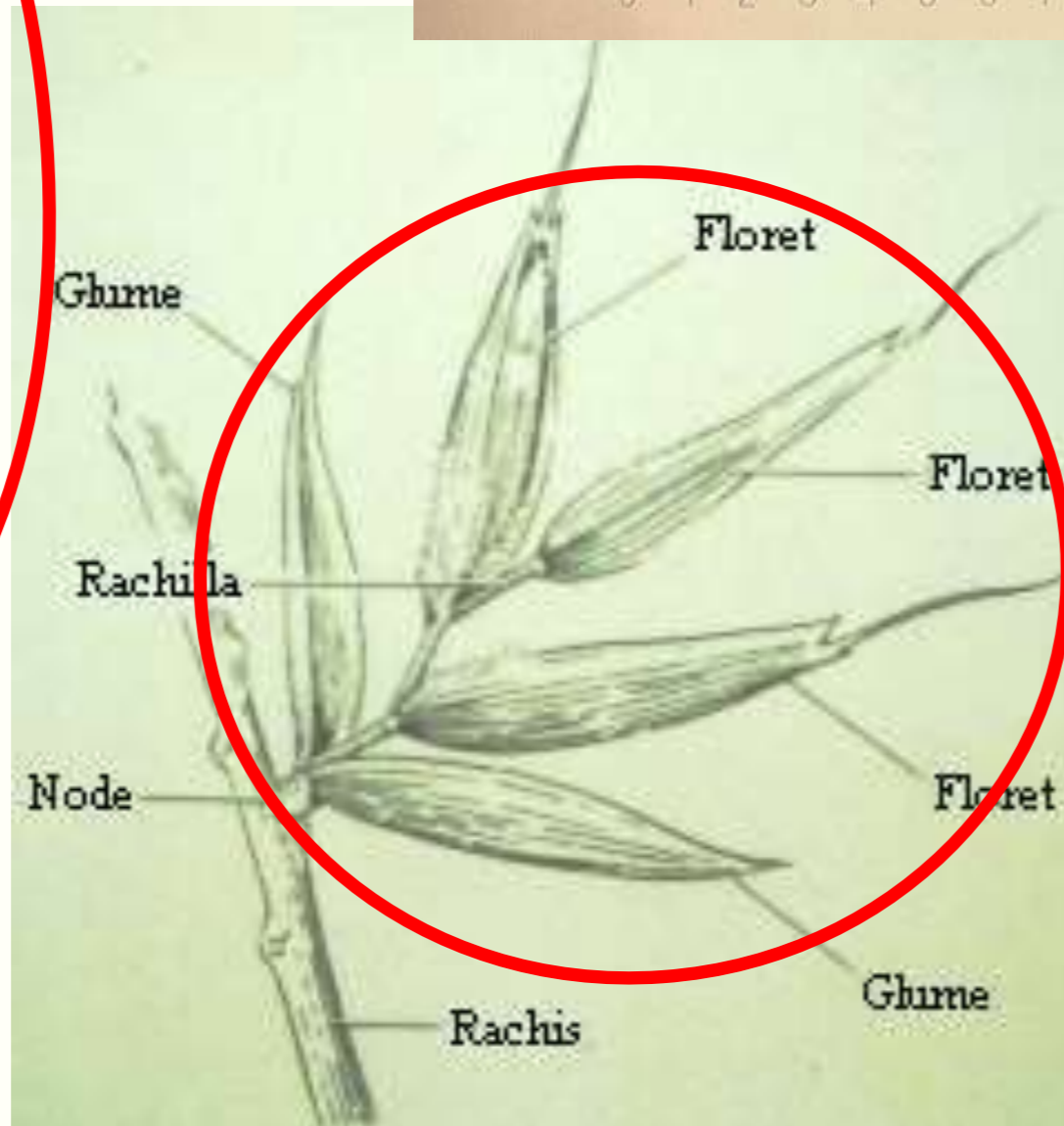


Separated into:

kernels



- **FDK**
- **% infected kernels (PIK)**
- **DON**

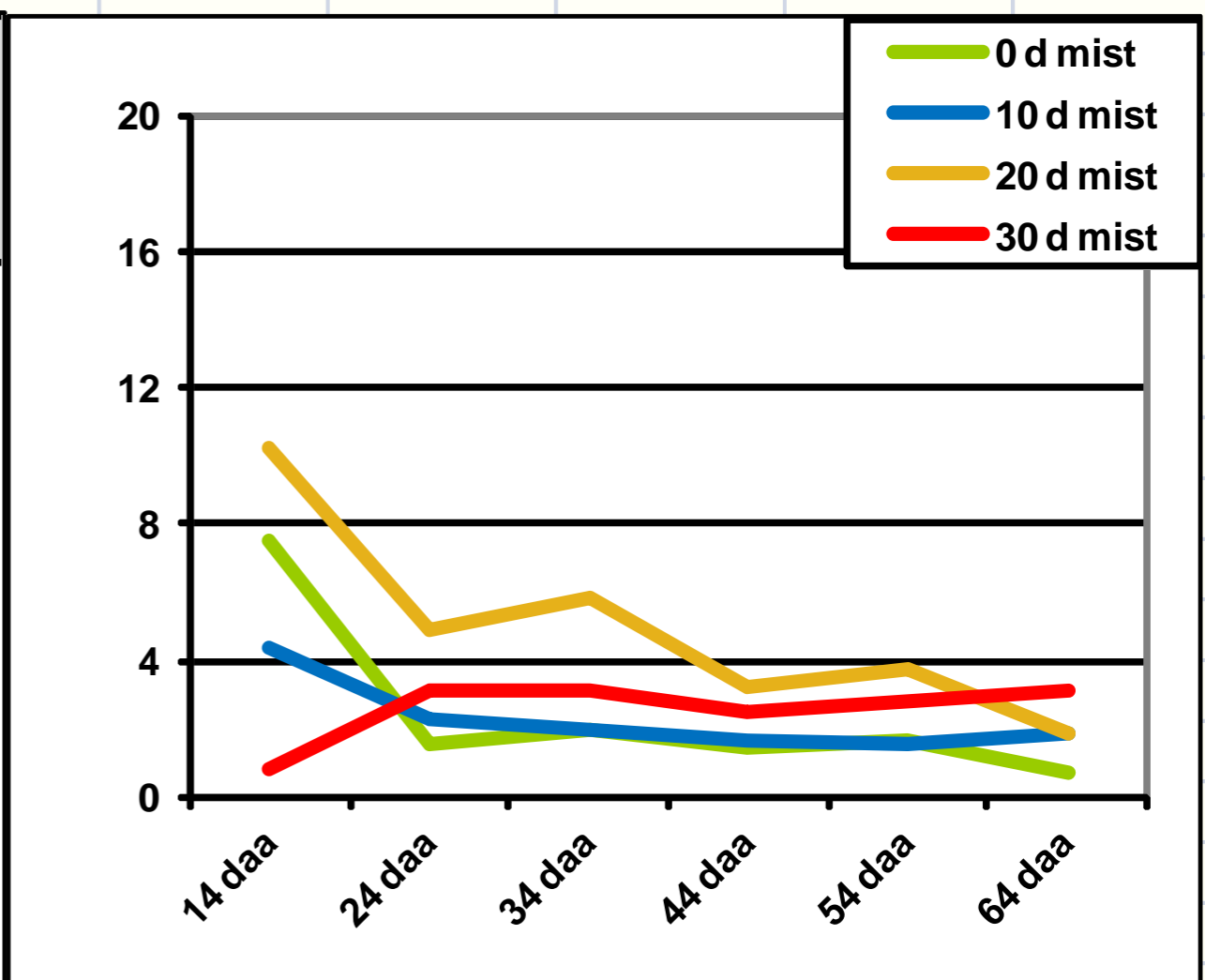
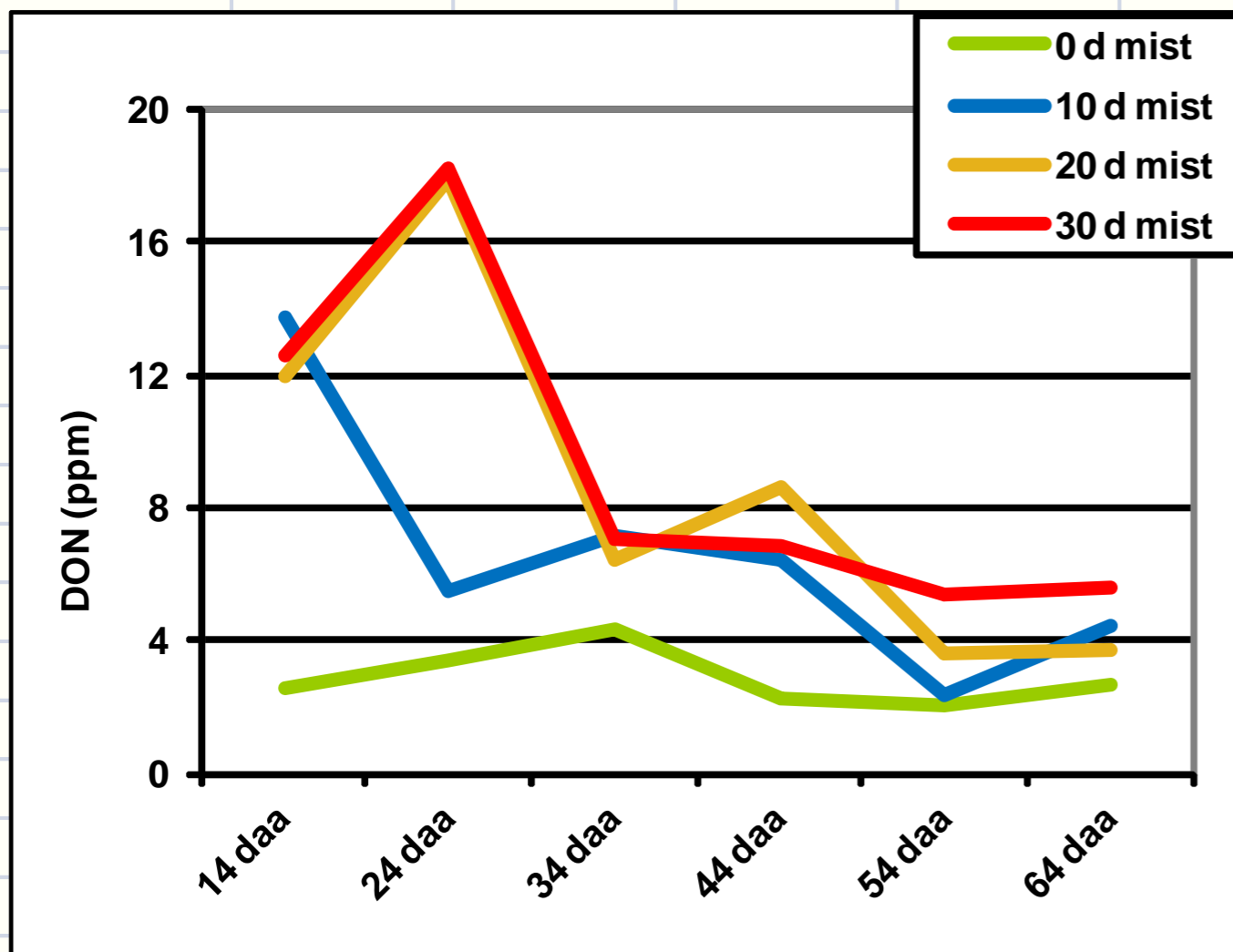


Glumes, lemma, palea

Grain DON

2006

2007



Med milk Hard dough Early KH KH Harv ripe Kern loose

Med milk Hard dough Early KH KH Harv ripe Kern loose

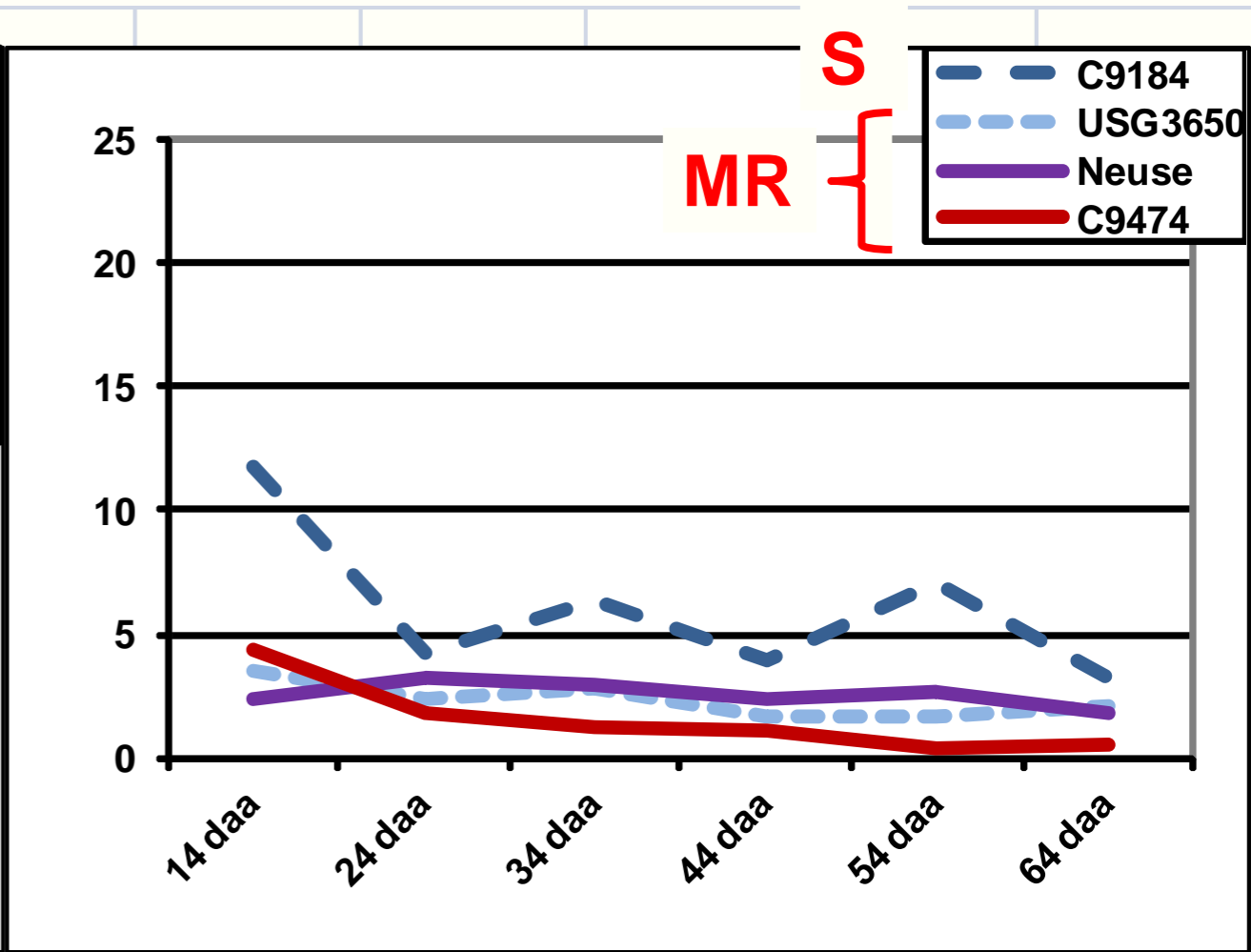
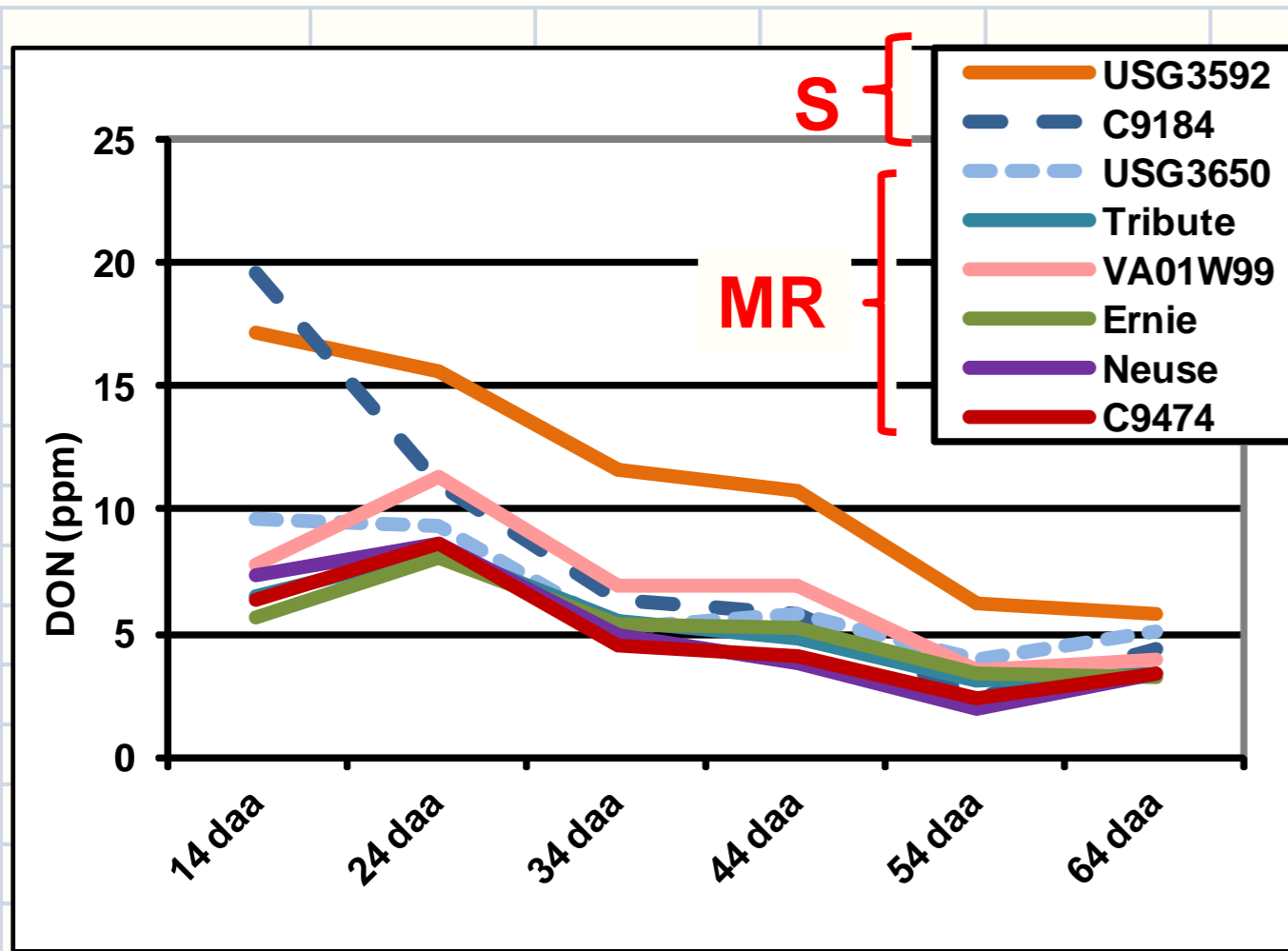
← 166 mm rain →

