AARHUS
UNIVERSITY

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EARLY SEED DEVELOPMENT IN *LOLIUM PERENNE* L.

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OUTLINE

- Introduction
  - Need for understanding early seed development
  - Defining floret fertility
  - Implications for restricting high yeilding seed crops
- Methods
- Results

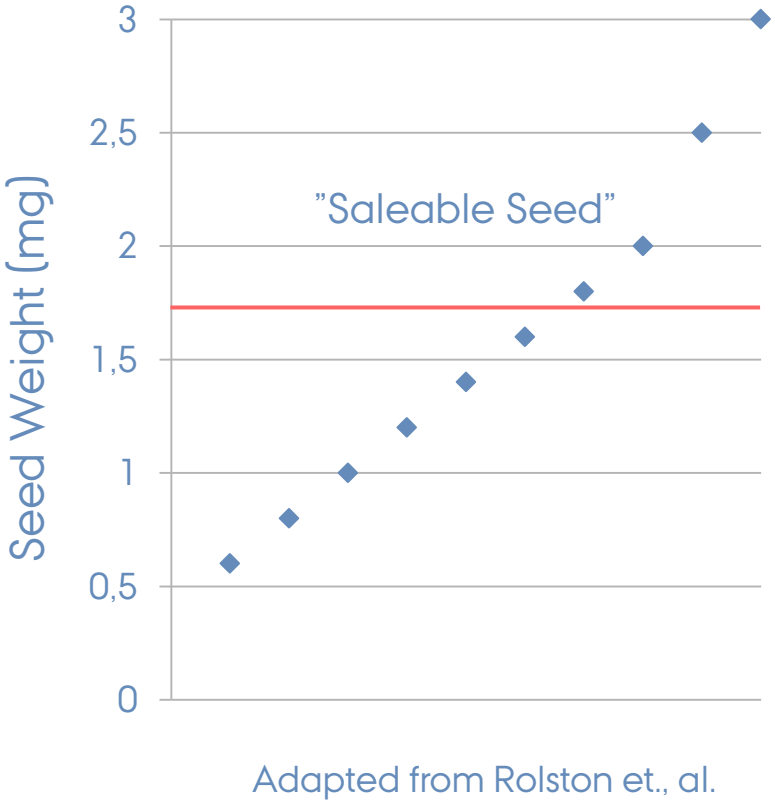
SEED DEVELOPMENT

- Early seed development essential for determining yield
- Determines floret fertility
- Many factors can restrict seed development
- Aim: optimizing yields utilising all possible approaches

FLORET FERTILITY

› Defined as the success of a floret (flower) to produce a seed

› Can be further defined to ”saleable seed floret fertility”, which is the number of floret (flower) that produce ”saleable seeds”



Adapted from Rolston et., al.

