GRAIN WEIGHT DETERMINATION IN CONTRASTING HYBRIDS OF MAIZE

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INTRODUCTION

- In maize, unlike in wheat and barley, grain growth seems to be clearly source-limited as reductions in assimilate availability during post-silking produces parallel reductions in final grain weight.
- High temperature also reduced grain weight, though the causes have been scarcely studied under field conditions.
- A plausible hypothesis in maize may be that, as high temperatures accelerates leaf senescence, the negative effect on final grain weight would operate through reductions in assimilate availability.
- If the hypothesis is right, under the expected increased temperatures in the near future breeding would need to identify sources of reduced senescence response to increased temperatures.

The **AIM** of this study was to determine the nature off the negative effect of high temperatures on maize grain weight

MATERIALS AND METHODS

We carried out field experiments combining **two contrasting hybrids** with **defoliations** in a **cool** (Algerri, Ebro Valley) and a **warm location** (La Seu d'Urgell, in the Pyrenees) and **two contrasting N** conditions.

Hybrids: Pioneer 31N28, long cycle (FAO 700) with large grains; Lapopi, short cycle (FAO 450) with small grains

Defoliation: Undefoliated control; Defoliated 15 days post-silking

N-fertilisation: Unfertilised control; 200 KgN ha^{-1}

In Algerri there were two extra treatments: **normal field or increased temperatures**. The latter was achieved by placing a structure with transparent polyethylene over the canopy from 15 days post-silking onwards.

RESULTS

Expectedly, under control conditions Pioneer 31N28 had heavier grains than Lapopi

		Average grain weight (mg grain^{-1})	
		Pioneer	Lapopi
Algerri	N200	283.83±14.96	230.19±6.40
	N0	259.02±12.47	199.86±14.21
Seu d'Urgell	N200	262.20±10.95	224.25±17.69
	N0	259.41±9.30	234.64±8.44

Also expectedly, increased temperatures during grain filling reduced grain weight in both hybrids

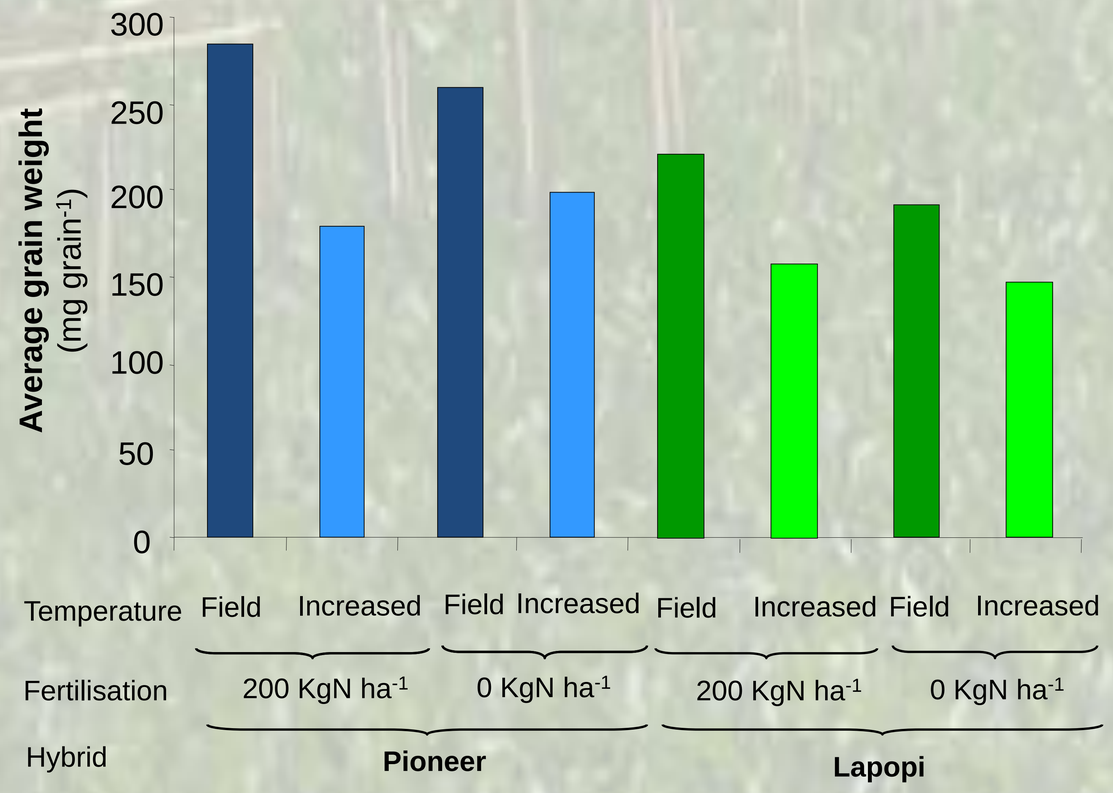

Figure 1. Average grain weight for the ambient temperature (Field) and the increased temperature (Increased) by placing the chamber over the plots for the two nitrogen availabilities and the two contrasting hybrids in Algerri.