← 94 mm rain →

Grain DON

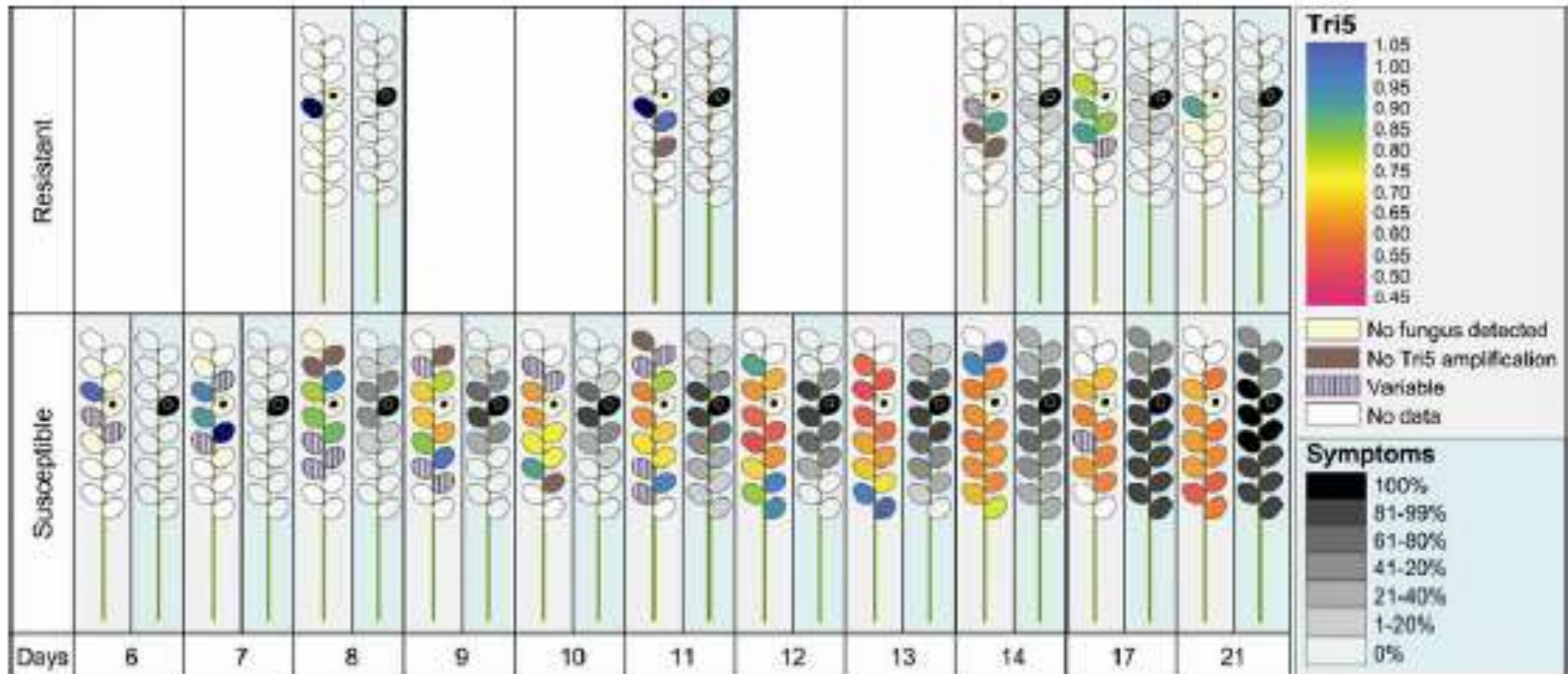
2006

2007



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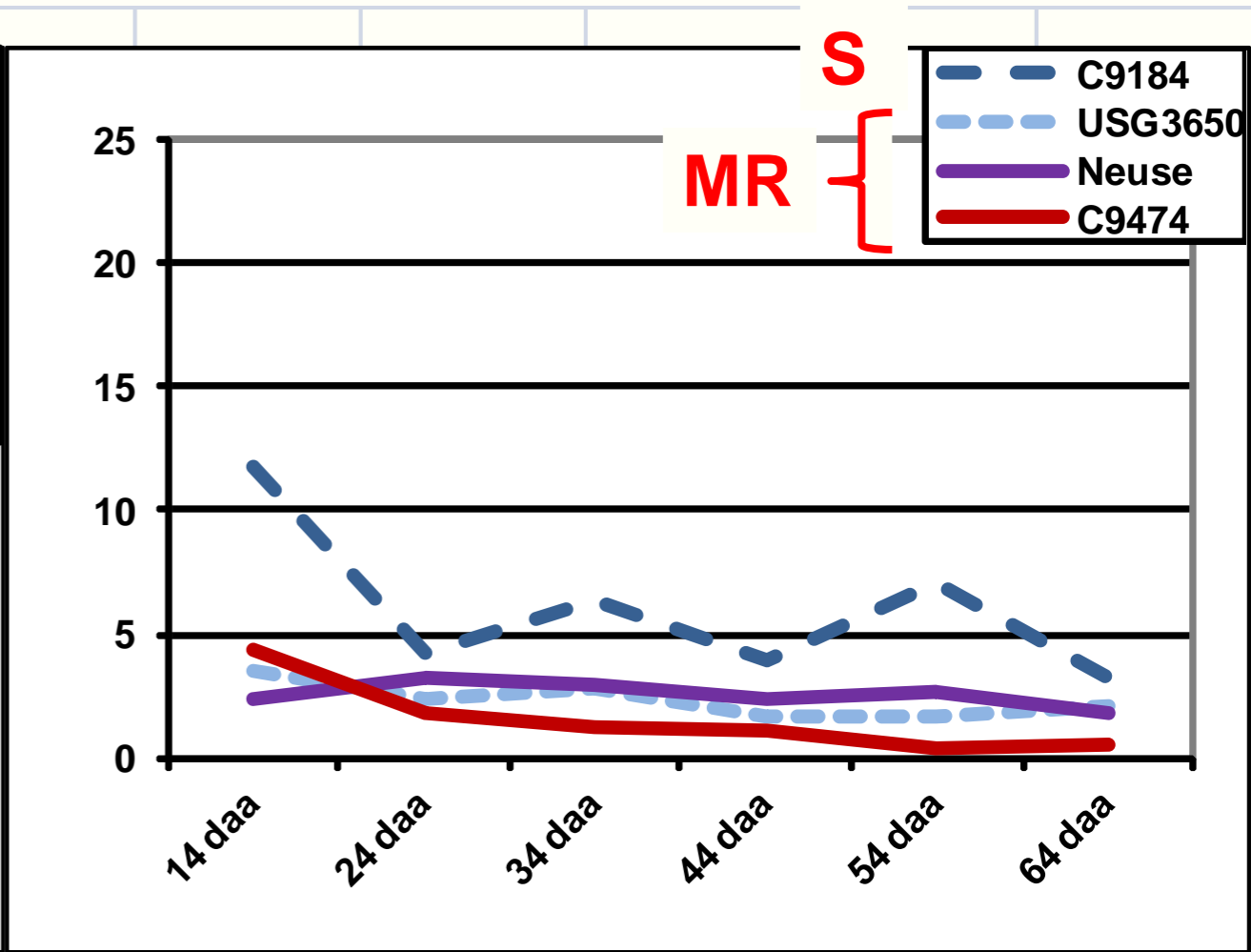
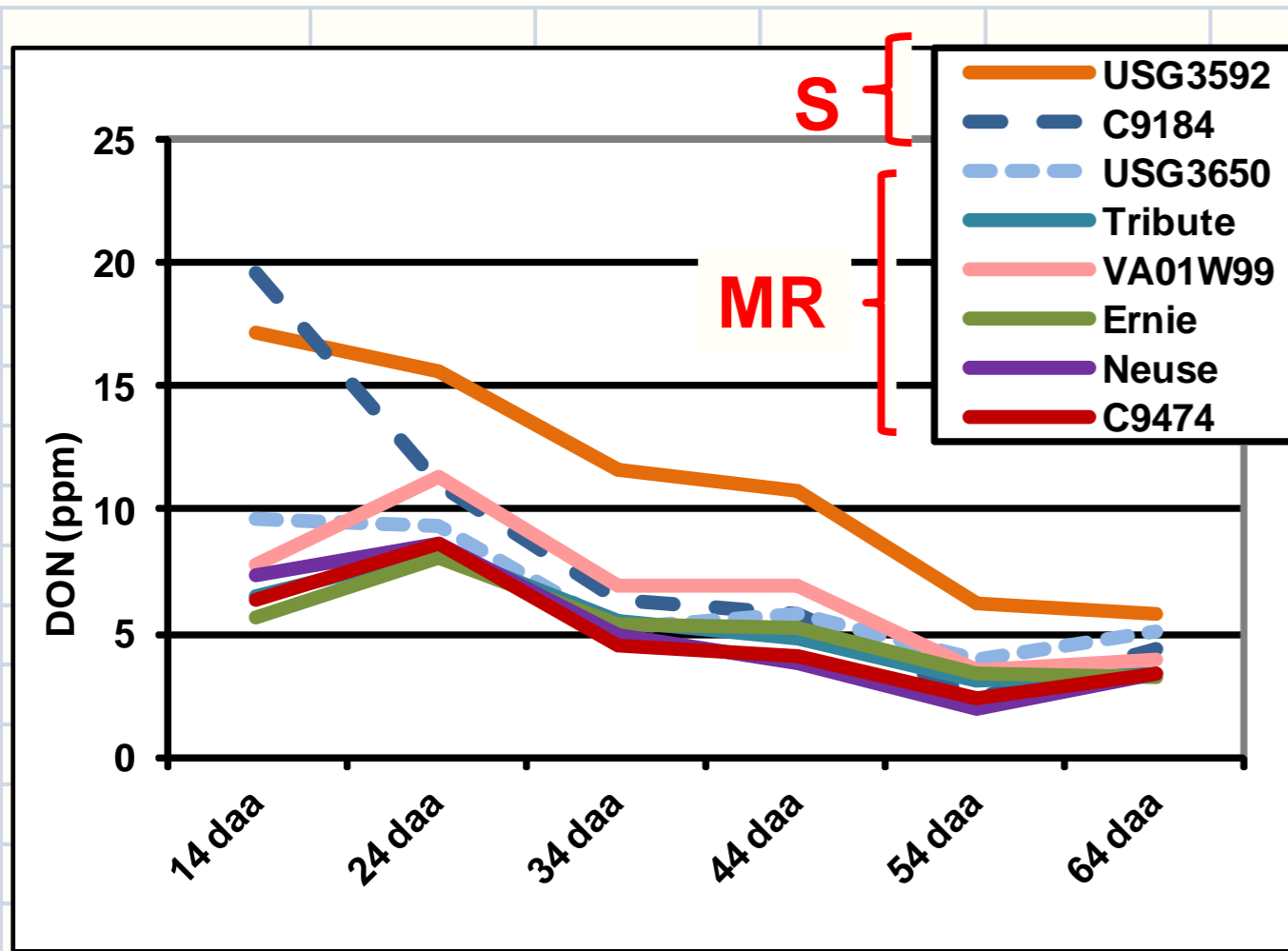


- **DON biosynthesis**
 - maximal at the infection front before symptom development
 - drops after infection