FLORET FERTILITY IMPORTANCE

› Small increases in floret ferility can significantly increase seed number

› 10% increase can result in 30.000 seeds per m²

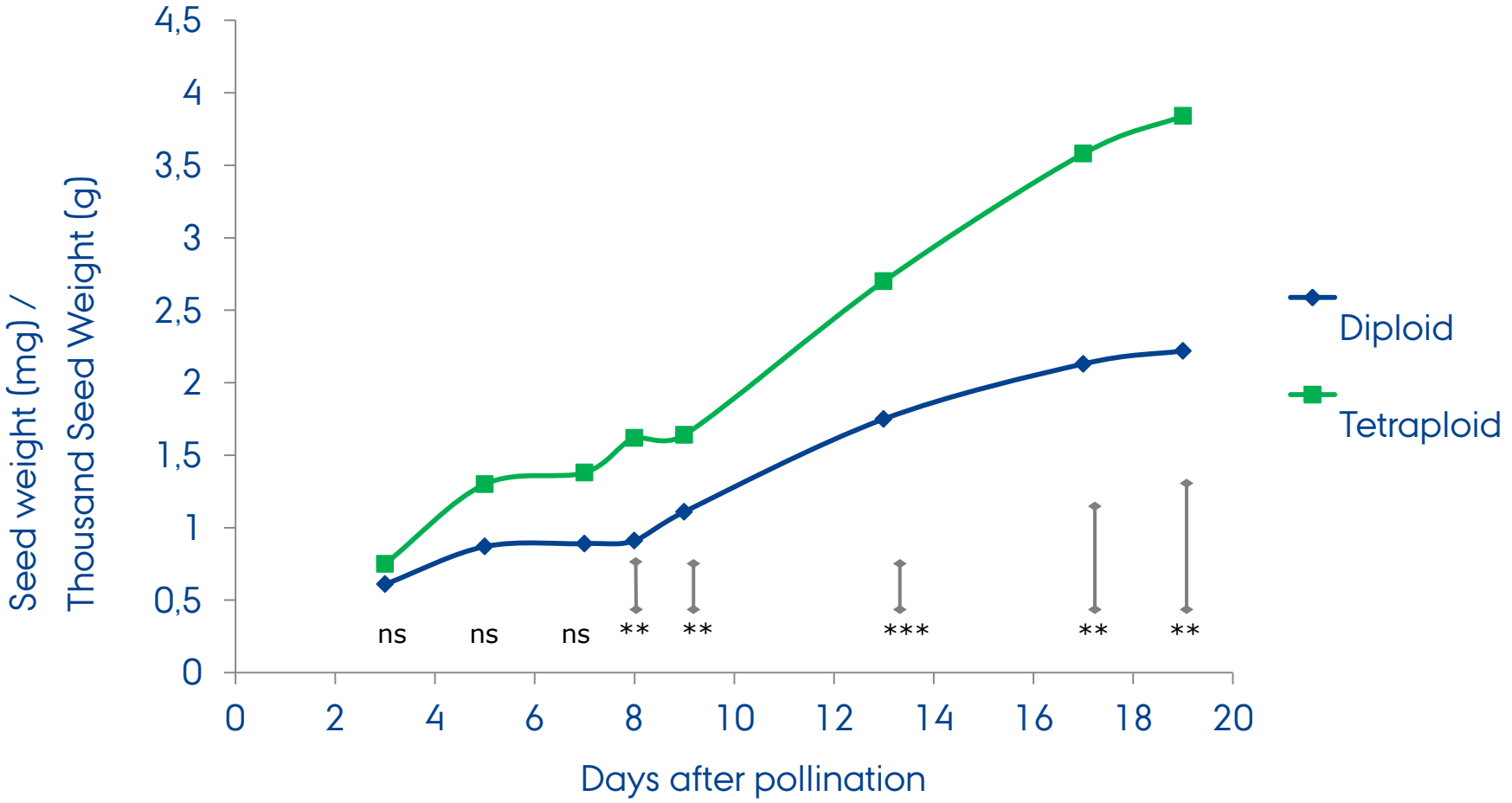
› **Or 600kg seed / ha**

	Seeds per m²		
Floret Fertility	**Billund**	**Bornholm**	**Borreby**
0%	0	0	0
10%	**23118**	**25353**	**30282**
20%	46236	50707	60564
30%	69353	76060	90845
40%	92471	101413	121127
50%	115589	126766	151409
60%	138707	152120	181691
70%	161824	177473	211973
80%	184942	202826	242254
90%	208060	228180	272536
100%	231178	253533	302818

METHODS

- 3 perennial ryegrass varieties
  - 2 diploid
  - 1 tetraploid
- Placed into controlled environment conditions prior to flowering
  - 20°C day temperature / 15°C night temperature
- Florets/flowers recorded when opened
- Actively pollinated
- Sampled after pollination and assessed with Videometer lab
- Seeds were then dried, and weighed

