

Is winter rapeseed limited by the source of assimilates during grain filling?

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Introduction

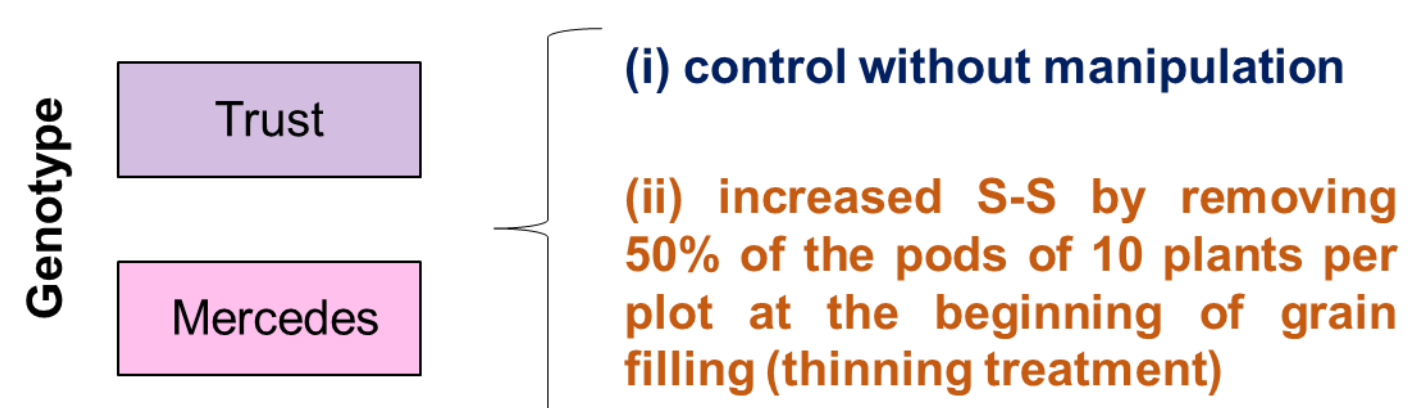
For the future improvement of yield and production of rapeseed is a key to answer if grain and oil yields of this crop limited by the source of assimilates during grain filling. Controversial results have been reported in the literature (1, 2), therefore, the study of whether the source or the sink limit grain filling of rapeseed is a clue for breeding and management strategies to increase grain and oil yields of rapeseed.

Objectives

- To evaluate the sensitivity of thousand kernel weight (TKW) and oil content to different source-sink ratios (S-S) after flowering of winter rapeseed, regarding that winter hybrids are widely sown in Chile and other countries.

Materials and Methods

Two winter hybrids (NPZ-Lembke, Germany) were evaluated at field conditions in Valdivia, Chile (39°47'S, 73°14'W). The experiment was sown on June 6 (2017) in a Duric Hapludand soil. Two S-S treatments were carried out to assess the responses of TKW and kernel oil concentration.



Plots were arranged in a randomized block design. The experiment was fertilized, irrigated and well-managed.