Grain DON

2006

2007



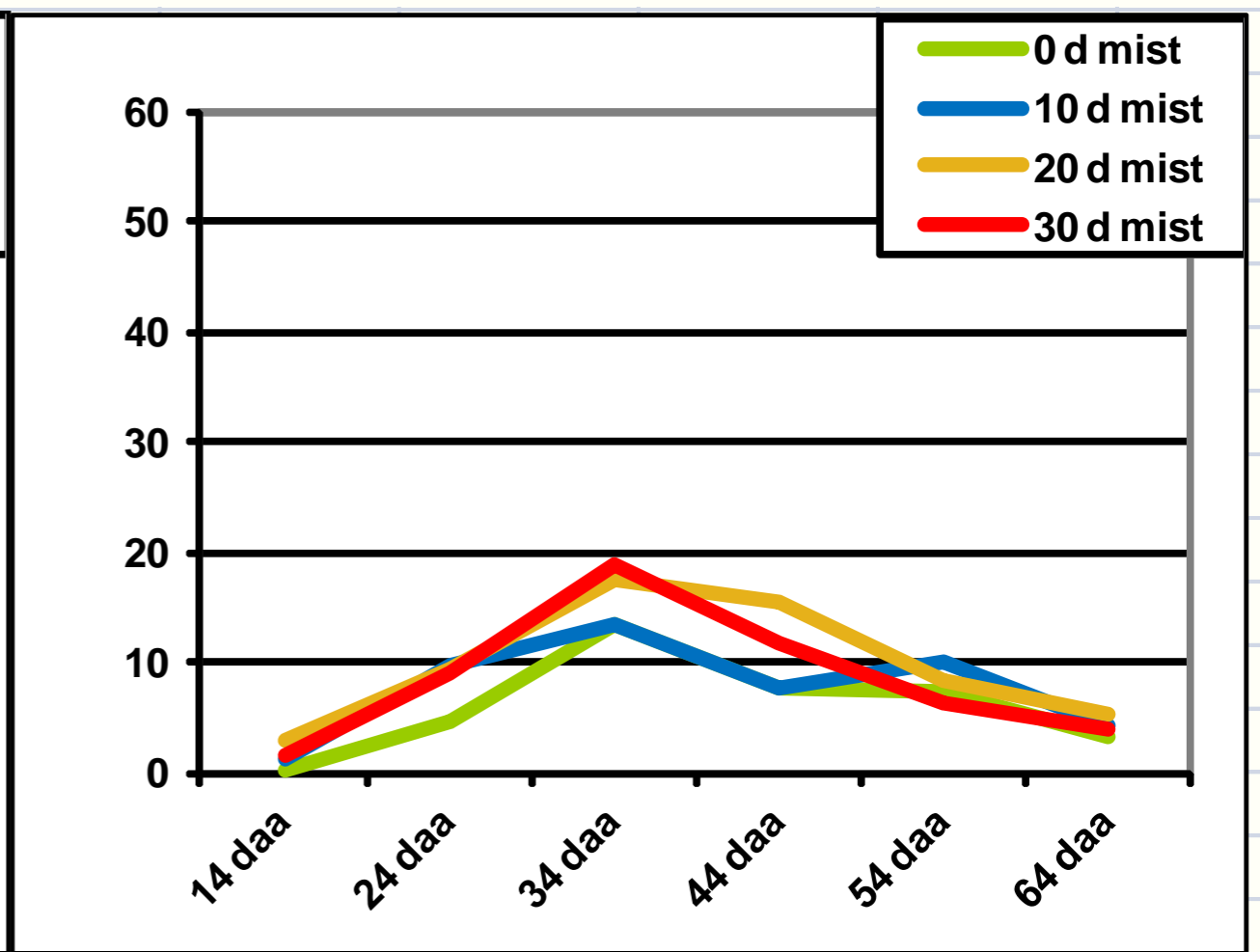
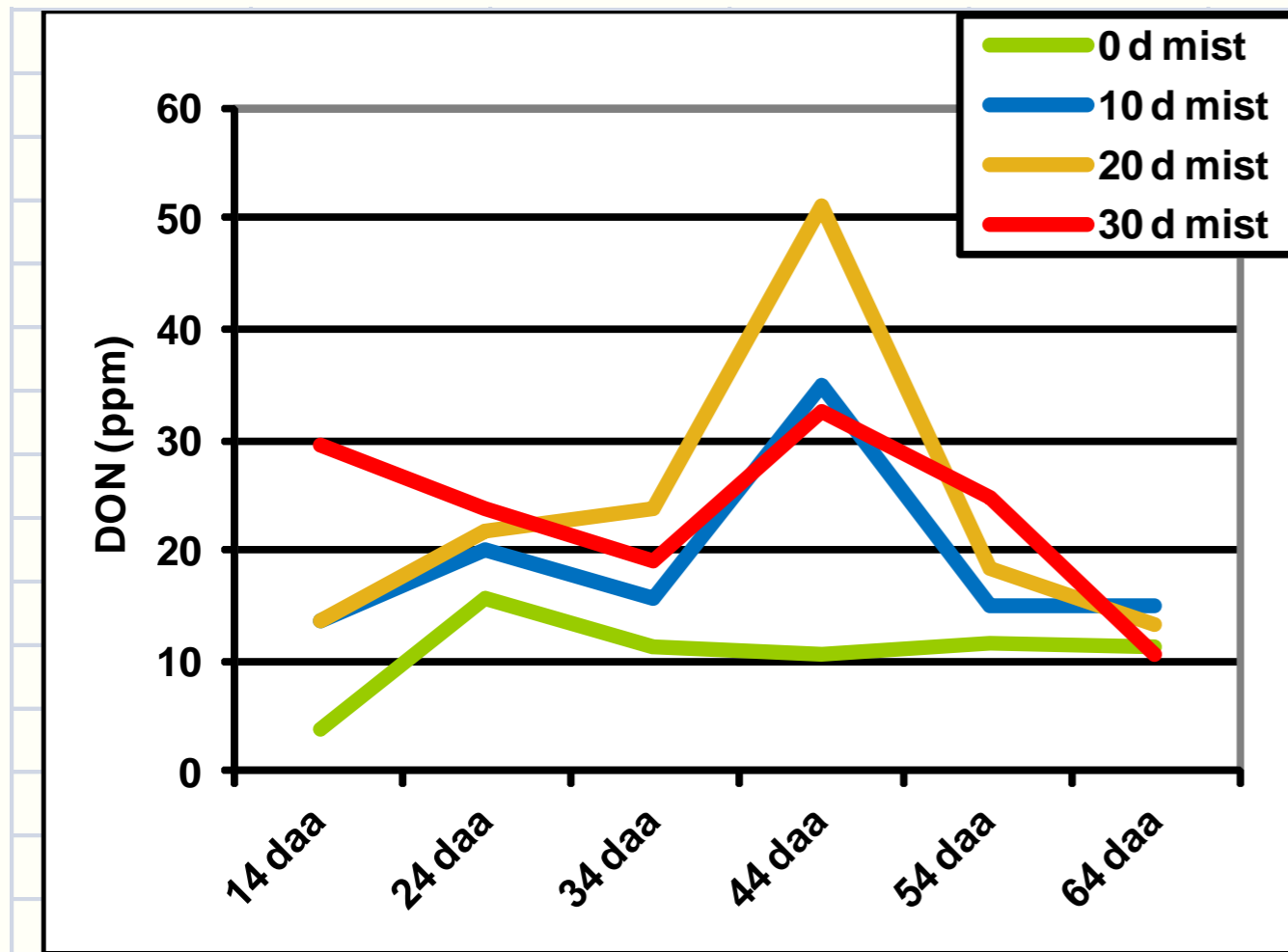
Med milk Hard dough Early KH KH Harv ripe Kern loose

Med milk Hard dough Early KH KH Harv ripe Kern loose

Glume DON

2006

2007



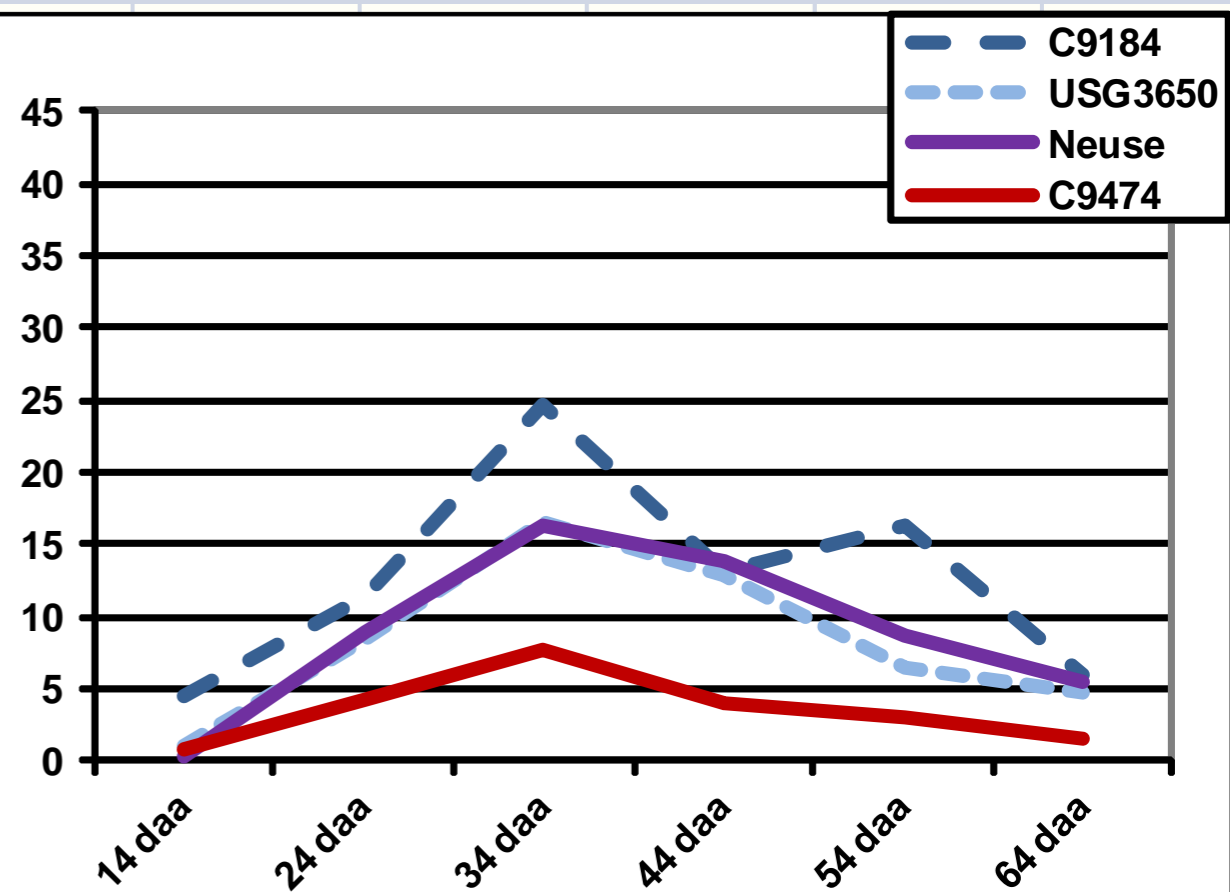
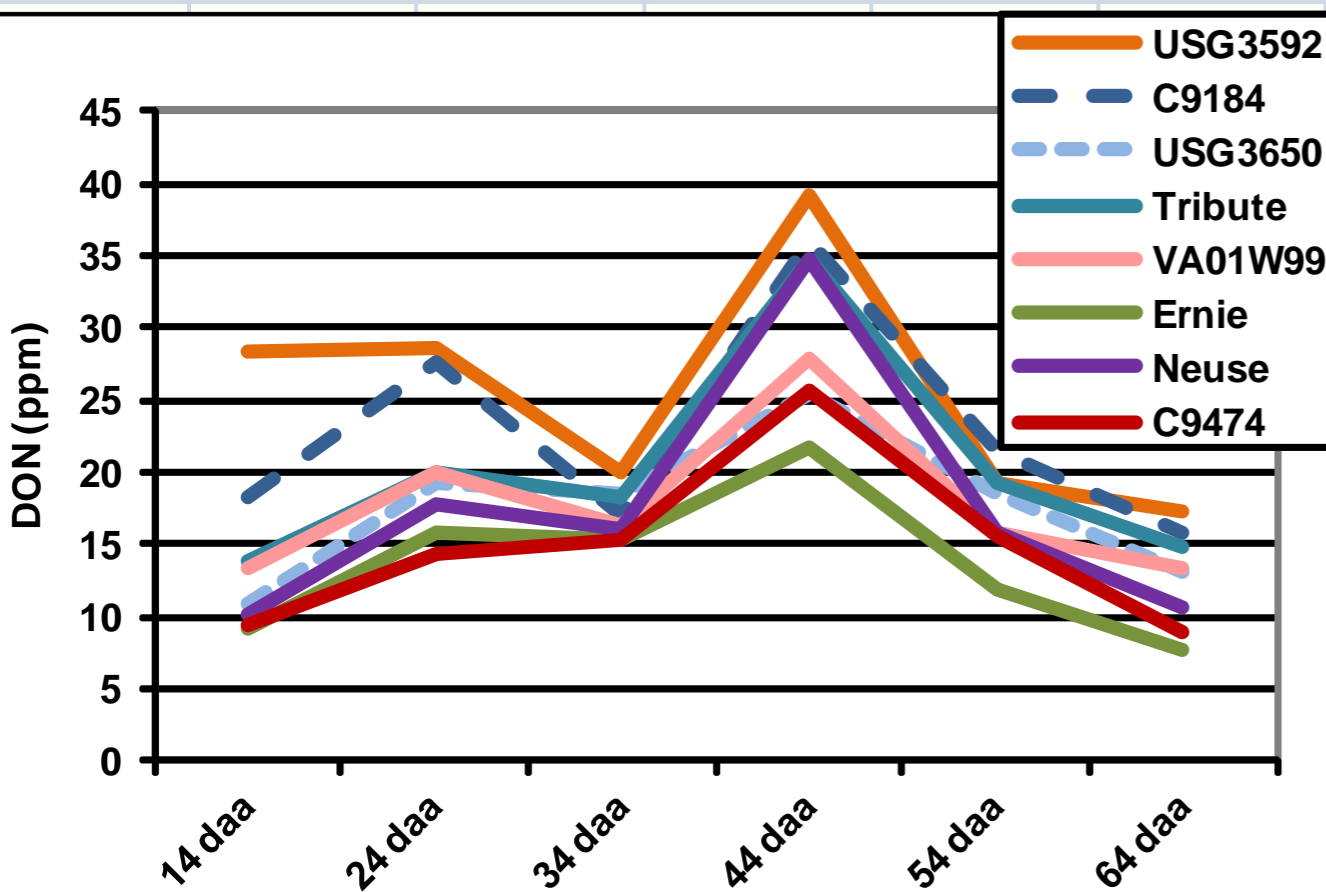
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Med milk Hard dough Early KH KH Harv ripe Kern loose