Defoliation under all conditions markedly reduced grain weight, and imposing high temperatures reduced grain weight even more markedly under all conditions tested.

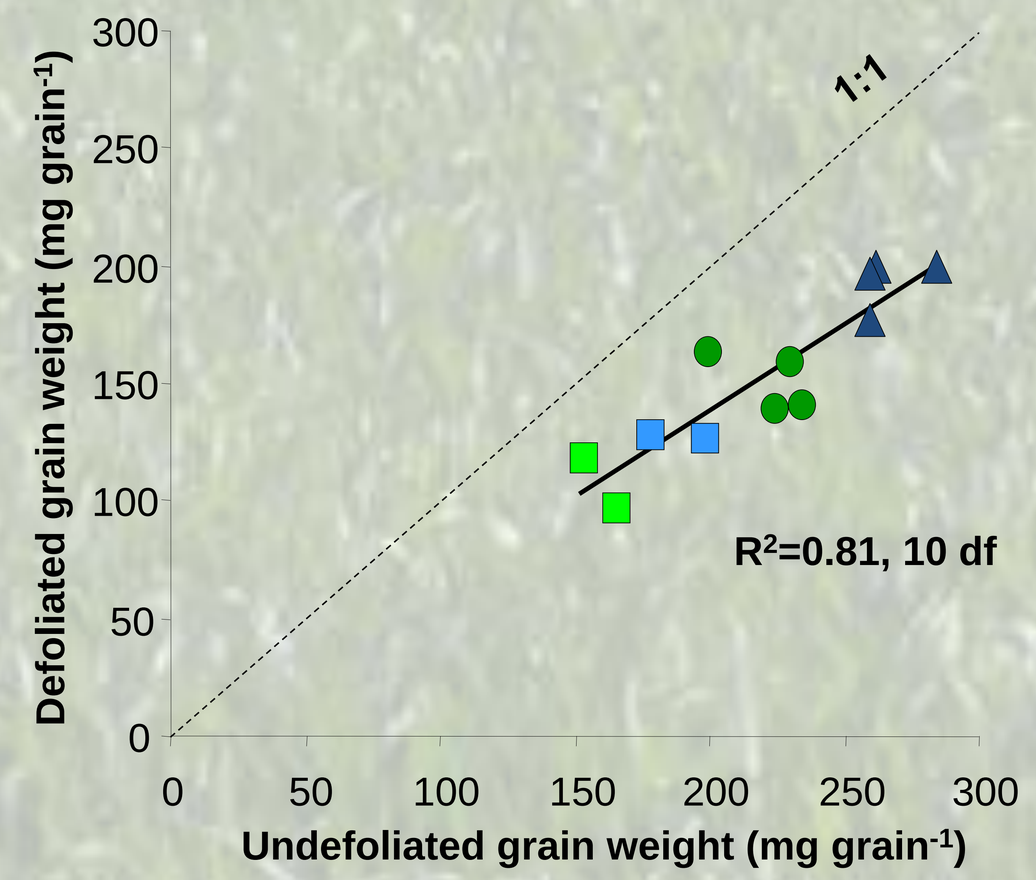

Figure 2. Grain weight for defoliated and control treatments for the two nitrogen availabilities, the two contrasting hybrids (triangles and blue squares, Pioneer and circles and green squares, Lapopi) and the two temperatures regimes (increased with chamber, squares and ambient field temperature, circles and triangles). Dashed line represents 1:1 ratio.

As there was a slight trend to increase the magnitude of the response to defoliation with grain size in un-defoliated plants, the slope of the relationship between grain weight in defoliated vs. un-defoliated plants was smaller than 1 (0.74±0.12).

CONCLUSION

It seems that high temperature effect in grain size might have been direct on the capacity of the grains than indirect through accelerating senescence; otherwise the restriction imposed by defoliation should have been more drastic on grain size in the heated than in the ambient temperature plots.

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