SEED WEIGHT


Seed weight (mg) / Thousand Seed Weight (g)
4,5
4
3,5
3
2,5
2
1,5
1
0,5
0
0
2
4
6
8
10
12
14
16
18
20
Days after pollination
ns
ns
ns
**
**
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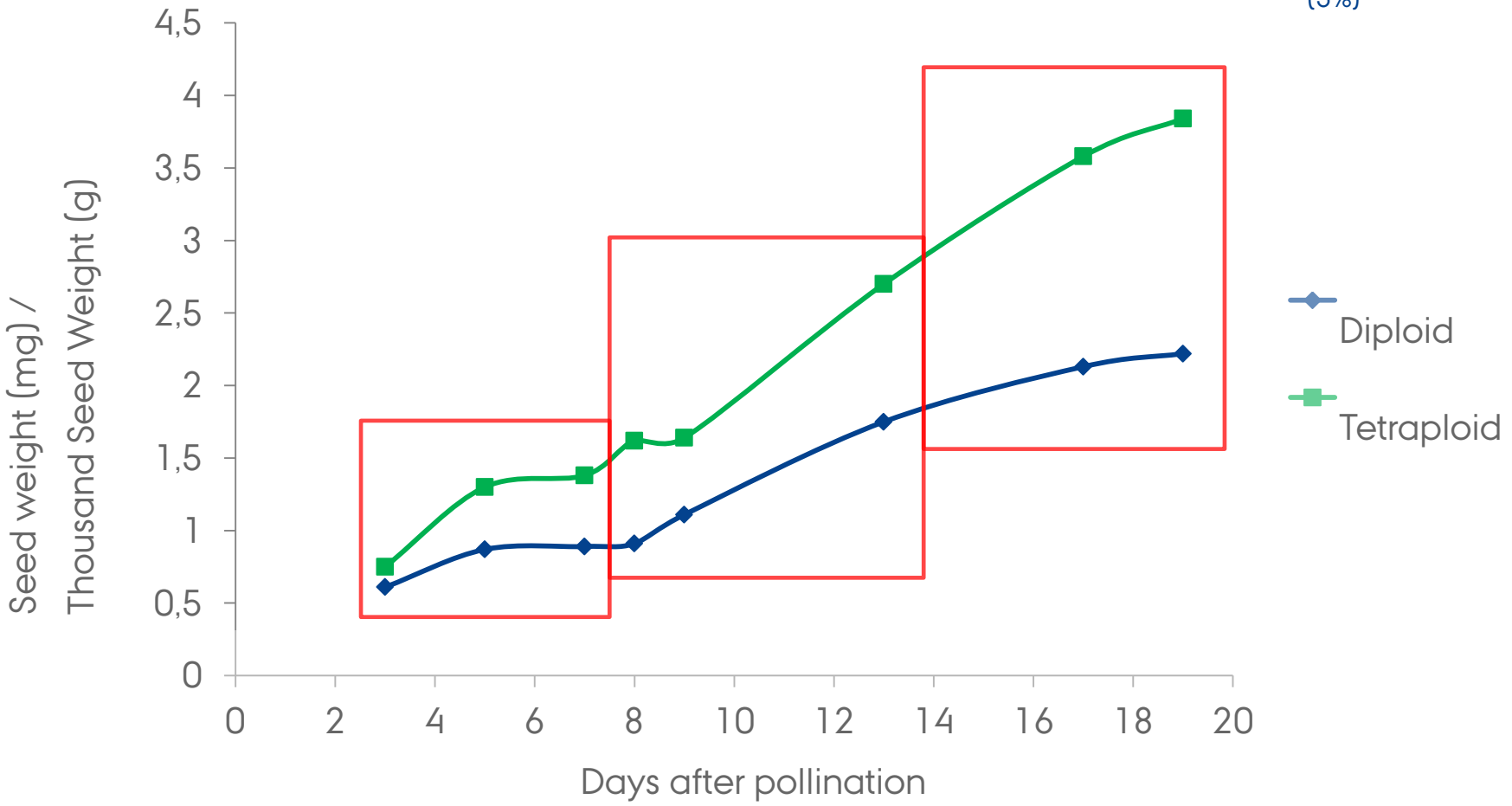
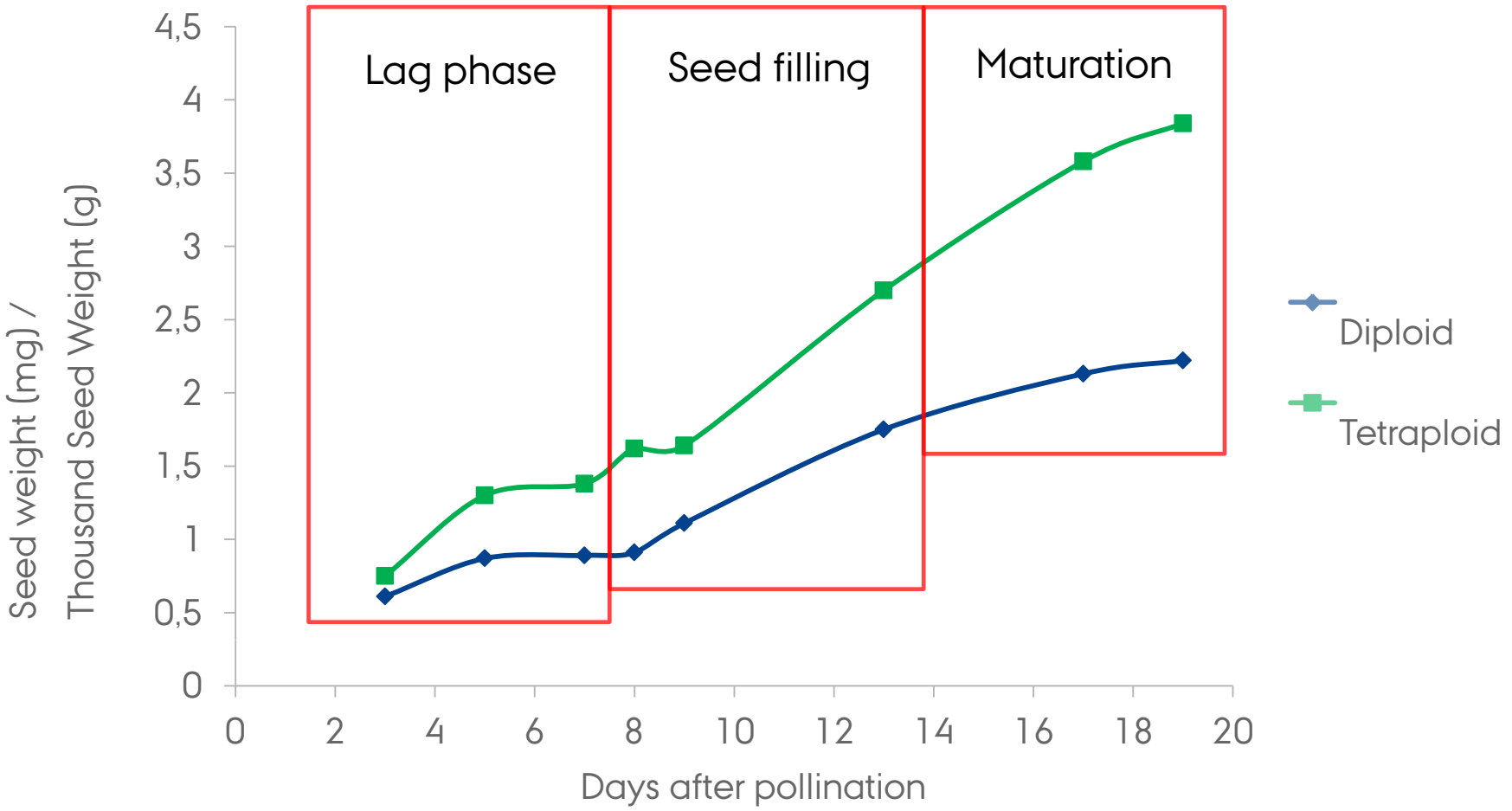
**
**
Diploid
Tetraploid