Glume DON

2006

2007

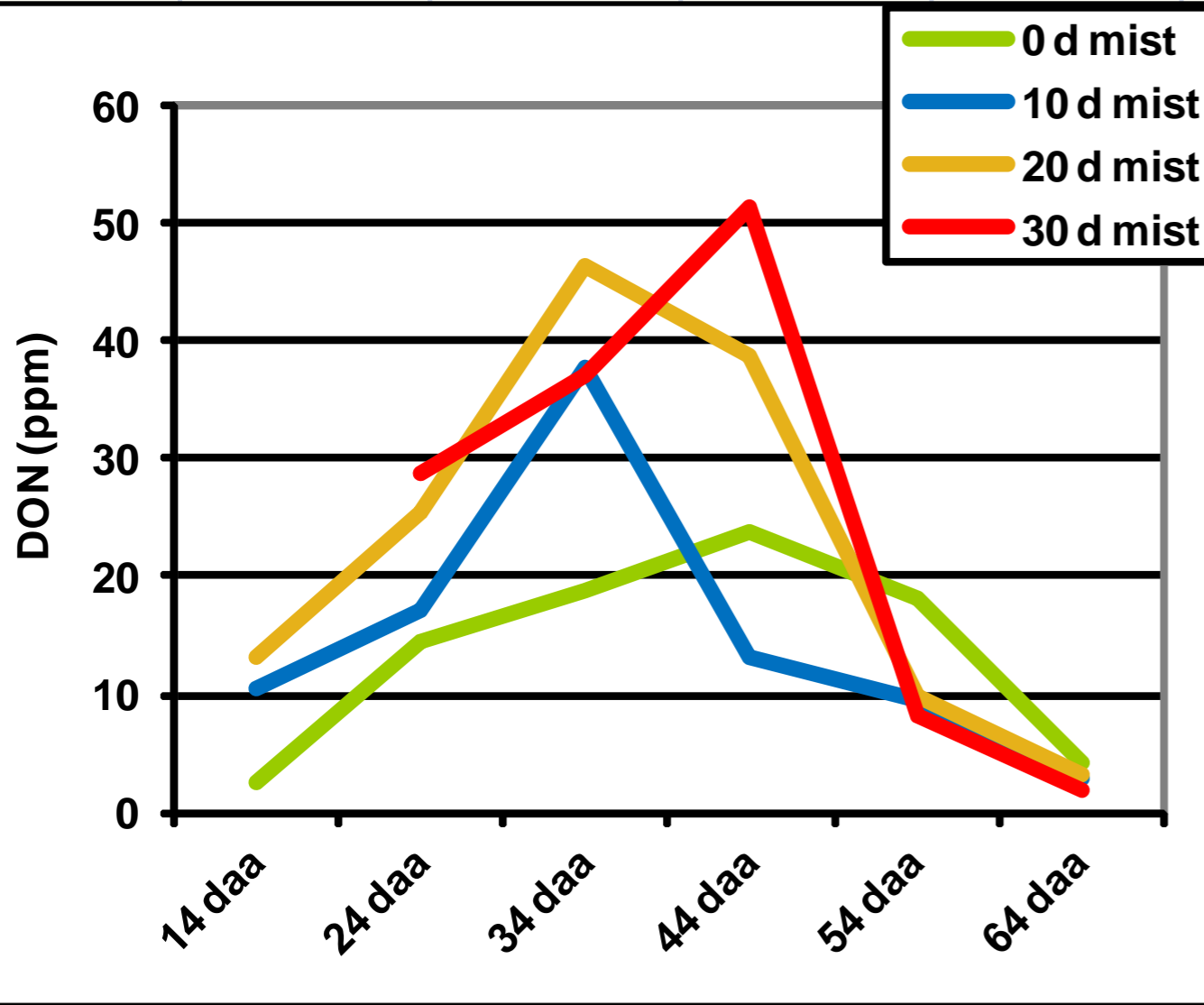


Med milk Hard dough Early KH KH Harv ripe Kern loose

Med milk Hard dough Early KH KH Harv ripe Kern loose

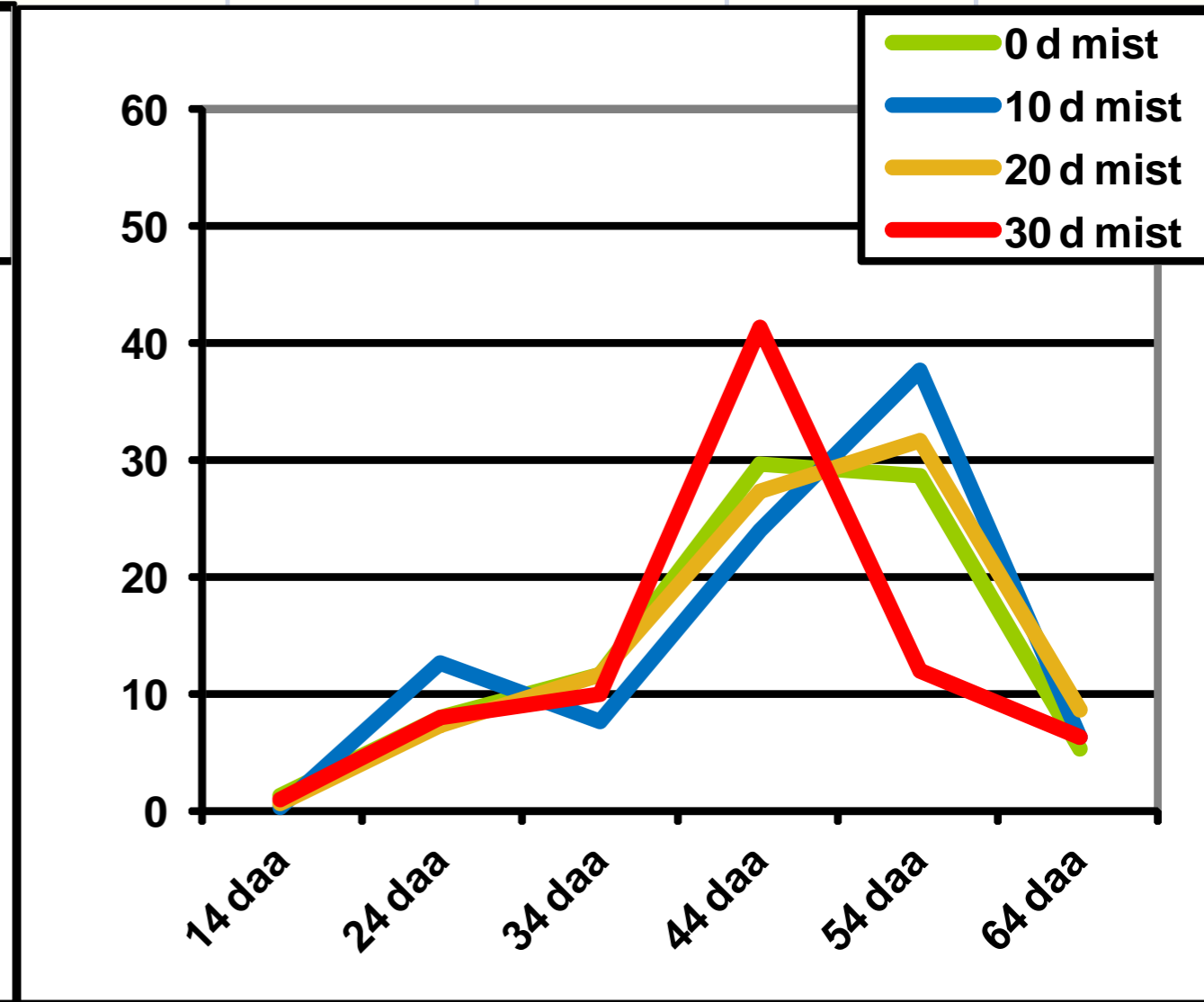
Rachis DON

2006



Med milk Hard dough Early KH KH Harv ripe Kern loose

2007

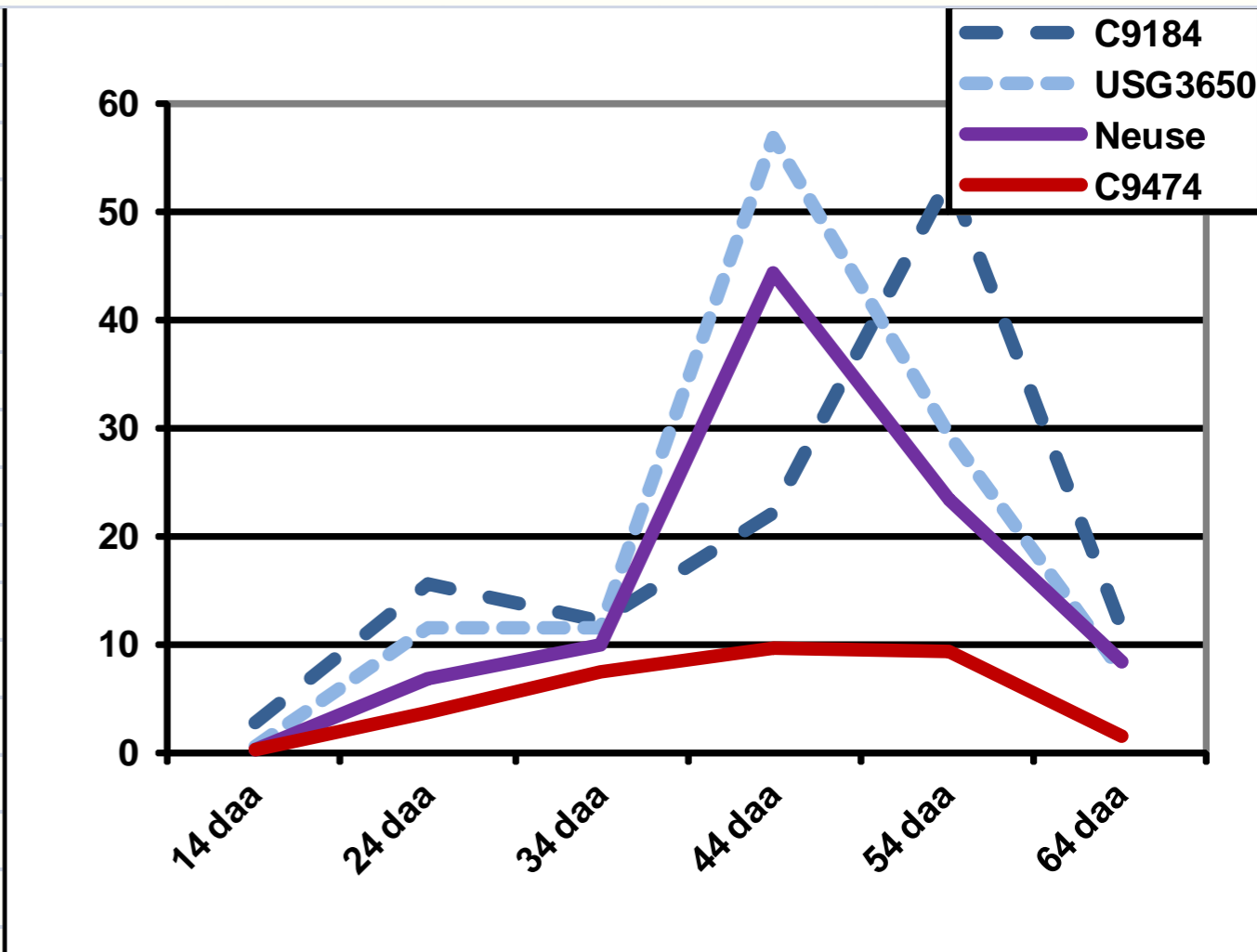
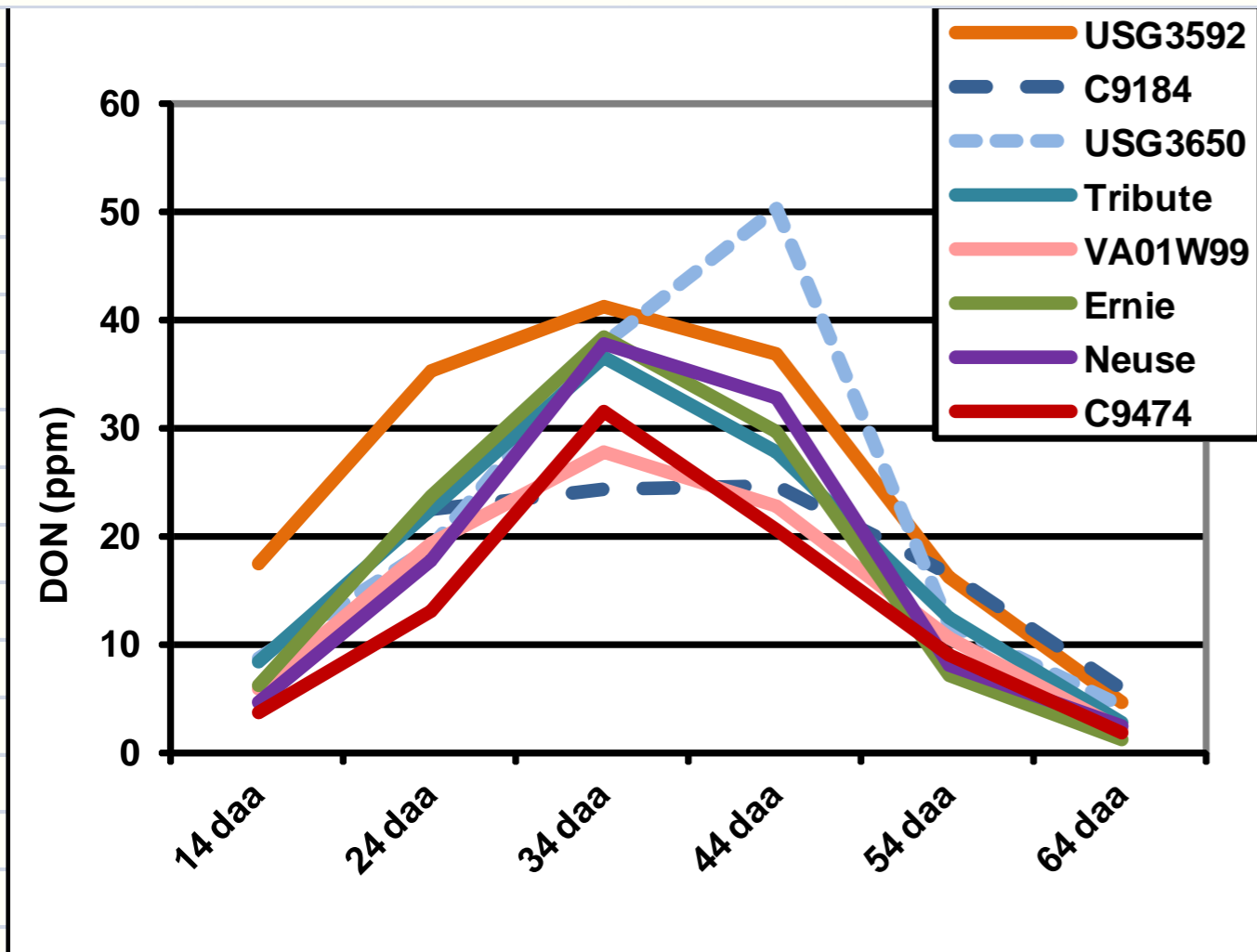