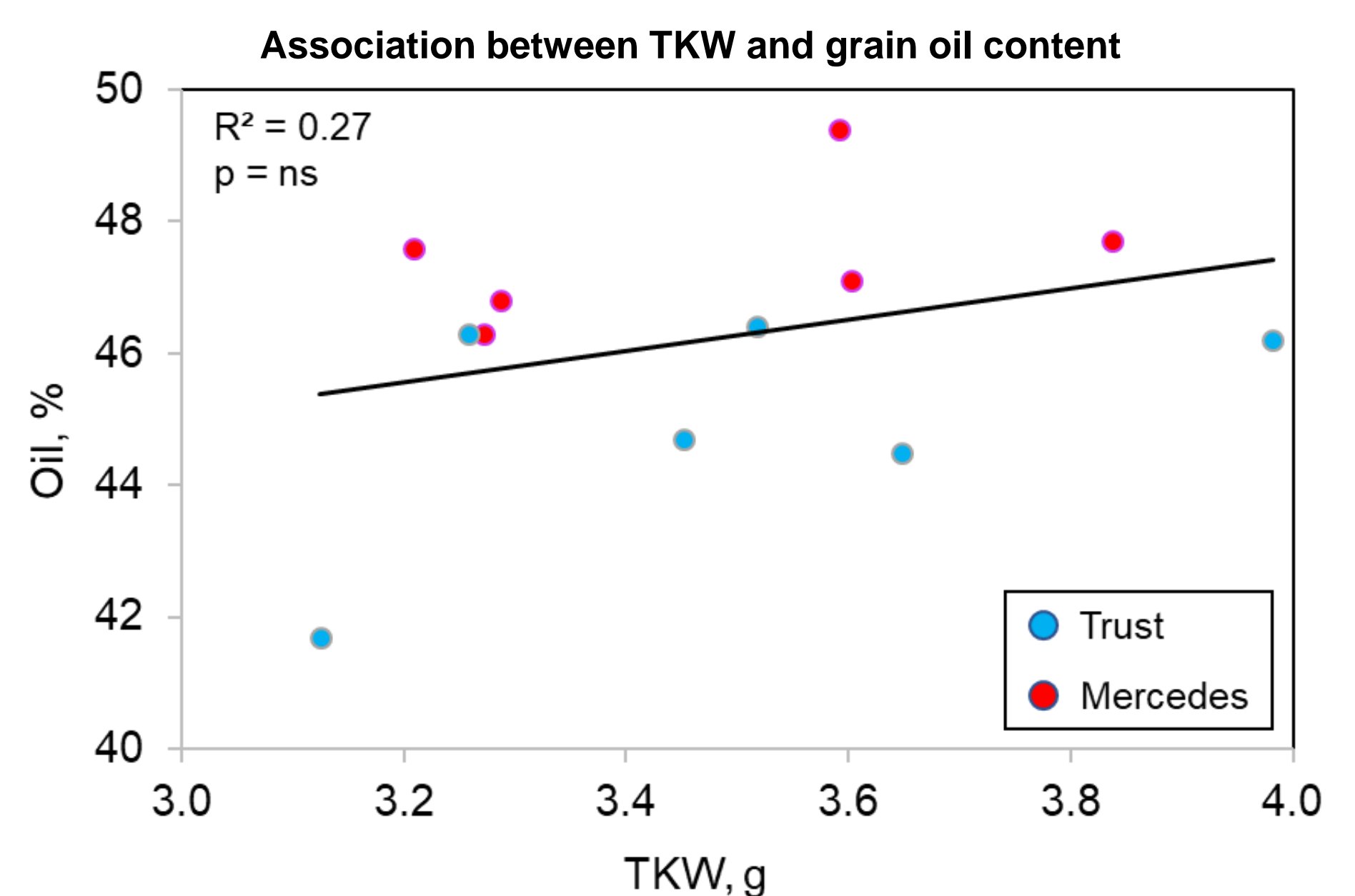
Results

Thinning decreased ($P < 0.01$) as expected kernel number, between 20 and 39%. On the contrary, TKW increased ($P < 0.05$) moderately from 6 to 12% over the control. As a consequence, grain yield per plant recorded under thinning achieved lower values ($P < 0.05$) than the control by 16-31%. Interestingly, changes in grain yield due to the increased S-S ratio was mainly due to kernel number decrease.

Genotype	Thinning	Grain yield (Mg ha ⁻¹)	KN (10 ³ m ⁻²)	TKW (g)	Oil (%)
Trust	Control	3.2 ± 0.7	97 ± 20	3.3 ± 0.2	44.2 ± 2.3
	Thinning	2.2 ± 0.7 ↓ -31%	59 ± 18 ↓ -39%	3.7 ± 0.3 ↑ 12%	45.7 ± 1.0 ↑ 3%
Mercedes	Control	4.0 ± 0.5	119 ± 18	3.4 ± 0.2	47.0 ± 0.7
	Thinning	3.4 ± 0.3 ↓ -16%	95 ± 11 ↓ -20%	3.6 ± 0.3 ↑ 6%	48.0 ± 1.3 ↑ 2%
G	*	*	NS	*	
T	*	*	*	NS	
G x T	NS	NS	NS	NS	

Mean ± standard deviation. Statistical differences were tested by ANOVA. Asterisks indicate significant differences between treatments at * $P < 0.05$

Kernel oil content was not affected ($P > 0.05$) by the S-S treatments, reaching oil concentrations of 45.6 ± 2.2% (control) and 46.8 ± 1.6% (thinning). In addition, no association between grain oil content and TKW was found in the experiment.



Conclusions

Winter rapeseed is scarcely limited by the source or at the most, this crop is co-limited by the source and sink.

References:

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- Zhang, H., Flottmann, S., 2018. Source-sink manipulations indicate seed yield in canola is limited by source availability. *Eur J Agron* 96, 70-76.

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