SEED WEIGHT – STATISTIC GROUPS*

* Based on LSD (5%)



SEED WEIGHT – FOLLOWING STANDARD



NOVEL ASSESSMENT

- Following an initial ”lag phase”, we see rapid seed development (weight)
- But what is happening during this rapid seed filling?
  - Physical changes?
  - Biochemical changes?
  - Physiological changes?
- Can we further redefine a ”saleable seed”?
- Future proofing perennial ryegrass seed production
  - Developing a tool for knowing more about seed development
  - With the Videometer Lab apparatus

SEED DEVELOPMENT - IMAGING

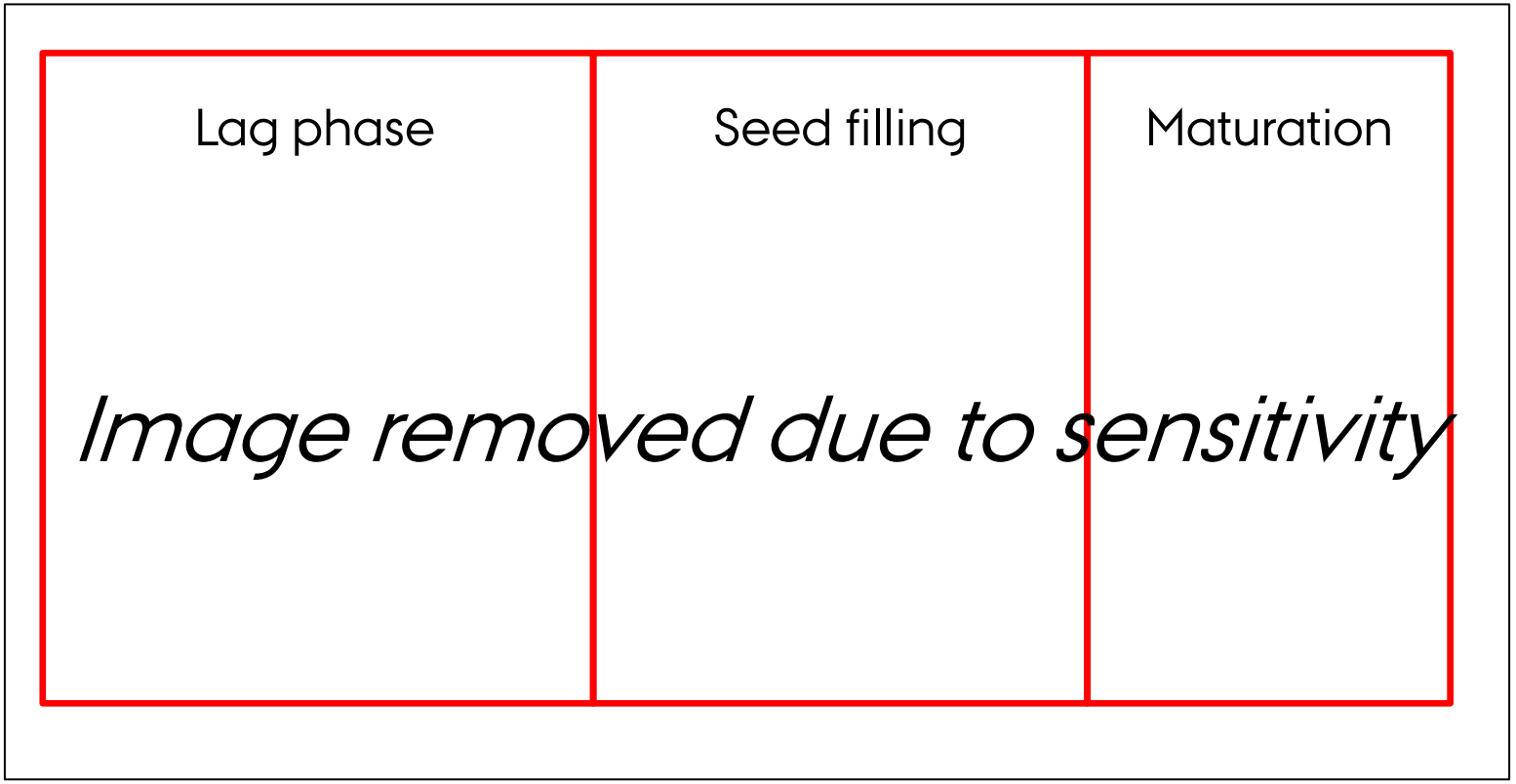
› New mutli-spectral imaging potential

› Still to be ”fully” explained with science

Image removed due to sensitivity

SEED DEVELOPMENT – BUT…

› Can we see similar groupings? Looks very promising



DISCUSSION AND QUESTIONS

- Need for development of early seed development models in perennial ryegrass
- Yet what we see follows classic seed development models
- Only after, can we impose different environmental/ agronomic factors to observe effects of said factors
- Multi-spectral imaging offer a rapid method for assessing seed development