Med milk Hard dough Early KH KH Harv ripe Kern loose

Rachis DON

2006

2007



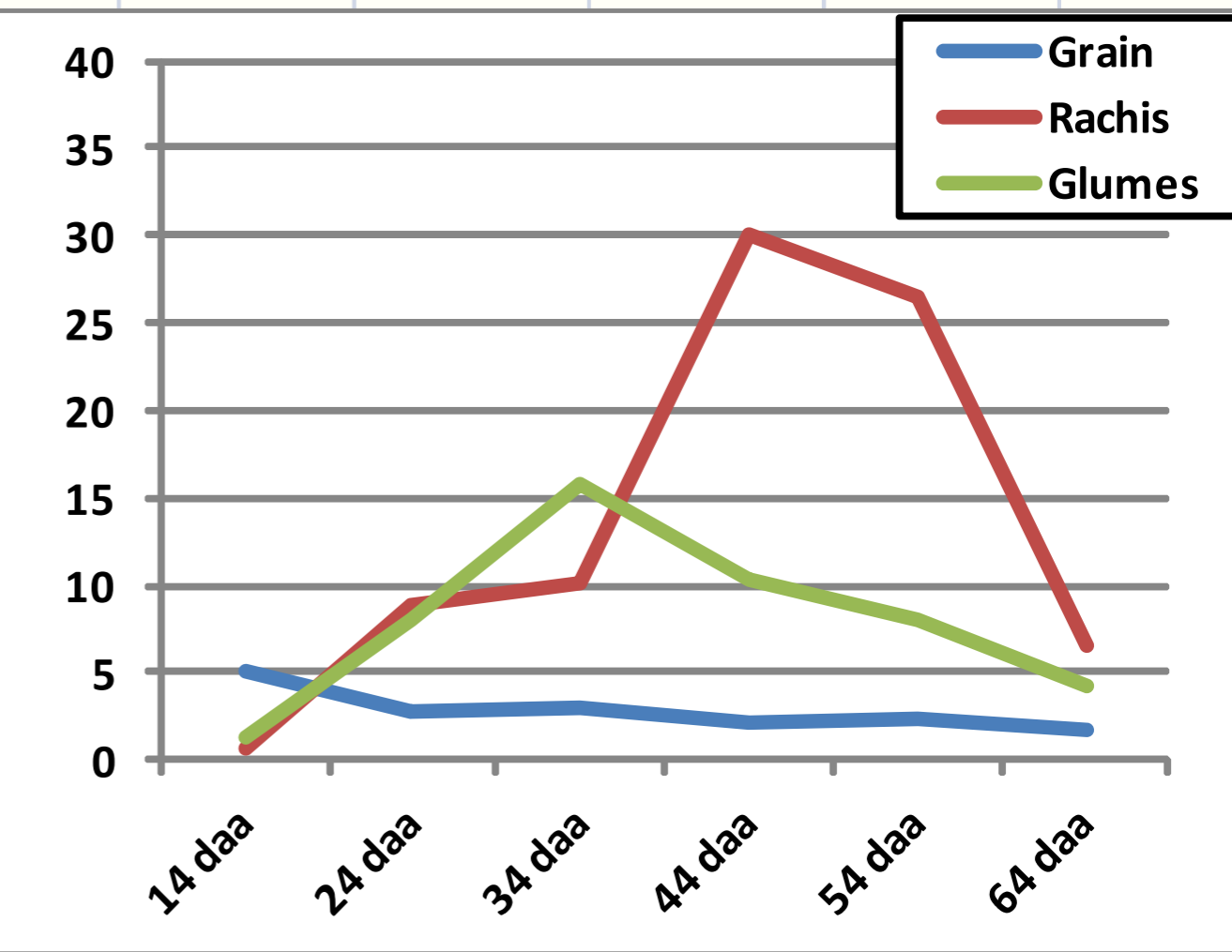
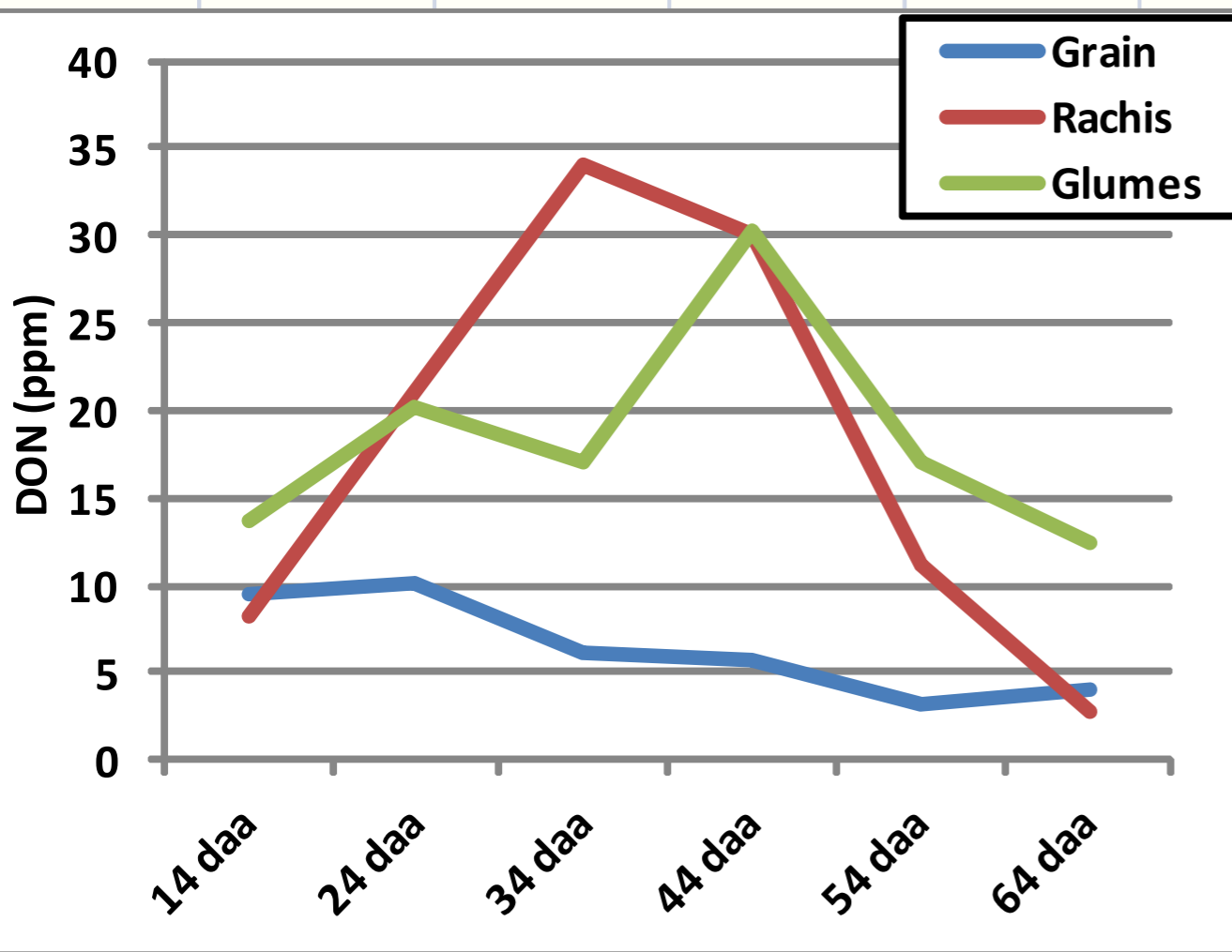
Med milk Hard dough Early KH KH Harv ripe Kern loose

Med milk Hard dough Early KH KH Harv ripe Kern loose

DON boiled down

2006

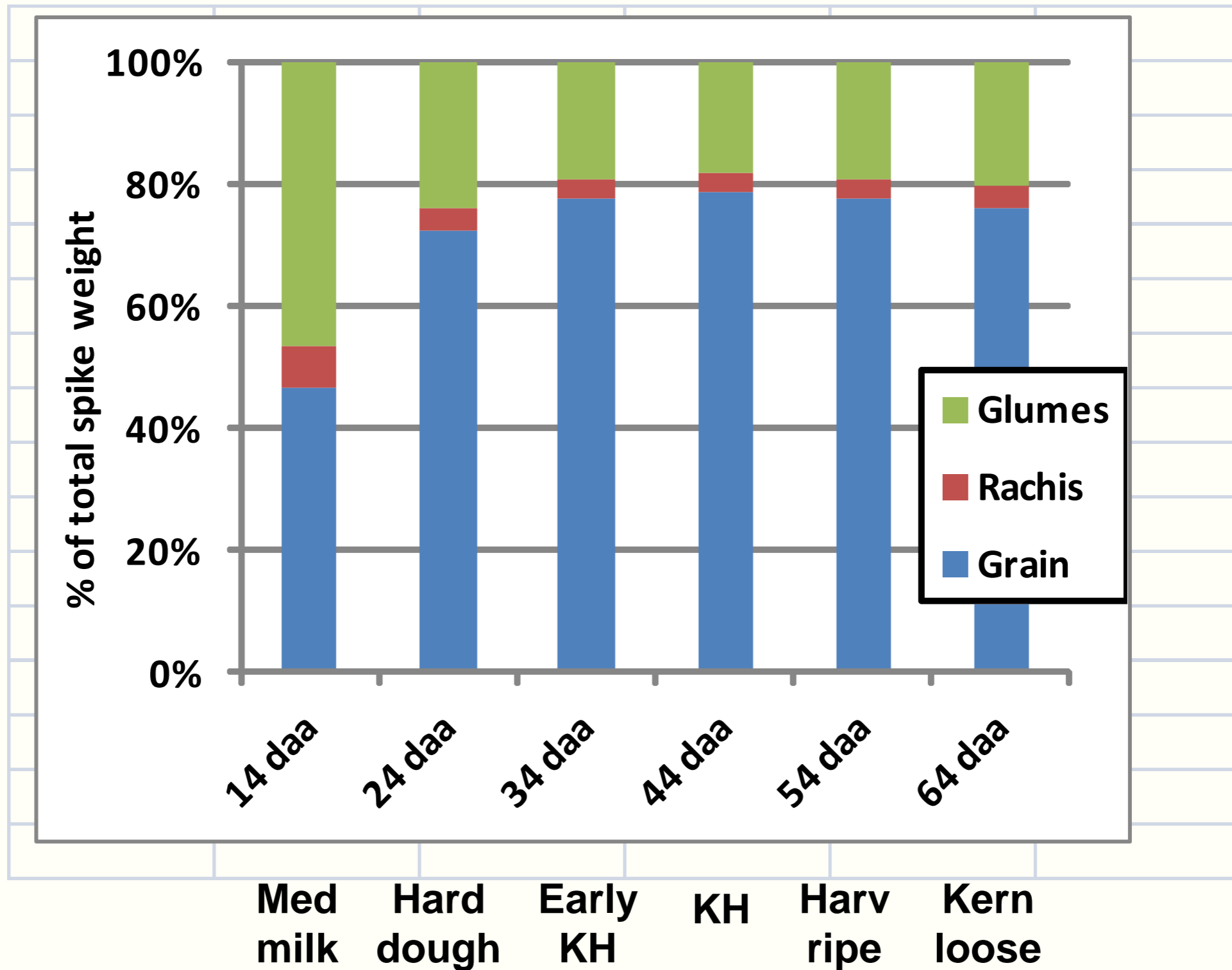
2007



Med **Hard** **Early** **KH** **Harv** **Kern**
milk **dough** **KH** **ripe** **loose**

Med **Hard** **Early** **KH** **Harv** **Kern**
milk **dough** **KH** **ripe** **loose**

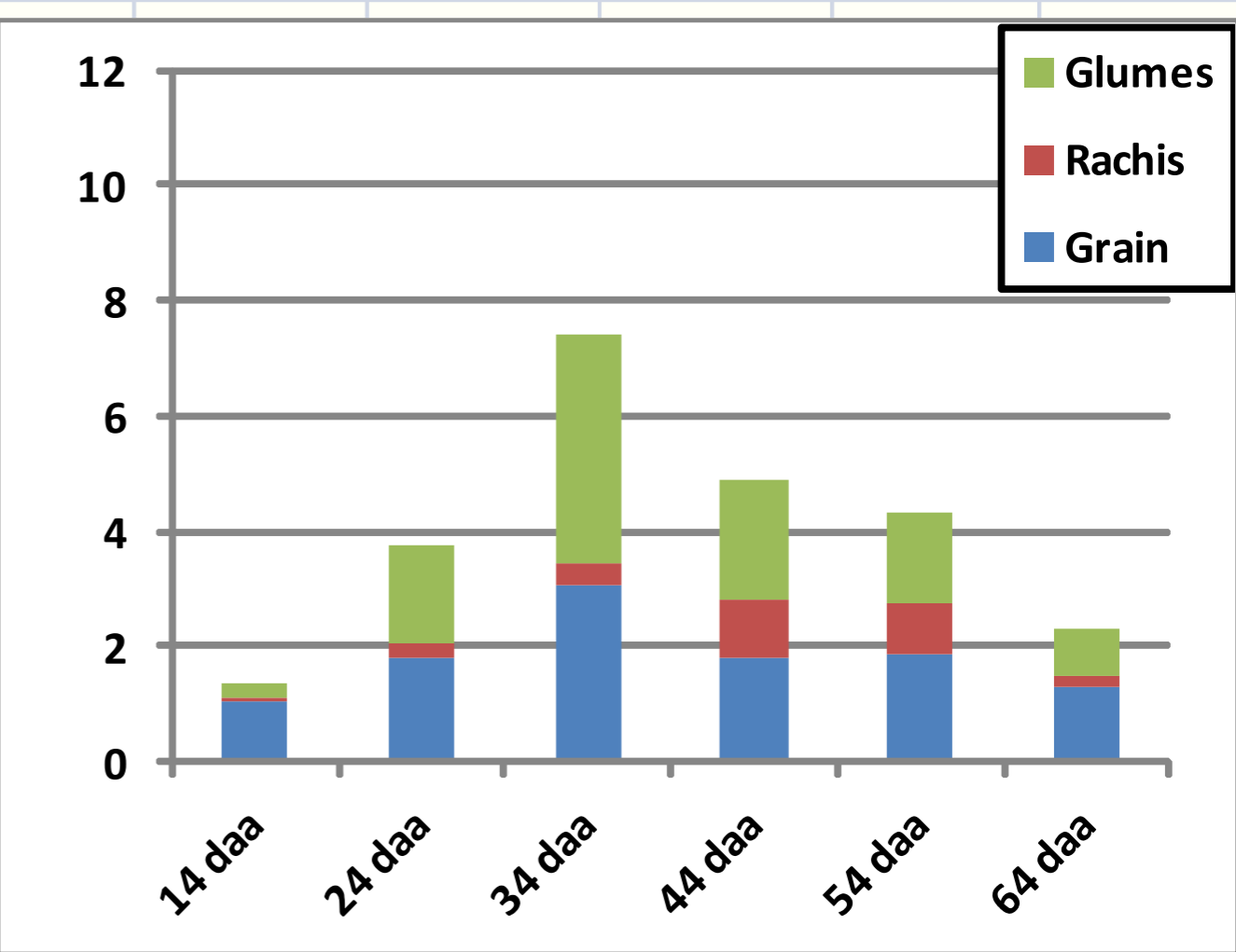
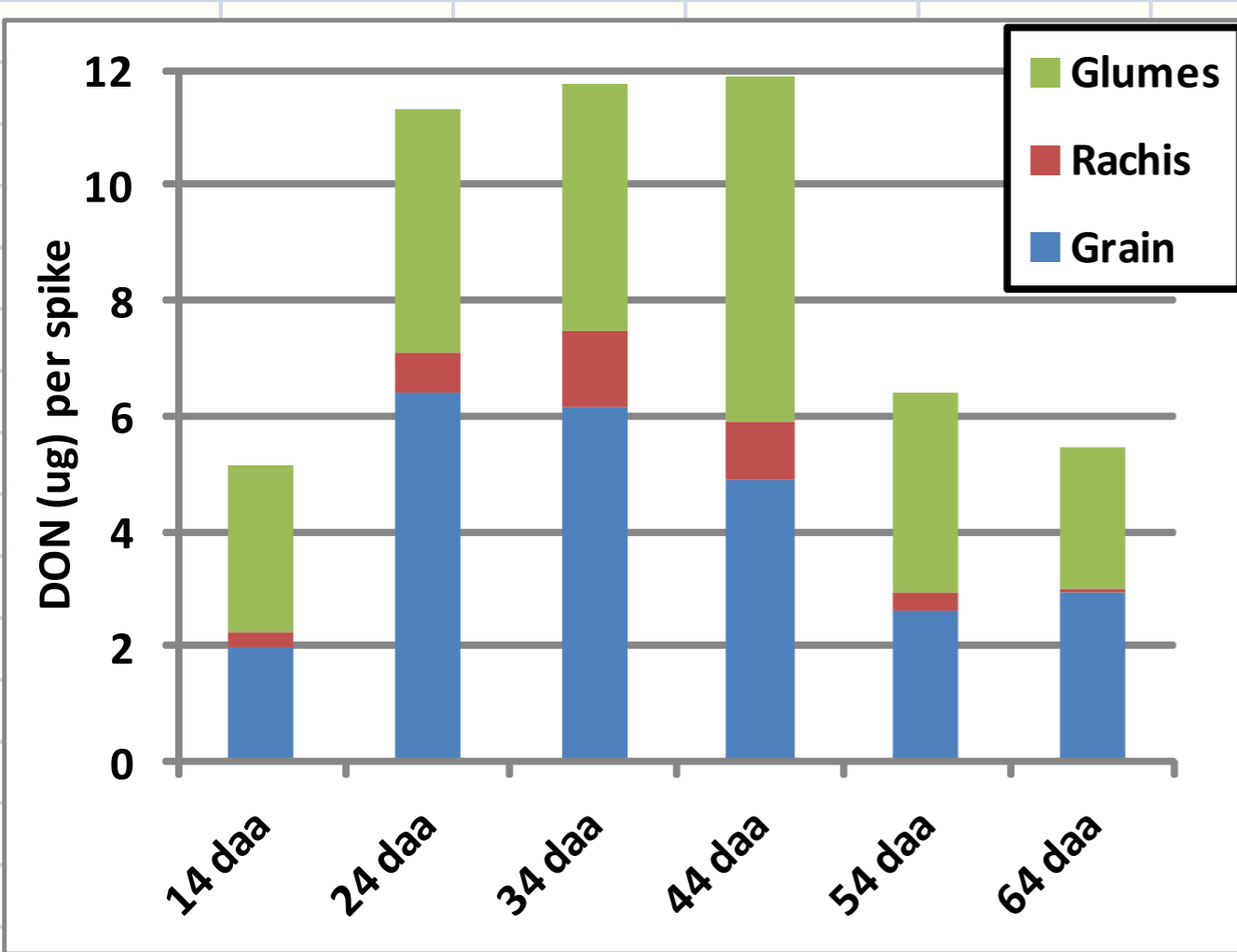
Spike fractions by weight



Total DON per spike

2006

2007



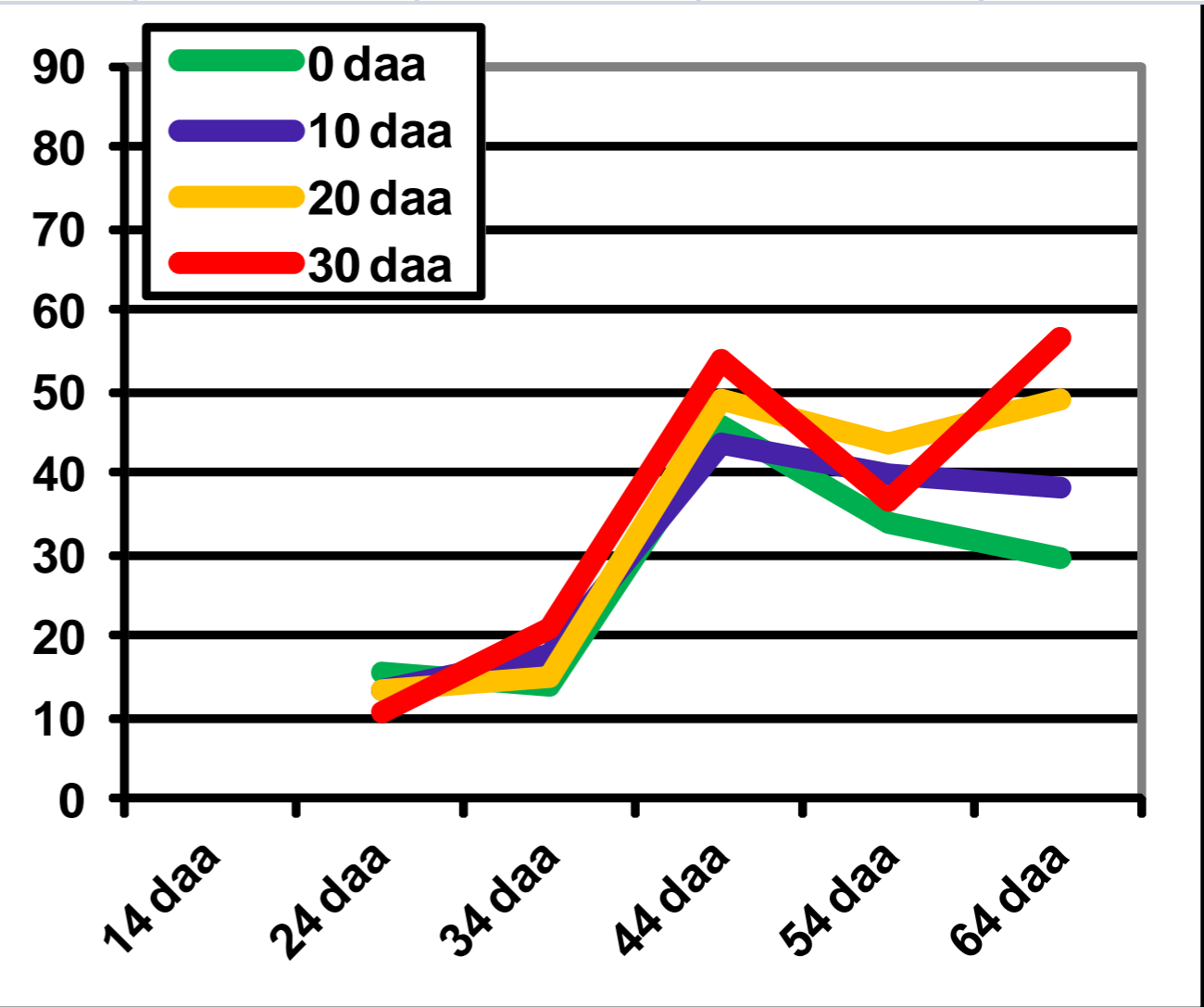
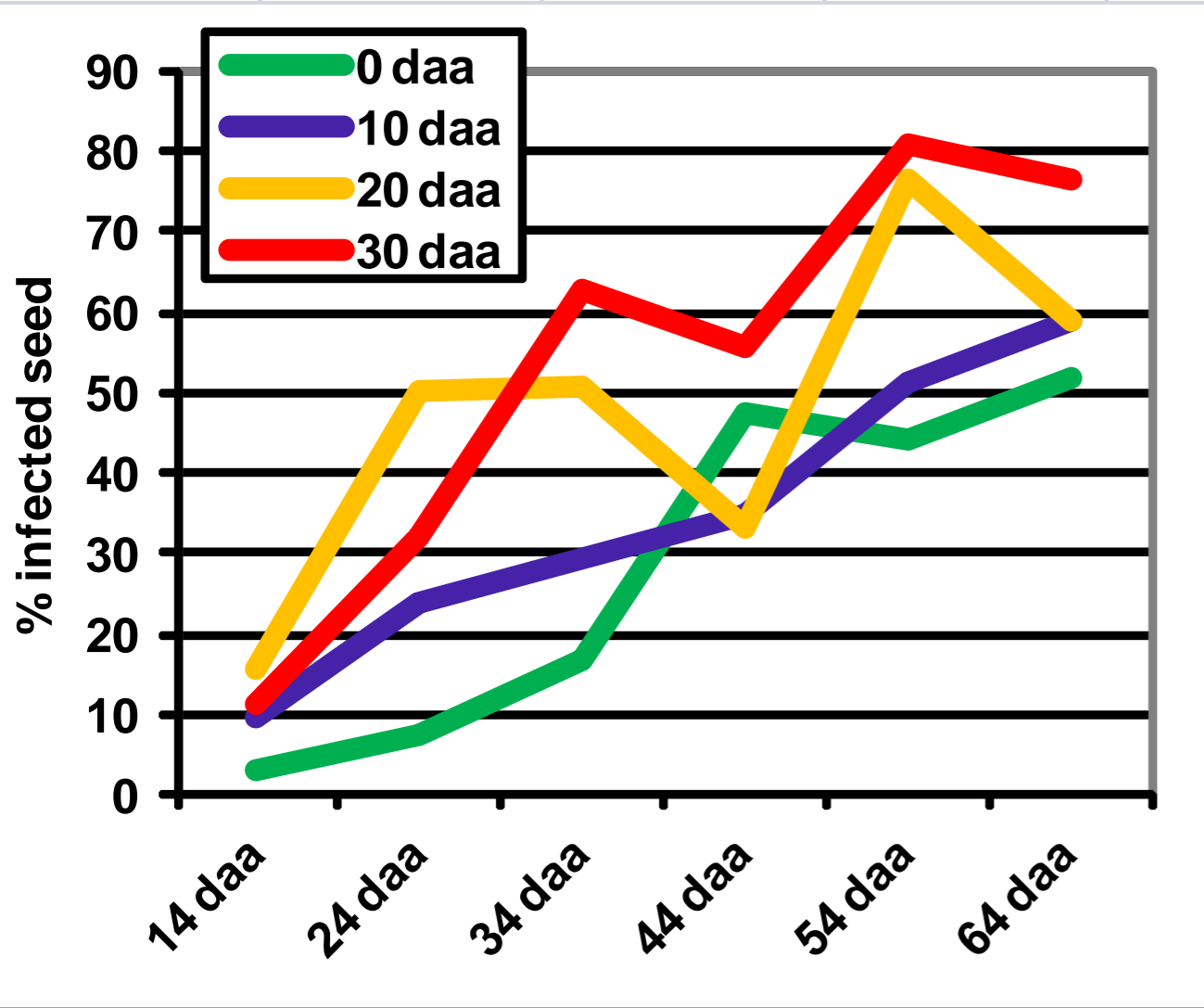
Med milk Hard dough Early KH KH Harv ripe Kern loose

Med milk Hard dough Early KH KH Harv ripe Kern loose

% infected kernels

2006

2007

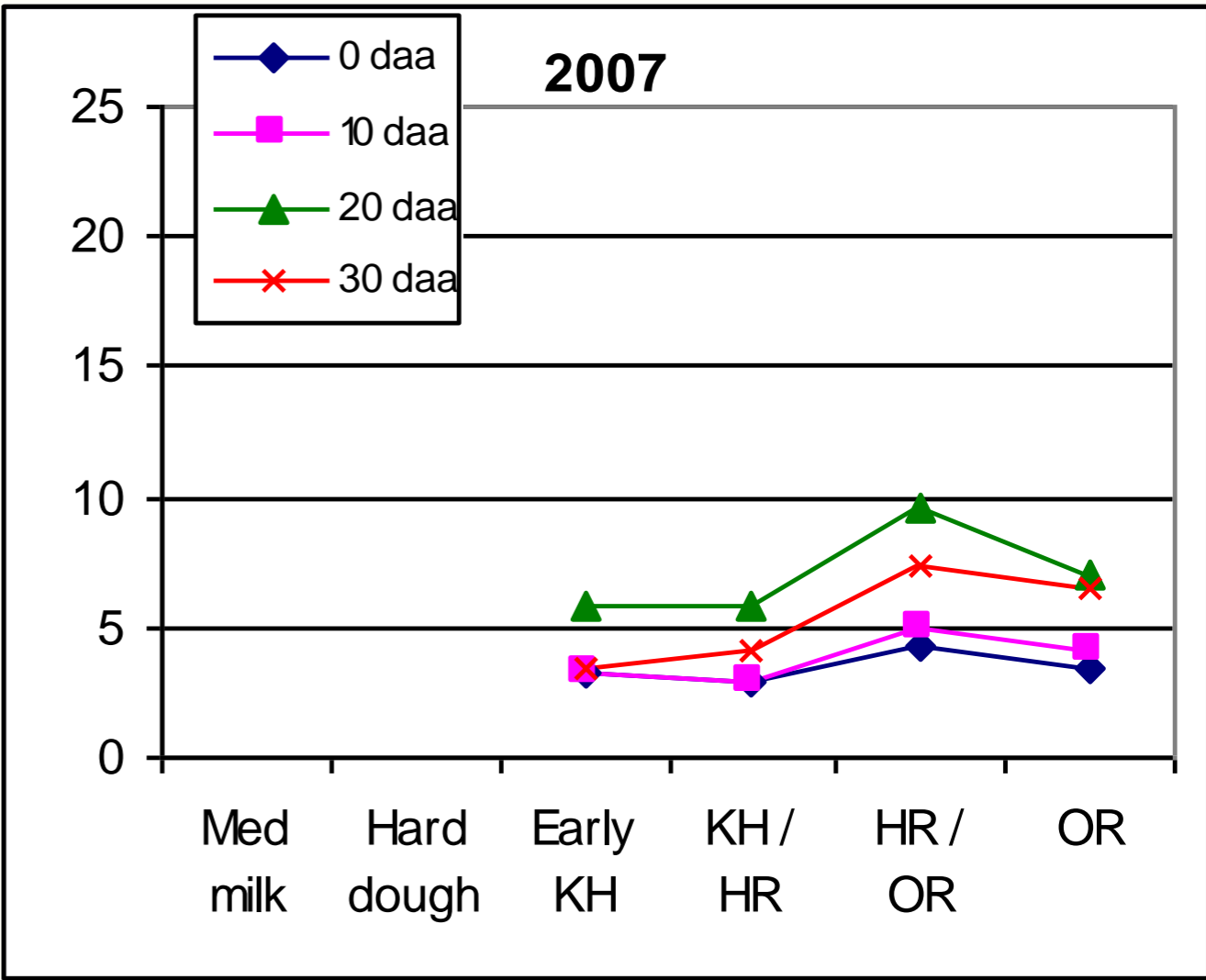
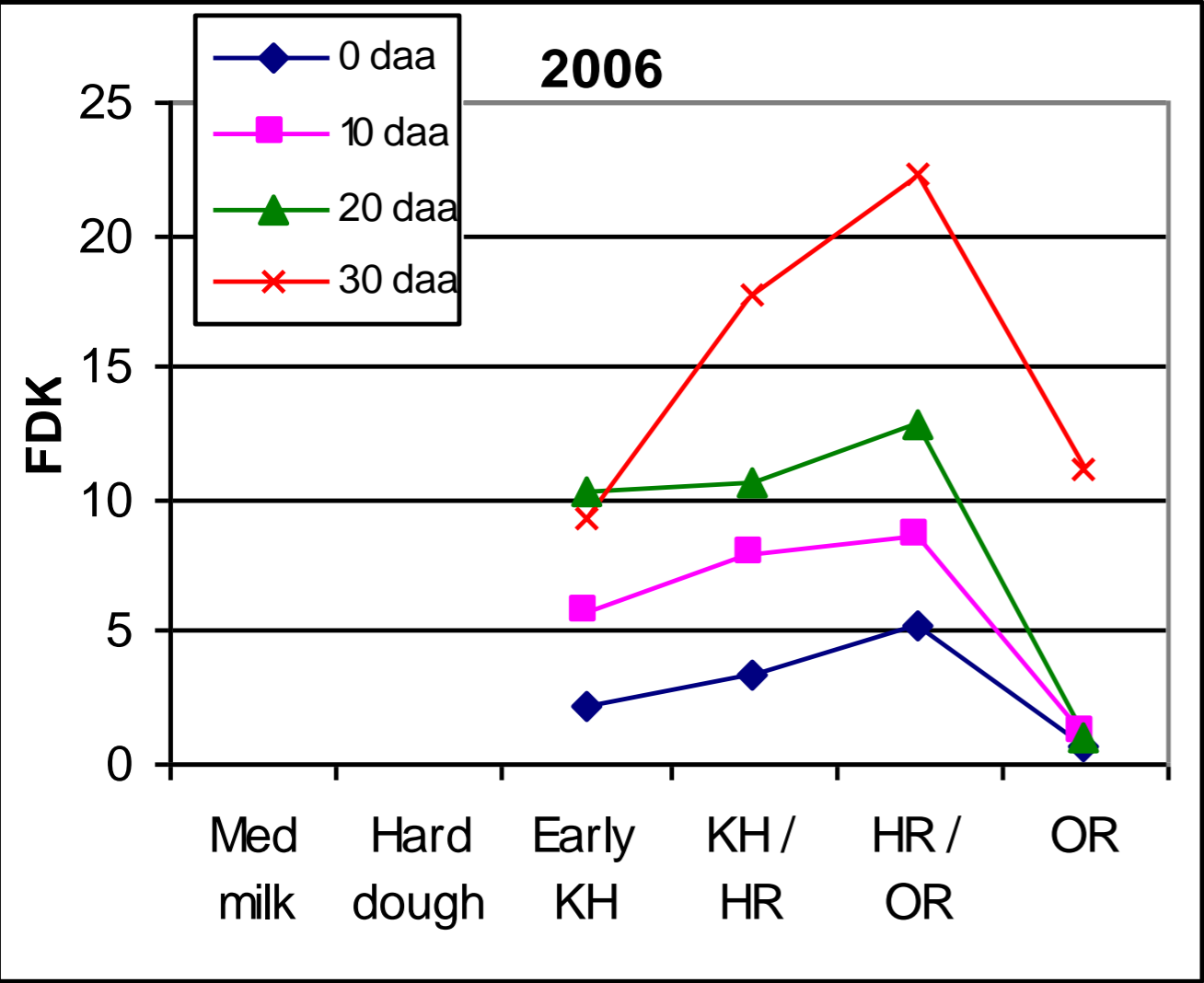


Med milk Hard dough Early KH KH Harv ripe Kern loose

Med milk Hard dough Early KH KH Harv ripe Kern loose

Infections spread through heads over time

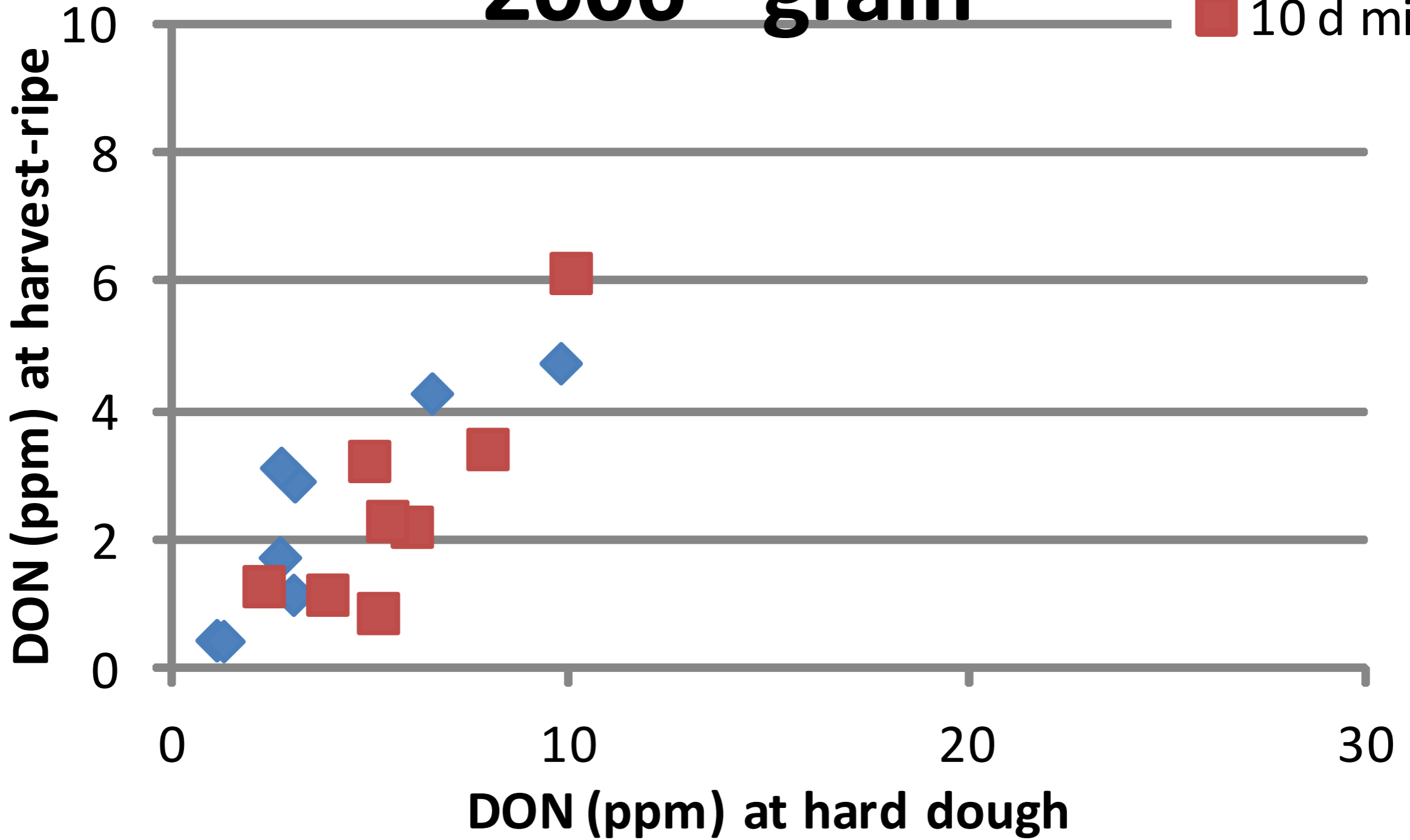
FDK increases during grain fill especially if it's very wet....



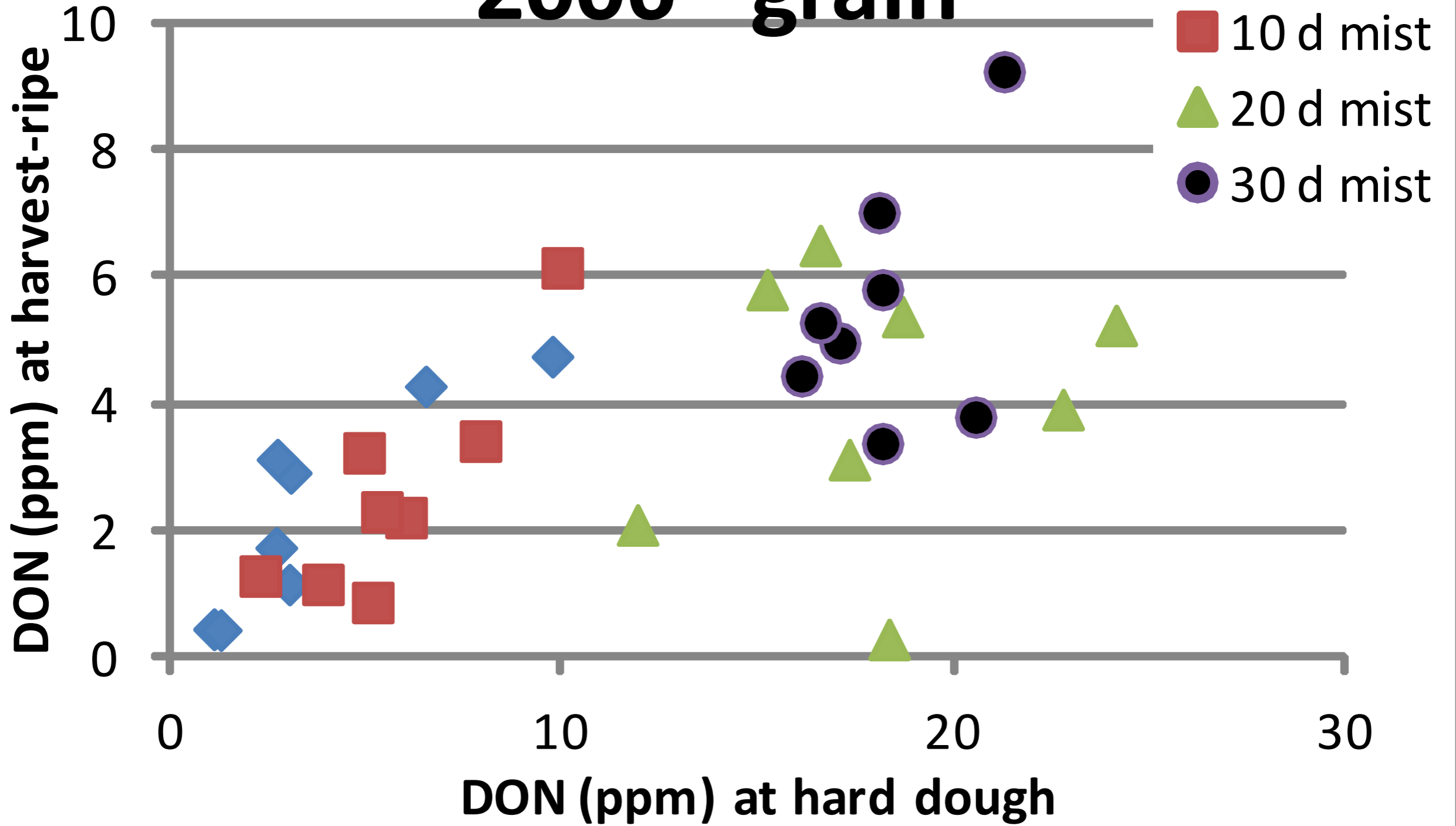
FDK %

2006 - grain

- 0 d mist
- 10 d mist



2006 - grain



2007 - grain

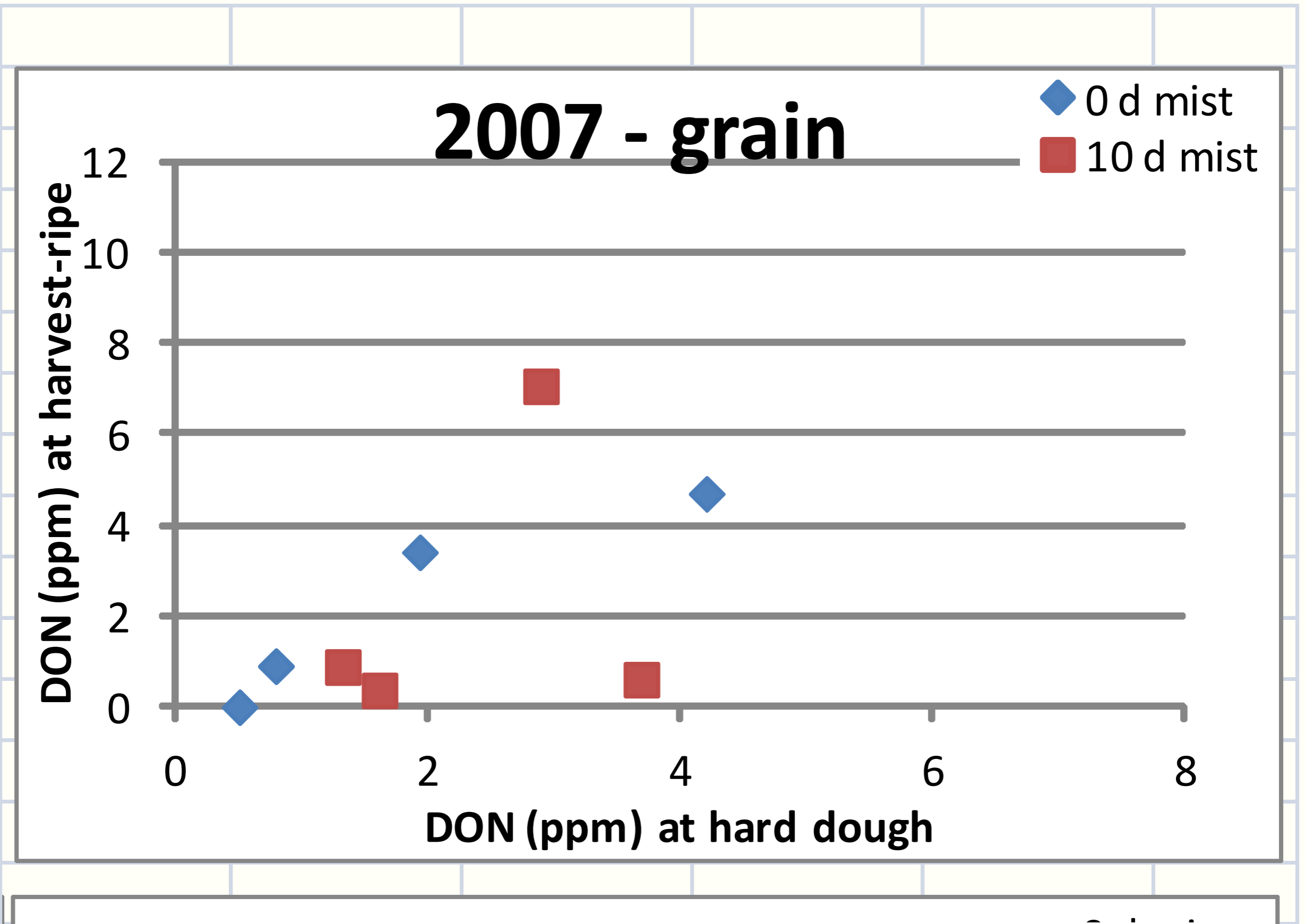
◆ 0 d mist
■ 10 d mist

DON (ppm) at harvest-ripe

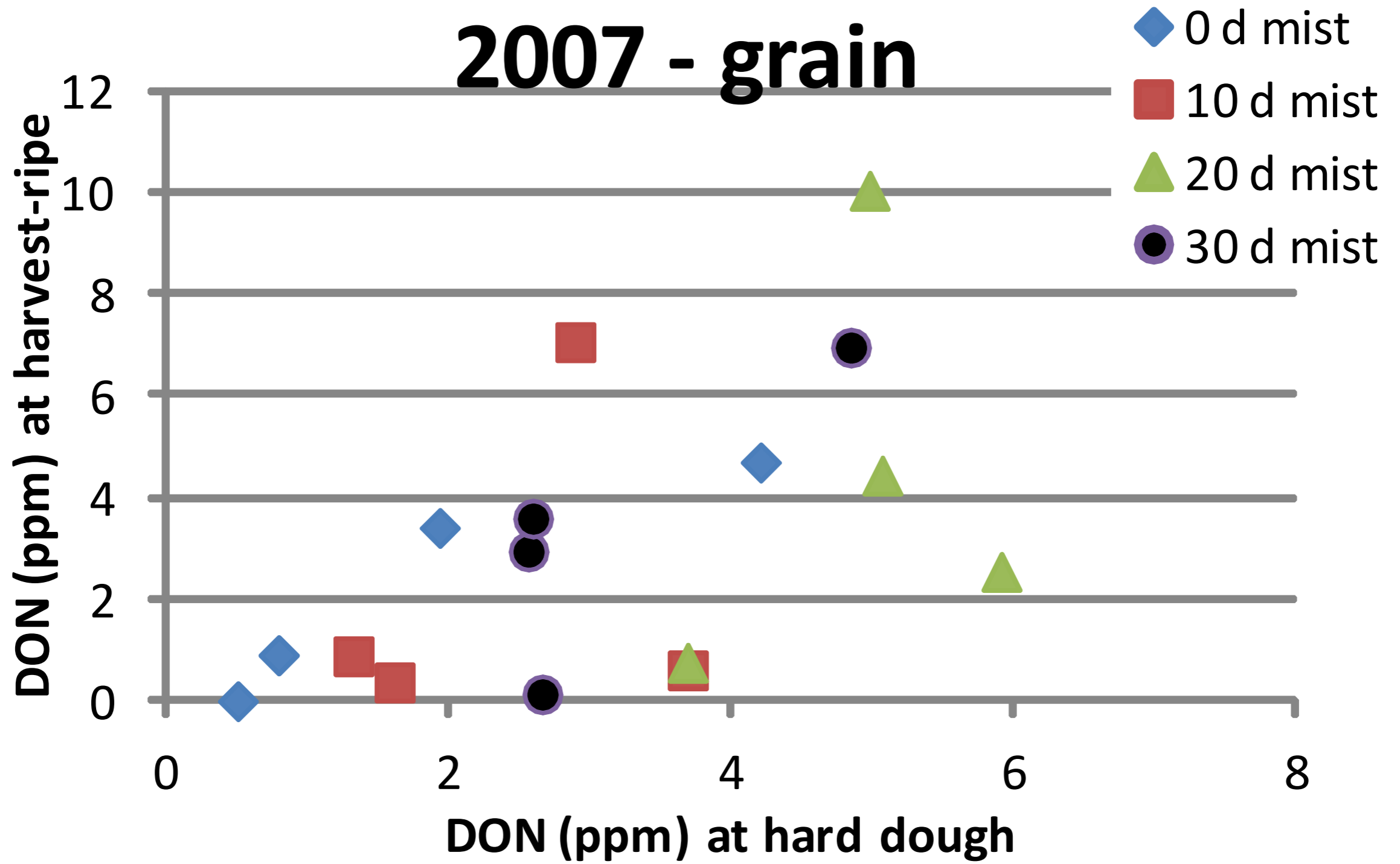
12
10
8
6
4
2
0

0 2 4 6 8

DON (ppm) at hard dough

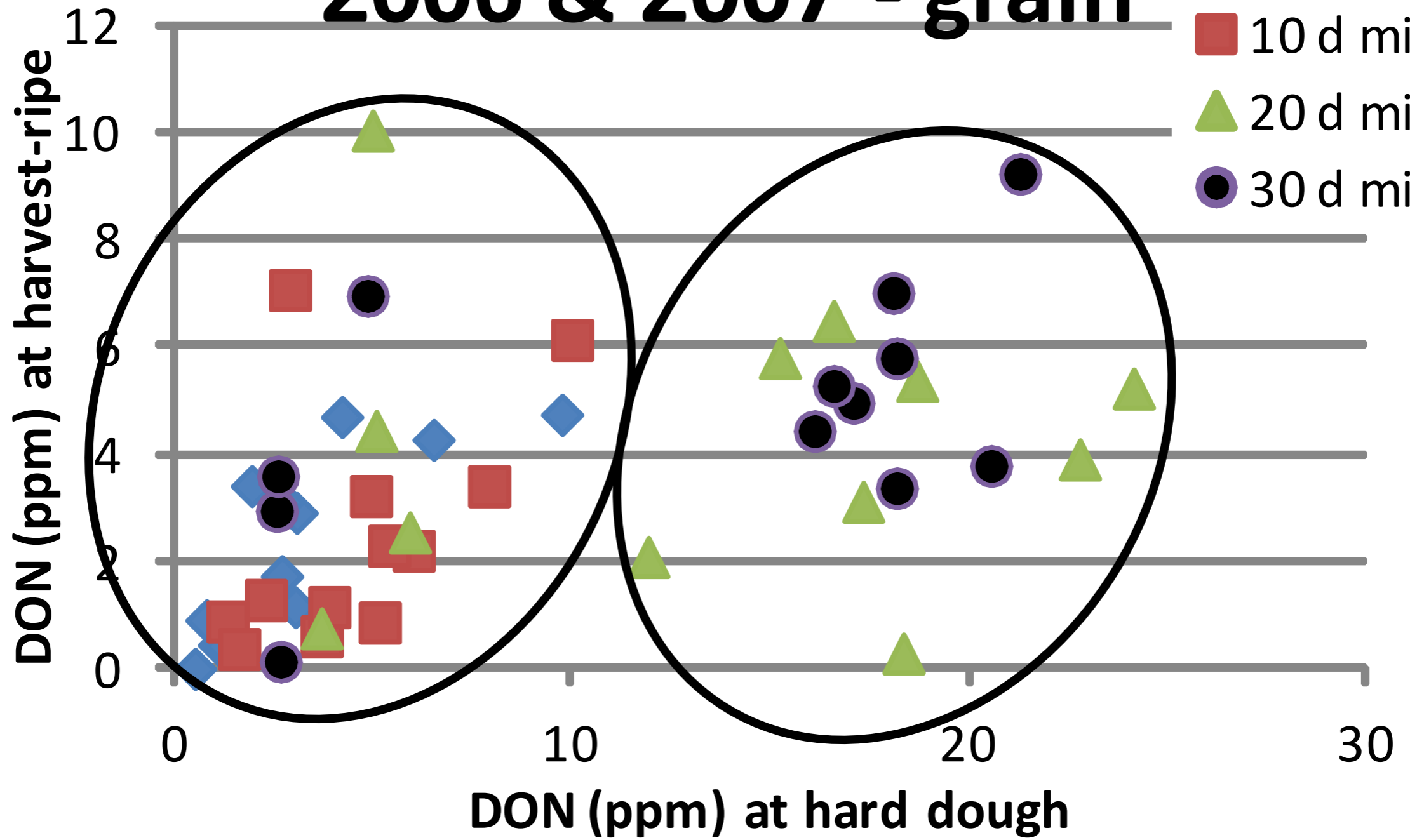


2007 - grain

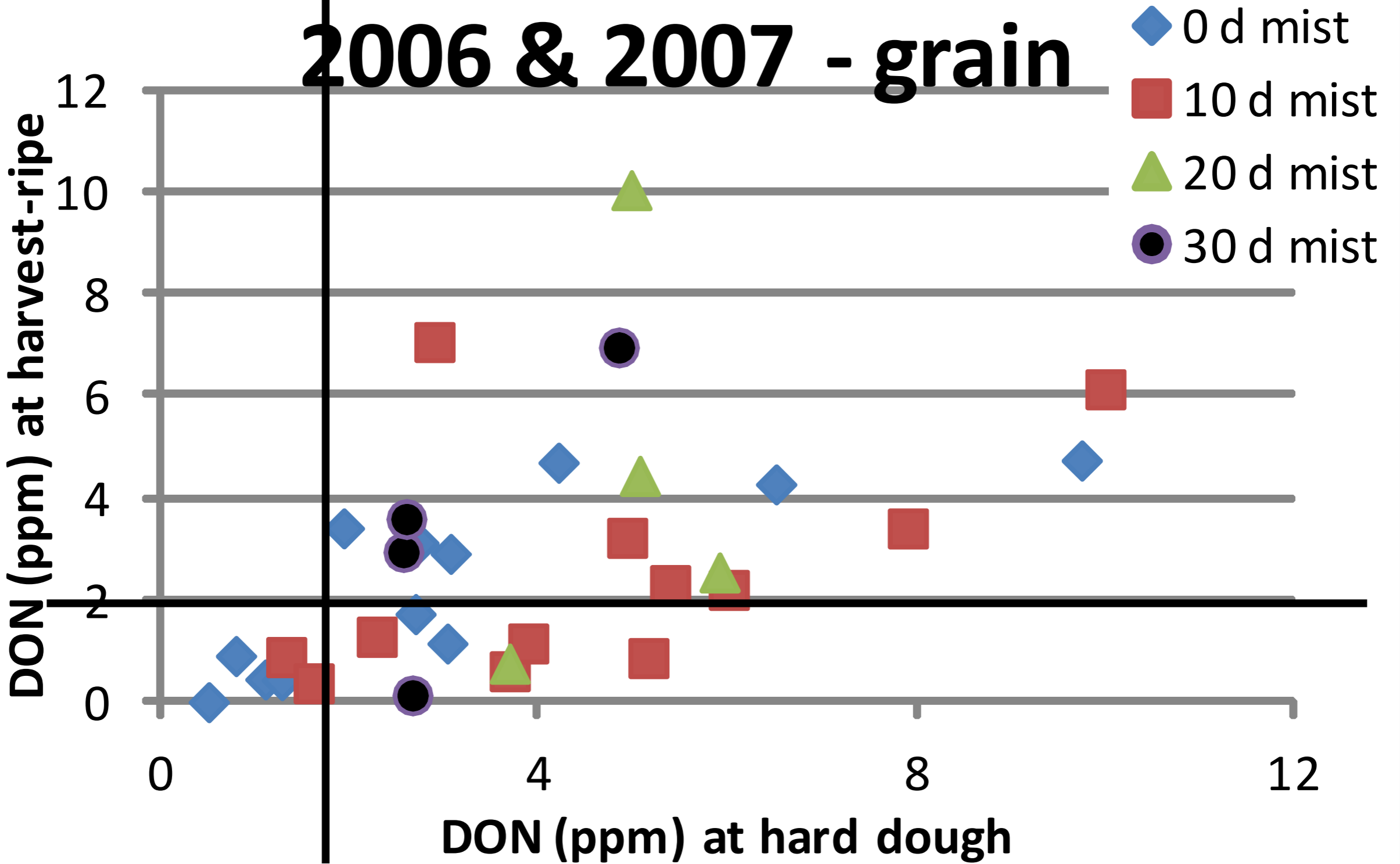


2006 & 2007 - grain

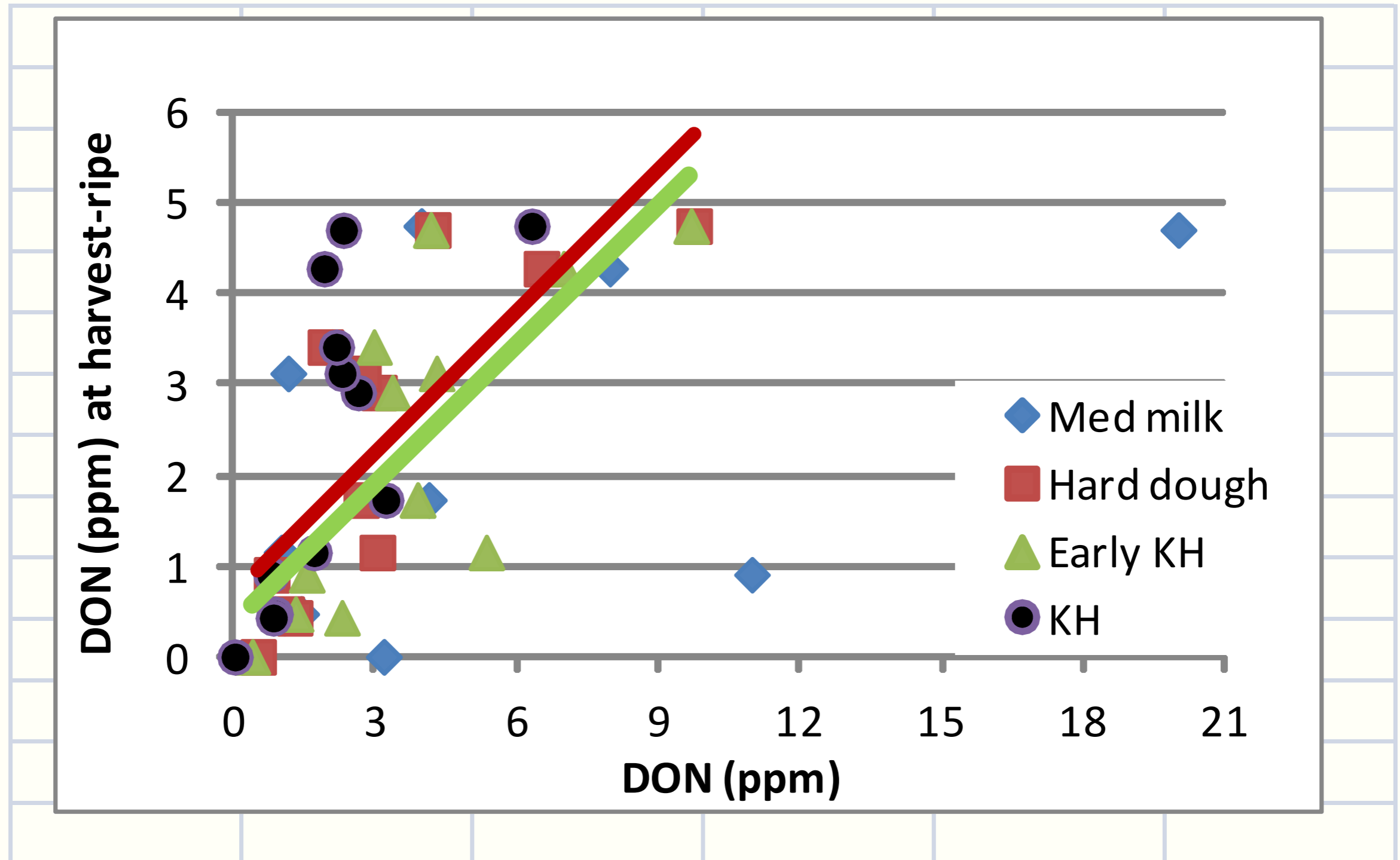
- ◆ 0 d mist
- 10 d mist
- ▲ 20 d mist
- 30 d mist

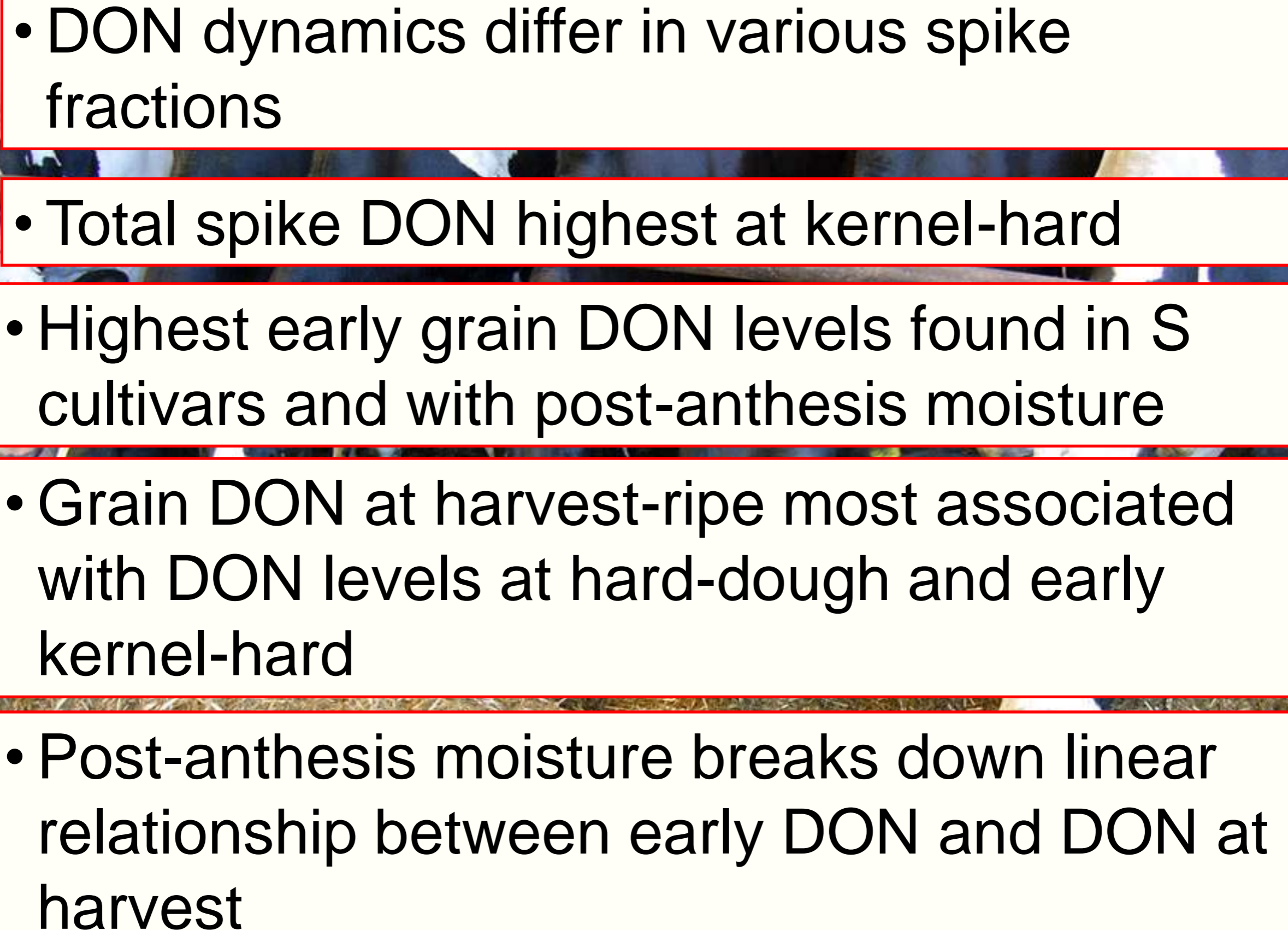


2006 & 2007 - grain



2006 and 2007 – no mist



- 
- DON dynamics differ in various spike fractions
 - Total spike DON highest at kernel-hard
 - Highest early grain DON levels found in S cultivars and with post-anthesis moisture
 - Grain DON at harvest-ripe most associated with DON levels at hard-dough and early kernel-hard
 - Post-anthesis moisture breaks down linear relationship between early DON and DON at harvest

Thanks!



- **USWBSI funding**
- **Cunningham Research & Extension Center**